Building an evidence base for skills development training for cancer clinicians to support lifestyle behaviour change and self-management with cancer survivors

Prof David French, Dr Ellinor Olander, Stefanie Williams, Helen Fletcher, Lou Atkinson, & Dr Andy Turner

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Applied Research Centre in Health & Lifestyle Interventions, Faculty of Health & Life Sciences, Coventry University
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Further information
Any comments or enquiries regarding this report are welcome. Please contact Prof David French, Applied Research Centre in Health and Lifestyle Interventions, Coventry University; david.french@coventry.ac.uk
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                        Health Services Research Institute  
                        University of Warwick

Prof Robert West     Professor of Health Psychology  
                        Department of Epidemiology and Public Health  
                        University College London

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                        School of Psychology  
                        University of Southampton
Summary of findings

- The technique of “facilitate social comparison” appears particularly promising in promoting physical activity. Other techniques which currently have the strongest evidence base for increasing physical activity are: action planning, goal setting (behaviour), prompt self-monitoring of behaviour, provide feedback on performance, provide information on the consequences of behaviour in general, provide rewards contingent on effort or progress towards behaviour, and time management.

- The evidence base is weaker for promoting healthy eating, and so conclusions should be treated with caution. However, techniques which should be considered as good candidates for inclusion in future interventions: relapse prevention/ coping planning, use of follow-up prompts, prompt use of imagery, barrier identification/ problem solving, and plan social support/ social change, as well as those techniques identified by Michie et al (2009).

- Many advantages of using eLearning technologies were cited, including low cost if used for training many people, potentially large reach, convenience, and increased feasibility compared to face-to-face training.

- Major disadvantage of using eLearning technologies cited were that it was thought to not be well suited to producing skilled performance, as opposed to increasing knowledge, or basic skills. Further, it involves more set-up costs than traditional approaches to training.

- The four different models of “eLearning plus” received the most support, where practitioners are trained to deliver a basic intervention, which involves initiating a conversation with a view to referring patients to other services. Options discussed included a booklet or manual which delivers an intervention, a website which delivers the intervention, or to an existing service, e.g. the NHS stop smoking service.

- Although not the focus of the questions asked during the interviews with experts, a common view was that health behaviour change interventions may not best be delivered by cancer clinicians. This was a major reason why there was enthusiasm for “eLearning plus”.

- Websites which deliver health behaviour change interventions were thought to be more likely to effect behaviour change than interventions delivered by cancer clinicians.
Background

There is evidence to support the conclusion that a healthy lifestyle after cancer treatment, including physical activity and healthy eating, is linked to improved physical and psychological well-being (Davies, Thomas & Batehup, 2010). For example, a recent review including 82 studies, found large effects of physical activity interventions on upper and lower body strength and breast-cancer specific concerns and small to moderate effects on aerobic fitness, overall quality of life and fatigue in cancer survivors (Speck et al, 2011). In addition, a recent Macmillan Cancer Support report concluded that there is growing evidence that physical activity is important for cancer patients at all stages of the cancer care pathway (Anonymous, 2011). There is also some evidence that diets that have adequate vegetables, fruit, whole grains, and low-fat dairy foods and that are low in saturated fat may help to lower overall disease risk in breast cancer patients (Rock & Demark-Wahnefried, 2002).

We can be confident that well designed behaviour change interventions lead to sustainable changes in lifestyle behaviour. There is systematic review evidence that physical activity interventions can produce changes in physical activity for at least 6 months (Foster, Hillsdon & Thorogood, 2009). Similarly, a systematic review of interventions to promote walking concluded that the most successful can produce increases of between 30 to 60 minutes a week (Ogilvie et al, 2007).

There has been a recent increase in understanding of the mechanisms by which behaviour change interventions produce their effects. In a systematic review examining which intervention techniques were associated with greater changes in physical activity and healthy eating, the technique of prompting self-monitoring of behaviour was associated with improved outcomes (Michie et al, 2009). Further improvements in behaviour change were found when at least one of the following techniques was also used: prompt intention formation, prompt specific goal setting, prompt review of behavioural goals, and providing feedback on behaviour (Michie et al, 2009). Goal setting was in particular highlighted as an important behaviour change technique when encouraging cancer survivors to increase their walking (Knols et al, 2010). Further, the importance of self-monitoring of physical activity behaviour was also supported by the systematic review by Bravata et al (2007), which concluded that the use of pedometers as an intervention leads to increased physical activity. These techniques, which have been shown to be effective at increasing physical activity and healthy eating, are all central to self-regulatory theories of behaviour change, such as Social Cognitive Theory (Bandura, 1986).

Social Cognitive Theory proposes that the key mechanism by which much behaviour change occurs is by increasing self-efficacy. Self-efficacy has been defined as ‘the belief in one’s capabilities to organise and execute the courses of action required to produce given attainments’ (Bandura, 1997). Increasing self-efficacy can be brought about by many routes, e.g. by goal setting (Bodenheimer & Handley, 2009). There is good evidence that self-efficacy has a causal role in many behaviours: changes in beliefs about one's
capabilities result in subsequent changes in that behaviour (Bandura, 1997). For example, a review by Sheeran (unpublished) identified 105 behaviour change interventions which were successful in altering self-efficacy (mean Cohen’s d=0.74), which also had an effect on behaviour (mean Cohen’s d=0.61).

A systematic review we recently conducted supported the idea that self-efficacy is a strong cause of physical activity in healthy populations (Ashford, Edmunds & French, 2010). Our review aimed to identify what intervention techniques were most effective at producing changes in self-efficacy for recreational physical activity. We reliably coded (kappa = 0.83) specific intervention techniques used in each study and related these to changes in physical activity self-efficacy in the same studies (Ashford et al, 2010). We found a very strong association (r=0.69) between the extent to which physical activity interventions produced changes in self-efficacy and changes in physical activity (Williams & French, 2011). That is, those techniques that increased self-efficacy were the same techniques that increased physical activity; techniques that did not increase self-efficacy did not increase physical activity. Further, those techniques found to be effective (e.g. modelling, feedback on behaviour) were infrequently applied compared to those found not to be, e.g. persuasion, barrier identification (Ashford et al, 2010).

These reviews supported our ongoing work in developing and evaluating interventions to increase walking, by identifying those techniques that such interventions should include. We recently developed a 15 minute behaviour change intervention to increase walking amongst the general population, which produced large increases (over 60% change) in walking as objectively assessed by pedometers (Darker et al, 2010). These changes were mediated by increases in walking self-efficacy, i.e. the increases in walking were largest amongst those people for whom the intervention produced the largest changes in walking self-efficacy. Further, the intervention contained many of the techniques that the reviews described above had identified as being effective (e.g. providing feedback on behaviour, prompt specific goal setting) but none of those identified as being ineffective (e.g. persuasion, barrier identification). This large effect on objectively assessed walking has since been replicated (French et al, in press).

Our review was limited, however, in that it only looked at intervention studies of “healthy” adults below the age of 65 years. The results of this review are therefore of uncertain relevance for cancer survivors, who may despite being more engaged with their healthcare, also have additional issues (e.g. fatigue, pain) preventing them from being physically active. Further, the incidence of cancer rises with age, and the majority of cancer survivors are over the age of 65 years. In addition, a recent review concluded that “the mechanism of benefit from diet and physical activity pertains to body weight, with excess body weight being a risk factor, which is modifiable through lifestyle” (Davies, Batehup & Thomas, 2011).

As cancer survivors are likely to be over the age of 65 years, and may benefit from weight reductions, it becomes important to establish which intervention
techniques are most effective for those populations. For instance, an older population may respond to different techniques than those that are effective for younger adults (e.g. social or safety aspects may be more important for older adults, or attention or memory deficits may make some techniques less acceptable). The research presented here therefore extends our previous review (Ashford et al, 2010), by reviewing intervention studies that aim to increase self-efficacy for physical activity and healthy eating. We will include relevant populations that were not covered by our earlier review (Ashford et al, 2010), namely obese people or those seeking weight management, and those over 65 years of age. Based on preliminary scoping, restricting this review solely to intervention studies with cancer survivors will not yield sufficient studies to allow us to identify which behaviour change techniques are effective and which are ineffective. However, by expanding the coverage to include these other relevant populations we will be able to provide a solid evidence base for populations which will have similar barriers to physical activity and healthy eating as cancer survivors.

A major challenge to the effectiveness of behaviour change interventions is that they are not delivered with fidelity to the intervention protocol (Bellg et al, 2004). Consequently, producing training procedures which produce high levels of fidelity of delivery to effective interventions is a key part of the effectiveness of interventions to change behaviour, i.e. getting health professionals to deliver the intervention as intended. To optimise implementation of interventions with fidelity in routine practice, it is important to increase health professionals’ engagement with training. This may be brought about by training for the health professionals including a focus on enhancing their self-efficacy for providing patients with support on lifestyle behaviour change, through structured practice and constructive feedback.

Our ongoing work involving training practice nurses to deliver a walking intervention in primary care has been based on such principles. It has been informed by a systematic review and meta-synthesis of qualitative studies of primary care nurses’ experiences of delivering behaviour change interventions (Taylor et al, 2011). The training has produced high levels of acceptability to nurses who received the training, and high levels of fidelity in consultations delivered in primary care (Taylor, 2011). Fidelity of delivery was assessed by recordings of consultations being reliably coding by 2 independent raters, using a checklist of 20 key nurse behaviours (e.g. assessing current walking, setting goals). These behaviours were specified during the development of nurse training, based on the key elements of the intervention. The fidelity observed in these consultations delivered in primary care was much higher than the usual levels of fidelity such training produces (Bellg et al, 2004). The majority of the specified behaviours were delivered in over 80% of consultations.

**Behaviour change interventions in the present work**

The present work is concerned with interventions to change the behaviours of physical activity and healthy eating. Such interventions are usually, complex and comprise many techniques which often interact (Craig et al, 2008). A “technique” is a component of an overall intervention, designed to bring about
a specific change in the recipient of an intervention. For example, the technique of “providing information about consequences of behaviour” is designed to increase the knowledge and alter outcome expectancies regarding that behaviour. In the present work therefore, an “intervention” is defined as a collection of one or more behaviour change techniques delivered to a participant with the aim of altering their behaviour in a more healthy direction. The first part of the current work is to identify which specific intervention techniques, are linked to changes in self-efficacy or behaviour. The second part of the current work is to elicit the views of experts in health-related behaviour change on how to best train health professionals to deliver an intervention consisting of one or more behaviour change techniques.

There are several constraints on the nature of the intervention the current work informs, which therefore affects the nature of the training for this intervention. It is anticipated that the intervention would take the form of the clinician initially being able to open a discussion about behaviour change. Secondly, they should also assess current levels of behaviour (e.g. by using the GPPAQ) and assess knowledge of how the behaviour relates to cancer risk. This assessment should be used to either reinforce continued good practice, or explore further possibilities for change with the patient, e.g. what this means to them and how they could become more active or eat more healthily. Finally for that consultation, the patient and clinician should agree a way forward. It is anticipated that such an intervention should not take more than 5 to 10 minutes. Further intervention as needed would then be taken at a future time.

With regard to constraints on the training, ideally such training to deliver and intervention, including the necessary knowledge for effective delivery should take place within one full day. Further, it must be amenable to being aligned with the NHS Connected communication skills training. This provides core communication skills within the context of an effective consultation and thus further training for supporting behaviour change can build on this. Finally, due to resource considerations, it should consider promising e-learning technologies, to reduce ongoing training costs, whilst still being effective in encouraging health professionals to deliver behaviour change interventions. Technologies that appear promising include computer-delivered training refresher modules and telephone follow-up to reinforce skills learnt.
Aims and objectives
The overall aim of the current work was to build a robust evidence base to inform opportunistic interventions to promote physical activity and healthy eating amongst cancer survivors, and approaches to training cancer clinicians to support lifestyle behaviour change and self-management with cancer survivors. There is now a consensus that a robust evidence base should underpin the development of all behaviour change interventions (Craig et al, 2006).

The first component of this project was a systematic review of studies which have evaluated interventions designed to increase physical activity and healthy eating by raising participants’ self-efficacy, in people who are obese or are seeking weight management, or those over 65 years of age. The objectives of this review were to identify extent of behaviour change and the specific intervention techniques employed, and examine which techniques are associated with the largest increases in self-efficacy, healthy eating and physical activity, for each sub-population.

The second component of this project was a series of case studies of possible models of training. We developed a series of case studies of possible models of training for those delivering behaviour change interventions, with a focus on the likely feasibility and acceptability of e-learning approaches. The case studies included a discussion of the pro’s and con’s of each promising model of training delivery, including likely efficacy, cost, and acceptability of training to health professionals.

These two components were integrated in the final section of this report, which reports on this evidence base, and which provides a discussion of possible options regarding the design and evaluation of an intervention, and how best to train cancer clinicians to ensure fidelity. It was designed to inform further thinking and discussion about the design and evaluation of an intervention to promote change in physical activity and healthy eating, and how best to train cancer clinicians to provide this intervention.
Methods for systematic review of intervention studies

The same methods were used as were successfully employed in our previous systematic review to establish which techniques raise healthy eating and physical activity self-efficacy in “well” populations under 65 years of age (Ashford et al, 2010; Williams & French, 2011).

Selection criteria

*Types of studies:* Published randomised experimental, non-randomised experimental, quasi-experimental or pre and post intervention studies were included. Studies assessing self-efficacy only as a predictor, qualitative studies, or surveys were excluded. English language only papers were included for pragmatic reasons.

*Type of participants:* Studies which included an adult sample with a mean BMI of at least 30 kg/m², or a sample over 60 years of age. Studies with samples under 18 years old, defined as athletes, or as college, university or school students were excluded.

*Type of intervention:* Lifestyle and recreational physical activity interventions that aimed to increase physical activity self-efficacy. Sport or lab-based studies that did not aim to increase the amount of physical activity but instead focused on competitive sports or fitness were also excluded.

*Type of outcome measures:* The primary outcome measure was self-efficacy for physical activity or healthy eating. To be included in this review the relevant information needed to calculate effect sizes for self-efficacy change should have been available. Thus self-efficacy should have been measured either pre and post intervention, or should have been measured for both intervention and comparison groups at least once following the end of the intervention. When sufficient data was unavailable for effect sizes to be calculated but the study met all other inclusion criteria, the first author of the paper was contacted to elicit this data. The secondary outcome measure was physical activity behaviour, measured by either self-report or objective measurement e.g. pedometers.

Search methods for identification of studies

The SCOPUS and PsycInfo databases were searched on 17th June 2011 using similar search terms as we used in our previous review. Abstracts identified were screened, and those articles that appear most relevant to our research question will be retrieved for full text scrutiny. See flowchart on p11 for more details. See appendix one for details of exact searches used.

Data extraction

Intervention descriptions, supplemented by additional information by study authors where available, were coded using the CALO-RE (Coventry Aberdeen London – Revised) taxonomy for coding techniques for interventions aiming to change physical activity or healthy eating (Michie, Ashford, Sniehotta, Dombrowski, Bishop & French, 2011). This taxonomy is a refinement of the taxonomy produced by Abraham & Michie (2008), and describes 40 distinct techniques to alter these behaviours, and was reliably used in our previous review.
Effect size estimates were calculated for changes in self-efficacy regarding either physical activity or healthy eating, and changes in behaviour itself, where relevant.

Data analysis
Results are reported separately for each of these two populations and behaviours, to examine which techniques appear to be less suitable for use with these different population groups.

Random effects meta-analysis is performed to estimate overall effects of interventions, with moderator analysis using z-scores to examine whether effects differ according to the presence or absence of each behaviour change technique.
Results

Figure 1: Flowchart describing the number of articles retrieved, and included and excluded at each stage of the review process.

Please note that some studies reported data on self-efficacy for both physical activity and healthy eating, hence 80 studies in total. See appendix two for a full list of studies included.
What intervention techniques were used to promote physical activity?

Table one on the following page shows which intervention techniques were used in the 73 studies identified concerning change in self efficacy for physical activity. Definitions of each intervention technique are provided in appendix three.

The most commonly used techniques were "prompt practice" used in 60 interventions, "provide instruction on how to perform the behaviour" (39 interventions), "action planning" (34 interventions), "barrier identification/ problem solving" (33 interventions), "prompt self-monitoring of behaviour" (32 interventions).

What intervention techniques were used to promote healthy eating?

Table two on page 17 shows which intervention techniques were used in the 28 studies identified concerning change in self efficacy for healthy eating. See appendix three for descriptions of each intervention technique.

The most commonly used techniques were "prompt practice", "provide instruction on how to perform the behaviour", and "goal setting (behaviour)", each of which were used in 12 interventions. Also commonly used were "barrier identification/ problem solving" and "stress management/ emotional control training" which were each used in 10 interventions.
<table>
<thead>
<tr>
<th>Technique</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide information on consequences of behaviour in general</td>
<td>23</td>
<td>28.8</td>
</tr>
<tr>
<td>2. Provide information on consequences of behaviour for the individual</td>
<td>11</td>
<td>13.8</td>
</tr>
<tr>
<td>3. Provide information about others’ approval</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4. Provide normative information about others’ behaviour</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>5. Goal setting (behaviour)</td>
<td>26</td>
<td>32.5</td>
</tr>
<tr>
<td>6. Goal Setting (outcome)</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>7. Action planning</td>
<td>34</td>
<td>42.5</td>
</tr>
<tr>
<td>8. Barrier Identification/Problem solving</td>
<td>33</td>
<td>41.3</td>
</tr>
<tr>
<td>9. Set graded tasks</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>10. Prompt review of behavioural goals</td>
<td>14</td>
<td>17.5</td>
</tr>
<tr>
<td>11. Prompt review of outcome goals</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>12. Prompt rewards contingent on effort or progress towards behaviour</td>
<td>15</td>
<td>18.8</td>
</tr>
<tr>
<td>13. Provide rewards contingent on successful behaviour</td>
<td>6</td>
<td>7.5</td>
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<tr>
<td>14. Shaping</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15. Prompting generalisation of a target behaviour</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>16. Prompt self-monitoring of behaviour</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>17. Prompt self-monitoring of behavioural outcome</td>
<td>8</td>
<td>10</td>
</tr>
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</tr>
<tr>
<td>18. Prompting focus on past success</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>19. Provide feedback on performance</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>20. Provide information on where and when to perform the behaviour</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. Provide instruction on how to perform the behaviour</td>
<td>39</td>
<td>48.8</td>
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<tr>
<td>22. Model/demonstrate the behaviour</td>
<td>11</td>
<td>13.8</td>
</tr>
<tr>
<td>23. Teach to use prompts/cues</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. Environmental restructuring</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>25. Agree behavioural contract</td>
<td>7</td>
<td>8.8</td>
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<tr>
<td>26. Prompt practice</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>27. Use of follow up prompts</td>
<td>13</td>
<td>16.3</td>
</tr>
<tr>
<td>28. Facilitate social comparison</td>
<td>9</td>
<td>11.3</td>
</tr>
<tr>
<td>29. Plan social support/social change</td>
<td>11</td>
<td>13.8</td>
</tr>
<tr>
<td>30. Prompt identification as role model/position advocate</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>31. Prompt anticipated regret</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>32. Fear arousal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>33. Prompt self-talk</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>34. Prompt use of imagery</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>35. Relapse prevention/coping planning</td>
<td>19</td>
<td>23.8</td>
</tr>
<tr>
<td>36. Stress Management/emotional control training</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Intervention</td>
<td>Score</td>
<td>Rating</td>
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<td>Motivational interviewing</td>
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<tr>
<td>Time management</td>
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<td>6.3</td>
</tr>
<tr>
<td>General communication skills training</td>
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</tr>
<tr>
<td>Stimulate anticipation of future rewards</td>
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<td>0</td>
</tr>
</tbody>
</table>

See appendix three for descriptions of each intervention technique.
Table 2: Frequency with which each behaviour change techniques was used in the 26 included studies concerning change in self-efficacy for healthy eating

<table>
<thead>
<tr>
<th>Technique</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide information on consequences of behaviour in general</td>
<td>6</td>
<td>19.4</td>
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<tr>
<td>2. Provide information on consequences of behaviour for the individual</td>
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<td>12.9</td>
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<td>3. Provide information about others’ approval</td>
<td>0</td>
<td>0</td>
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<tr>
<td>4. Provide normative information about others’ behaviour</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5. Goal setting (behaviour)</td>
<td>12</td>
<td>38.7</td>
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<tr>
<td>6. Goal Setting (outcome)</td>
<td>6</td>
<td>19.4</td>
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<td>7. Action planning</td>
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<td>3.3</td>
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<tr>
<td>8. Barrier Identification/Problem solving</td>
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<td>32.3</td>
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<tr>
<td>9. Set graded tasks</td>
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</tr>
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<td>10. Prompt review of behavioural goals</td>
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<td>11. Prompt review of outcome goals</td>
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<td>0</td>
</tr>
<tr>
<td>12. Prompt rewards contingent on effort or progress towards behaviour</td>
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<td>9.7</td>
</tr>
<tr>
<td>13. Provide rewards contingent on successful behaviour</td>
<td>1</td>
<td>3.3</td>
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<tr>
<td>14. Shaping</td>
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<td>15. Prompting generalisation of a target behaviour</td>
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<td>21. Provide instruction on how to perform the behaviour</td>
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<td>22. Model/demonstrate the behaviour</td>
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<td>23. Teach to use prompts/cues</td>
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<td>0</td>
</tr>
<tr>
<td>24. Environmental restructuring</td>
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<td>0</td>
</tr>
<tr>
<td>25. Agree behavioural contract</td>
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<td>0</td>
</tr>
<tr>
<td>26. Prompt practice</td>
<td>12</td>
<td>38.7</td>
</tr>
<tr>
<td>27. Use of follow up prompts</td>
<td>5</td>
<td>16.1</td>
</tr>
<tr>
<td>28. Facilitate social comparison</td>
<td>3</td>
<td>9.7</td>
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<tr>
<td>29. Plan social support/social change</td>
<td>4</td>
<td>12.9</td>
</tr>
<tr>
<td>30. Prompt identification as role model/position advocate</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>31. Prompt anticipated regret</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>32. Fear arousal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>33. Prompt self-talk</td>
<td>0</td>
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<tr>
<td>34. Prompt use of imagery</td>
<td>3</td>
<td>9.7</td>
</tr>
<tr>
<td>35. Relapse prevention/coping planning</td>
<td>9</td>
<td>29</td>
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<td>36. Stress Management/emotional control training</td>
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<tr>
<td>37. Motivational interviewing</td>
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<td>38. Time management</td>
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<td>0</td>
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<tr>
<td>39. General communication skills training</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40. Stimulate anticipation of future rewards</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

See appendix three for descriptions of each intervention technique.
What intervention techniques increase self-efficacy for physical activity?

Effects on self-efficacy for physical activity
Overall, the interventions produced mean effect sizes (Cohen's d) of 0.40 on self efficacy for physical activity (N= 10 805, k=80). This is considered as a "small to medium" sized effect, according to Cohen's (1992) criteria, where d=0.2 is considered to be a "small" effect, d=0.5 is considered to be a "medium" effect, and d=0.8 is considered to be a "large" effect.

Table three (column two) on page 24 shows, for each behaviour change technique, the overall mean effect size on self-efficacy where the technique is present and where the technique is absent. The z-score shows where these effect sizes are significantly different.

Thus, where the following techniques were used in an intervention, larger changes in self-efficacy were obtained than where those techniques were not used: "Facilitate social comparison" (p<0.001), "action planning" (p<0.01), "provide information on consequences of behaviour for the individual" (p<0.05), "use of follow up prompts" (p<0.05).

Similarly, where the following techniques were used in an intervention, smaller changes in self-efficacy were obtained than where those techniques were not used: "goal setting (outcome)" (p<0.001), "motivational interviewing" (p<0.001), "provide information on consequences of behaviour in general" (p<0.01), "set graded tasks" (p<0.01), "prompt self-talk" (p<0.01), "barrier Identification/Problem solving" (p<0.05), "prompt rewards contingent on effort or progress towards behaviour" (p<0.05).

Effects on physical activity behaviour
The interventions produced mean effect sizes (Cohen's d) of 0.44 on physical activity behaviour (N=4 604, k=38). (Note that for 42 interventions, effects on self-efficacy but not on behaviour were reported.) This is considered as a "small to medium" sized effect, according to Cohen's (1992) criteria, where d=0.2 is considered to be a "small" effect, d=0.5 is considered to be a "medium" effect, and d=0.8 is considered to be a "large" effect.

Table three (column three) shows, for each behaviour change technique, the overall mean effect size on physical activity where the technique is present and where the technique is absent. The z-score shows where these effect sizes are significantly different.

Thus, where the following techniques were used in an intervention, larger changes in physical activity are obtained than where those techniques were not used: "time management", "goal setting (behaviour)", "barrier identification/ problem solving", "provide rewards contingent on effort or progress towards behaviour", "prompt practice", "relapse prevention/ coping planning" (all p<0.001), "prompt self-monitoring of behavioural outcome", "facilitate social comparison", "stress management/ emotional control training" (all p<0.01), and "teach to use prompts/ cues", "agree behavioural contract", "provide information on the consequences of behaviour in general", "prompt
self-monitoring of behaviour”, "provide feedback on performance”, "plan social support/ social change” (all p<0.05).

Similarly, where the following techniques were used in an intervention, smaller changes in physical activity were obtained than where those techniques were not used: "motivational interviewing" and "provide instruction on how to perform the behaviour" (both p<0.01).

Association between change in self efficacy and change in physical activity
There was not a significant association between the extent to which interventions produced change in self-efficacy and changes in physical activity (r=0.08, p=0.69, N=26). That is, those techniques that increased self-efficacy were not necessarily the same techniques that increased physical activity. This result contrasts starkly with those of our previous review, where we found a very strong association (r=0.69) between changes in self-efficacy and changes in physical activity (Williams & French, 2011).

One possible reason for this is that there was much more heterogeneity of results in the present study. In the present study, only 36% of the variance in physical activity behaviour and 46% of the variance in self-efficacy could be attributed to sampling error (i.e. chance) alone. The remainder of the variance is due to systematic differences between studies. This contrasts with the results of our previous review, where 45% of the variance in physical activity behaviour and 68% of the variance in self efficacy could be attributed to sampling error alone.

Alternatively, it may be that increasing self-efficacy is not as effective at changing physical activity for older, ill and obese populations as it is for younger, healthy populations. This result is not in accordance with the results of previous individual studies (Schwarzer & Renner, 2000).

Which behaviour change techniques should be used?
Taking these results as a whole, the technique of "facilitate social comparison" was associated with larger increases in both self-efficacy and physical activity behaviour, as it was in the previous Williams and French (2011) review. Other techniques were associated with increases in either self-efficacy or physical activity behaviour in the present study, and were also found to be effective in changing both self-efficacy and physical activity behaviour in our previous review (Williams & French, 2011) or behaviour in the review of Michie et al (2009): action planning, goal setting (behaviour), prompt self-monitoring of behaviour, provide feedback on performance, provide information on the consequences of behaviour in general, provide rewards contingent on effort or progress towards behaviour, and time management. These techniques are therefore those which currently have the strongest evidence base.
What intervention techniques increase self-efficacy for healthy eating?

**Effects on self-efficacy for healthy eating**

Overall, the interventions produced mean effect sizes (Cohen's d) of 0.39 on self-efficacy for healthy eating (N= 3,788, k=31). This is considered as a "small to medium" sized effect, according to Cohen's (1992) criteria, where d=0.2 is considered to be a "small" effect, d=0.5 is considered to be a "medium" effect, and d=0.8 is considered to be a "large" effect.

Table four (column two) on page 28 shows, for each behaviour change technique, the overall mean effect size on self-efficacy where the technique is present and where the technique is absent. The z-score shows where these effect sizes are significantly different.

Thus, where the following techniques were used in an intervention, larger changes in self-efficacy are obtained than where those techniques were not used: "relapse prevention/ coping planning" (p<0.01), "use of follow-up prompts" (p<0.05), "prompt use of imagery" (p<0.05).

Similarly, where the following techniques were used in an intervention, smaller changes in self-efficacy are obtained than where those techniques were not used: "model/ demonstrate the behaviour" (p<0.001), "goal setting (behaviour)" (p<0.05), "prompt review behavioural goals" (p<0.05), "prompt self-monitoring of behaviour" (p<0.05).

**Effects on healthy eating behaviour**

The interventions produced mean effect sizes (Cohen's d) of 0.34 on healthy eating behaviour (N= 1,261, k=10). (Note that for 21 interventions, effects on self-efficacy but not on behaviour were reported.) This is considered as a "small to medium" sized effect, according to Cohen's (1992) criteria, where d=0.2 is considered to be a "small" effect, d=0.5 is considered to be a "medium" effect, and d=0.8 is considered to be a "large" effect.

Table four (column three) shows, for each behaviour change technique, the overall mean effect size on healthy eating where the technique is present and where the technique is absent. The z-score shows where these effect sizes are significantly different.

Thus, where the following techniques were used in an intervention, larger changes in healthy eating are obtained than where those techniques were not used: "barrier identification/ problem solving" and "plan social support/ social change" (both p<0.05).

Similarly, where the following techniques are used in an intervention, smaller changes in healthy eating were obtained than where those techniques were not used: "relapse prevention/ coping planning" (p<0.01) and "prompt self-monitoring of behavioural outcomes" (p<0.05).
Effects on self efficacy and effects on healthy eating
There was not a significant association between the extent to which interventions produced change in self-efficacy and changes in healthy eating ($r=0.20$, $p=0.54$, $n=12$). That is, those techniques that increased self-efficacy were not necessarily the same techniques that increased healthy eating. This result contrasts with those of our previous review, where we found a very strong association ($r=0.69$) between changes in self-efficacy and changes in physical activity (Williams & French, 2011).

One possible reason for this is that there was much more heterogeneity of results in the present study. In the present study, only 25% of the variance in healthy eating behaviour and 43% of the variance in self-efficacy could be attributed to sampling error (i.e. chance) alone. The remainder of the variance is attributable to systematic differences between studies, such as the nature of the interventions and measures employed.

Alternatively, it may be that increasing self-efficacy is not as effective at changing healthy eating for older, ill and obese populations as it is for changing physical activity in younger, healthy populations.

Which behaviour change techniques should be used?
Taking these results as a whole, no techniques were associated with larger increases in both self-efficacy and healthy eating. There were also no techniques which were associated with increases in either self-efficacy or healthy eating behaviour in the present study, and were also found to be effective in changing both self-efficacy and physical activity behaviour in our previous review (Williams & French, 2011) or behaviour in the review of Michie et al (2009). Given this, and the smaller number of studies included for healthy eating ($N=28$) compared with physical activity ($N=73$), these results should be treated with more caution, and any conclusions should be more tentative.

However, the following techniques were found to be effective in the present review at changing self-efficacy or healthy eating behaviour, and should be considered as good candidates for inclusion in future interventions: relapse prevention/ coping planning, use of follow-up prompts, prompt use of imagery, barrier identification/ problem solving, and plan social support/ social change. Other techniques which should be considered are those identified by Michie et al (2009): prompt self-monitoring of behaviour, prompt intention formation, prompt specific goal setting, prompt review of behavioural goals, and providing feedback on behaviour.
Table 3: Effect size estimates for self-efficacy and physical activity, according to whether specific techniques are included in the intervention to change physical activity or not

<table>
<thead>
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<th>Technique</th>
<th>Self-efficacy</th>
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<th>Physical Activity</th>
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</thead>
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<td>Present</td>
<td>Not present</td>
<td>Present</td>
<td>Not present</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>K</td>
<td>d</td>
<td>n</td>
</tr>
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<td>1. Provide information on consequences of behaviour in general</td>
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<td>23</td>
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<td>3. Provide information about others' approval</td>
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<tr>
<td>4. Provide normative information about others' behaviour</td>
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<td></td>
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<td></td>
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<tr>
<td>5. Goal setting (behaviour)</td>
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<td>6. Goal Setting (outcome)</td>
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<td>8393</td>
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<td>7. Action planning</td>
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<td>0.43</td>
<td>5723</td>
</tr>
<tr>
<td>8. Barrier Identification/Problem solving</td>
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<td>0.34</td>
<td>5952</td>
</tr>
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<td>9. Set graded tasks</td>
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<td>0.26</td>
<td>9080</td>
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<td>14</td>
<td>0.34</td>
<td>8988</td>
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<td>11. Prompt review of outcome goals</td>
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</tr>
<tr>
<td>12. Prompt rewards contingent on effort or</td>
<td>1270</td>
<td>15</td>
<td>0.29</td>
<td>9535</td>
</tr>
<tr>
<td></td>
<td>progress towards behaviour</td>
<td></td>
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<tr>
<td>13.</td>
<td>Provide rewards contingent on successful behaviour</td>
<td>889</td>
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<td>14.</td>
<td>Shaping</td>
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<td>Prompting generalisation of a target behaviour</td>
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<td>Prompt self-monitoring of behaviour</td>
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<td>Prompt self-monitoring of behavioural outcome</td>
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<td>18.</td>
<td>Prompting focus on past success</td>
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<tr>
<td>19.</td>
<td>Provide feedback on performance</td>
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<tr>
<td>20.</td>
<td>Provide information on where and when</td>
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<td></td>
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<td>1289 11 0.34 9516 69 0.39 0.77</td>
<td>264 4 0.47 10541 76 0.38 0.73</td>
<td>924 7 0.41 9881 73 0.37 0.43</td>
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</tr>
<tr>
<td>31.</td>
<td>Prompt anticipated regret</td>
<td>464</td>
<td>4</td>
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<tr>
<td>32.</td>
<td>Fear arousal</td>
<td></td>
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<tr>
<td>33.</td>
<td>Prompt self-talk</td>
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<td>19</td>
<td>0.36</td>
</tr>
<tr>
<td>34.</td>
<td>Prompt use of imagery</td>
<td>407</td>
<td>4</td>
<td>0.41</td>
</tr>
<tr>
<td>35.</td>
<td>Relapse prevention/coping planning</td>
<td>1212</td>
<td>4</td>
<td>0.14</td>
</tr>
<tr>
<td>36.</td>
<td>Stress Management/emotional control training</td>
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</tr>
<tr>
<td>37.</td>
<td>Motivational interviewing</td>
<td></td>
<td></td>
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<tr>
<td>38.</td>
<td>Time management</td>
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<tr>
<td>39.</td>
<td>General communication skills training</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>40.</td>
<td>Stimulate anticipation of future rewards</td>
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</table>

*p<0.05, **p<0.05, ***p<0.001
See appendix three for descriptions of each intervention technique.
Table 4: Effect size estimates for self-efficacy and healthy eating, according to whether specific techniques are included in the intervention to change healthy eating or not

<table>
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<th>Technique</th>
<th>Self-efficacy</th>
<th>Physical Activity</th>
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<tbody>
<tr>
<td></td>
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<td>Not present</td>
</tr>
<tr>
<td></td>
<td>n  K  d  n  k  d</td>
<td></td>
</tr>
<tr>
<td>1. Provide information on consequences of behaviour in general</td>
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<td></td>
</tr>
<tr>
<td>2. Provide information on consequences of behaviour for the individual</td>
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<tr>
<td>3. Provide information about others' approval</td>
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<td>4. Provide normative information about others' behaviour</td>
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</tr>
<tr>
<td>5. Goal setting (behaviour)</td>
<td>1983 12 0.34 1805 19 0.48 1.97*</td>
<td>765 5 0.31 496 5 0.40 0.73</td>
</tr>
<tr>
<td>6. Goal Setting (outcome)</td>
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<td>7. Action planning</td>
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<tr>
<td>8. Barrier Identification/Problem solving</td>
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<td>9. Set graded tasks</td>
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<td>10. Prompt review of behavioural goals</td>
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<tr>
<td>11. Prompt review of outcome goals</td>
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<tr>
<td>12. Prompt rewards contingent on effort or</td>
<td>346 3 0.34 3442 28 0.40 0.57</td>
<td>146 2 0.39 1115 8 0.33 0.29</td>
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</table>
progress towards behaviour

13. Provide rewards contingent on successful behaviour

14. Shaping

15. Prompting generalisation of a target behaviour

16. Prompt self-monitoring of behaviour

17. Prompt self-monitoring of behavioural outcome

18. Prompting focus on past success

19. Provide feedback on performance

20. Provide information on where and when

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<td>Value 2</td>
<td>p Value 2</td>
<td>Value 3</td>
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<td>21.</td>
<td>Provide instruction on how to perform the behaviour</td>
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<td>2166</td>
<td>0.36</td>
<td>1.29</td>
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<td>3149</td>
<td>0.42</td>
<td>4.01***</td>
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<td>Teach to use prompts/cues</td>
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<td>Agree behavioural contract</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>26.</td>
<td>Prompt practice</td>
<td>1794</td>
<td>0.39</td>
<td>1994</td>
<td>0.39</td>
<td>0.02</td>
<td></td>
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</tr>
<tr>
<td>27.</td>
<td>Use of follow up prompts</td>
<td>728</td>
<td>0.56</td>
<td>3060</td>
<td>0.37</td>
<td>2.22*</td>
<td></td>
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<tr>
<td>28.</td>
<td>Facilitate social comparison</td>
<td>673</td>
<td>0.48</td>
<td>3115</td>
<td>0.38</td>
<td>1.12</td>
<td></td>
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<tr>
<td>29.</td>
<td>Plan social support/social change</td>
<td>587</td>
<td>0.40</td>
<td>3201</td>
<td>0.39</td>
<td>0.20</td>
<td></td>
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<tr>
<td>30.</td>
<td>Prompt identification as role model/position advocate</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>31. Prompt anticipated regret</td>
<td>136</td>
<td>3</td>
<td>0.71</td>
<td>3652</td>
<td>28</td>
<td>0.37</td>
<td>1.89*</td>
<td></td>
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<tr>
<td>32. Fear arousal</td>
<td>1240</td>
<td>9</td>
<td>0.53</td>
<td>2548</td>
<td>22</td>
<td>0.33</td>
<td>2.84**</td>
<td></td>
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<tr>
<td>33. Prompt self-talk</td>
<td>602</td>
<td>10</td>
<td>0.34</td>
<td>3186</td>
<td>21</td>
<td>0.36</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>34. Prompt use of imagery</td>
<td>222</td>
<td>2</td>
<td>0.14</td>
<td>1039</td>
<td>8</td>
<td>0.43</td>
<td>2.80**</td>
<td></td>
</tr>
<tr>
<td>35. Relapse prevention/coping planning</td>
<td>310</td>
<td>3</td>
<td>0.40</td>
<td>951</td>
<td>7</td>
<td>0.37</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>36. Stress Management/emotional control training</td>
<td>310</td>
<td>3</td>
<td>0.40</td>
<td>951</td>
<td>7</td>
<td>0.37</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>37. Motivational interviewing</td>
<td>310</td>
<td>3</td>
<td>0.40</td>
<td>951</td>
<td>7</td>
<td>0.37</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>38. Time management</td>
<td>310</td>
<td>3</td>
<td>0.40</td>
<td>951</td>
<td>7</td>
<td>0.37</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>39. General communication skills training</td>
<td>310</td>
<td>3</td>
<td>0.40</td>
<td>951</td>
<td>7</td>
<td>0.37</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>40. Stimulate anticipation of future rewards</td>
<td>310</td>
<td>3</td>
<td>0.40</td>
<td>951</td>
<td>7</td>
<td>0.37</td>
<td>0.22</td>
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</tr>
</tbody>
</table>

*p<0.05, **p<0.05, ***p<0.001

See appendix three for descriptions of each intervention technique.
Methods for development of training case studies

Participants
Interviews were conducted with leading figures in the field of health behaviour change, with particular expertise in training health professionals, as were people with expertise in designing behaviour change interventions using eLearning methods. A total of eight people were interviewed, several of whom had extensive expertise in designing health behaviour change interventions and training health professionals using eLearning methods. After eight interviews, it became apparent that there was convergence in views regarding which possible technological approaches were feasible, and what the interviewees considered unlikely to result in sustained change in clinician behaviour.

Interview topic guide
The interview topic guide was informed by previous work (Davies & Batehup, 2010). Interviewees were asked to discuss their experience and knowledge of using any models of training with health professionals, and to identify other promising models which have been used, or are currently being considered.

The overall aim was to elicit views on the merits of different methods of training health professionals against a number of criteria. The criteria were derived from the health behaviour change competency framework of Dixon and Johnston (2010) recommended by a recent Macmillan report (Davies & Batehup, 2010), as follows:

- Mode of delivery, including promising e-learning approaches
- How amenable the training model is to being integrated into the NHS Connected communication skills training
- Cost
- Likely efficacy to produce acceptable fidelity
- Acceptability of training to health professionals.
- Required training components (e.g. clinician self-efficacy, modelling, feedback, etc.)
- Training intensity (e.g. length, timing, duration, potential need for refreshers and follow-up)
- Intended clinician outcomes (e.g. enhanced skills, increased self-efficacy, greater use of skills, ‘activation’ to endorse behaviour change, etc.)

Semi-structured interviews were employed, to allow participants freedom to communicate their idiosyncratic experiences of developing and evaluating methods for training health professionals. The topic guide was used as a prompt to ensure that views on all the criteria listed above were elicited for each model of training discussed.

Procedure
All participants were interviewed by Prof French or Dr Olander. All interviews were taped, and extensive concurrent notes made.
Analysis
The participants’ views on each training model identified were evaluated against a number of criteria to assess their suitability for training clinicians to deliver a health behaviour change interventions that can be integrated into everyday practice and consultations with patients. The aim of the analysis were therefore to faithfully summarise these views, giving more weight to those participants who had most expertise for each criterion. Thus, the analysis shared similarities with framework analysis (Ritchie & Spencer, 1994).

Based on this analysis, a series of case studies of training models that have been applied to training clinicians to deliver health behaviour change interventions were developed. In carrying out this work, it became clear that the criteria of feasibility/ cost, likely efficacy to produce acceptable criteria, and acceptability to health professionals were seen as the most important to those people interviewed. The results reported below therefore focuses on these criteria, to faithfully reflect the views expressed.
Results

Eight people with expertise in eHealth and/ or eLearning were interviewed, several of whom were also experts in behaviour change, and three of whom had considerable experience of using eLearning to deliver such training. It should be noted that there was not a single consensual view about using internet-based methods for training health professionals to deliver behaviour change interventions: the differing areas of expertise lead to a wide coverage of possibilities, rather than convergence around a common view. Where there are diverging views, greater weight will be given to the views expressed by those people with the most relevant expertise and experience.

The results will be described for three broad categories of eLearning approaches to training health professionals:

- Using E-Learning to increase knowledge
- Using E-Learning only to prepare health professionals to deliver interventions
- Using E-Learning in conjunction with other modes of intervention delivery

Once this overall pattern of views is described, then observations made about the various platforms available to support eLearning will be reported. Finally, observations made about assessing knowledge and skills relevant to intervention delivery will be made.

Using E-Learning to increase knowledge

There was a clear consensus that using eLearning technologies are a very effective way of increasing knowledge. These technologies are commonly used in educational settings for this purpose.

Despite this, increasing knowledge was seen by these participants as not sufficient to bring about skilled performance, such as successful delivery of behaviour change techniques. Increasing knowledge may, however, be a useful basis for further training, as it was felt that there was often a minimum level of knowledge that a professional delivering behaviour change interventions should possess, to be able to respond adequately to questions (e.g. about physical activity or diet recommendations). E-learning technologies also allow people to be tested as they go along, which may be useful in ensuring practitioners have a basic level of knowledge before progressing to more advanced skills learning.

The advantages cited of using eLearning technologies to increase knowledge were low cost if used for training many people, potentially large reach, they allow people to go at their own pace, and thereby can take into account existing knowledge. The other main advantage cited is that such learning can be enjoyable, with people able to skip through material they are familiar with, and focus more on unfamiliar material, and experience learning through a variety of media. Convenience was often cited as an advantage of using eLearning technologies, as it does not require clinicians to attend learning events which may involve travelling, scheduling difficulties, cancelling clinics during working hours, or a lack of motivation due to seeing this training as a
low priority. A further advantage of using eLearning technologies is that it is an efficient method of training high volumes of staff, which may be particularly important where there is high turnover.

The main disadvantage cited of using eLearning technologies to increase knowledge was that, although it offers the potential of large reach, it involves more set-up costs than traditional approaches to training. Assuming the training is delivered on a website, it also has issues concerning who will host the software, and who will update it. It also requires that staff have access to PCs, usually with an internet connection. This may not always be possible in clinical settings. A further possible disadvantage is that if clinicians are not motivated with regard to the content of training, it is easier to not engage with it than is the case with face to face training. The use of assessments of knowledge acquired, to receive certification of training completed may be helpful in addressing this problem.

The general approach endorsed was of presenting basic information which trainees move through in a fairly linear fashion, with the option of having optional illustrations, e.g. video clips or sources of evidence available at each step. The view expressed was that although people may often not want to look at examples or evidence, they feel reassured that it is there should they want to consult it.

Using E-Learning only to prepare health professionals to deliver interventions
There was a consensus amongst those with the most relevant experience that using E-learning to train health professionals to deliver behavioural interventions would be unlikely to produce skilled performance, for any behaviour change techniques beyond the most simple. The techniques described above would generally not be considered simple. There was also a consensus that it would also have to be very expensive to be effective.

Training to produce skilled performance should involve being told what to do, being shown what to do, followed by practicing skills, and getting feedback on skilled performance, in an iterative fashion. The view was expressed that eLearning approaches would be suitable for telling practitioners what to do (i.e. increasing declarative knowledge, as described above), as well as showing practitioners what to do, via video clips. However, practicing skills and getting feedback to increase procedural knowledge would present considerable challenges.

Practicing skills and getting feedback, leading to skilled performance, is possible in principle, but would present practical difficulties. For example, practitioners could video themselves, then upload to a central server. They could then receive feedback on their performance, either from a person employed to do this, or from other trainees. An advantage of using other trainees would be that the task of giving feedback, and thereby having to recognise competent and less competent performance, would be a useful part of training. This would involve considerable cost, to co-ordinate this feedback, as well as provide equipment to allow video recording.
A further challenge to practicing skills and getting feedback would be that this would require considerable commitment from practitioners. Not only would they have to agree to take part in training, but also acquire competence at using the relevant software and hardware. Further, they would have to commit to accessing the relevant website on a number of occasions, to record their performance, but also to receive feedback. They would also have to arrange a patient or simulated patient to be available to be recorded.

In sum, whilst it was felt it was possible to train practitioners to deliver health behaviour change interventions, it would be likely to be a complex and expensive process, and require a very high degree of engagement from practitioners. It is probably revealing that this model is the only one which the experts who were interviewed described but have not attempted themselves.

**Using E-Learning in conjunction with other modes of intervention delivery**

The model of eLearning which has been most commonly applied by the experts themselves, and which they were most enthused about is where practitioners are trained using eLearning to deliver a very basic intervention. This intervention is then supplemented in one of a variety of ways.

Four different models of “eLearning plus” were described. For the first three, the practitioners are trained to deliver a basic intervention, which involves initiating a conversation with a view to referring patients to other services. These could be a booklet or manual which delivers an intervention, a website which delivers the intervention, or to an existing service, e.g. the NHS stop smoking service. The advantage of this approach is that it requires comparatively little training and does not involve a major extension of the practitioner role, which should increase acceptability of training to practitioners. Further, where there is high turnover of staff, it is comparatively cheap to provide the small amount of training to practitioners required to produce competent performance, given that the training may have to be repeated for new staff.

**E-learning plus booklet/ manual**

This approach has been taken by interventions such as the Heart Manual, Angina Plan, Stroke Workbook, and Diabetes Manual. Here, the role of clinical staff is mainly to persuade patients with these conditions to use the Manual, which contains the behaviour change material. Clinical staff may prompt patients regarding the use of manuals, and be willing to answer questions during follow-up appointments or telephone calls. The manuals themselves contain tasks aiming to correct misconceptions, get goals or plans, and provide reassurance. There is evidence of some benefit for each of these approaches.

**E-learning plus website**

This approach is an extension of E-learning plus booklet/ manual, to take advantage of technology. This approach has the advantage of being able to include click-through links to provide more information to those patients who
want it, but do not have to be used by those who do not. It can also allow much greater interactivity, e.g. the use of feedback on patients’ self-monitoring of behaviours. The major disadvantage is the initial set-up cost.

**E-learning plus existing services**
This approach involves referral to existing services. This approach has particular merit where there is evidence for the effectiveness of those services (e.g. the NHS Stop Smoking Service). Given that this service has considerable expertise in effecting behaviour change, there seems little worth in duplicating these skills by training cancer clinicians to perform the same service. The key task of cancer clinicians is to initiate the relevant conversation, and refer effectively.

**E-learning plus additional face-to-face training**
The fourth model of “eLearning plus” is where eLearning is used to provide practitioners with basic knowledge and skills, but training in intervention delivery is then performed face-to-face with practitioners. The main advantage of this approach is that it reduces the practical and financial barriers to practitioners being released for face-to-face training, as it provides those elements remotely. Clearly, it does not completely remove practical and financial barriers, as practitioners still need to find some time for face-to-face training. Another potential difficulty with this fourth model is that practitioners have to be sufficiently engaged in the training to access it before the face-to-face training.

**The possible platforms to support eLearning**
The above sections have set out the views on the advantages of eLearning in general. However a number of observations were made about the different software that could be used as a platform for eLearning.

**Traditional websites**
These can vary in complexity, with basic websites being very cheap to build, but more complex websites being possible at additional cost. Typical features include downloadable pdf’s, hyperlinks to external websites, video clips and animations, and assessments. It was noted that this approach can seem quite dull to users.

**Moodle**
This was generally described as the standard platform for eLearning. It is free to use and install, and has a large network of users. It was originally developed for education, and has a focus on interactivity. Given this, it generally focusses on presenting material, providing files to download, submission and grading of assignments, online quizzes, and discussion fora. It is comparatively less flexible than traditional websites, which are built for purposes other than learning and teaching.

**LifeGuide**
This is somewhat similar to Moodle, as it is free software that involves users sharing intervention components they have developed. It was the most enthusiastically endorsed, although it is important to note that it is being used
and promoted by several of the people interviewed. It was specifically designed as a basis for interventions to change behaviour, and therefore focusses on planning and self-monitoring task, and reminders (including automated emails or texts). The main advantage cited compared with Moodle was that it is more flexible in terms of setting up and adjusting in the light of user feedback, requiring less programming skill (although some IT support is necessary). It also has a user network who share intervention components, which can be adjusted by other users to meet their requirements.

**Serious Games**

Serious Games involves elements of role play in a virtual environment. The main advantage was described as being that it is possible to build in challenging situations, which makes people using the Game think about what they would do if such a situation were to arise. It uses previous decisions or information entered to personalise scenarios. This approach has been used to train paramedics in triage procedures, and has the advantage of providing feedback on decisions. However, it does not allow practice of skills, so may not be suitable for training clinicians to deliver behaviour change interventions.

**Assessing knowledge and skills**

It was generally noted that it was important to provide some assessment as part of eLearning. First, it can allow the material the participant engages with to be tailored, to increase relevance. Assessment of learning objectives after the training has been completed was also seen as important, to make sure that there has been engagement with the material, and the anticipated learning has occurred. Online assessment of knowledge was seen as comparatively straightforward, although more complex assessment can include a pool of relevant questions, some of which are used on any one occasion. Further, users can be locked out if they fail assessments on a specified number of occasions, to prevent guessing on repeated assessments. Assessing skills online was seen as very complicated and potentially very expensive (see "Using E-Learning only to prepare health professionals to deliver interventions" above).
Implications

What are the best techniques to use in behaviour change interventions?

Physical activity
Given the unexpectedly low association between the extent to which interventions produced change in self-efficacy and changes in physical activity \((r=0.08)\), conclusions are somewhat tentative. It may be that increasing self-efficacy is not as effective at changing physical activity for older, ill and obese populations as it is for younger, healthy populations.

However, given these caveats, the following behaviour change techniques are worth considering:

- The technique of "facilitate social comparison" appears particularly promising, as it was associated with larger increases in both self-efficacy and physical activity behaviour, as it was in the previous Williams and French (2011) review.
- Other techniques which received empirical support in the present review, and either of the reviews of Williams and French (2011) or Michie et al (2009) were: action planning, goal setting (behaviour), prompt self-monitoring of behaviour, provide feedback on performance, provide information on the consequences of behaviour in general, provide rewards contingent on effort or progress towards behaviour, and time management. These techniques are therefore those which currently have the strongest evidence base.

Healthy eating
Any conclusions drawn for healthy eating should be very tentative. Reasons for this include the unexpectedly low association between the extent to which interventions produced change in self-efficacy and changes in healthy eating \((r=0.20)\), the smaller number of studies identified, the lack of replication of findings from the Michie et al (2009) review. However, despite these reservations, the present results still form one of the best sources of evidence concerning which intervention techniques are most effective at changing healthy eating.

The following techniques were found to be effective in the present review at changing self-efficacy or healthy eating behaviour, and should be considered as good candidates for inclusion in future interventions:

- relapse prevention/ coping planning, use of follow-up prompts, prompt use of imagery, barrier identification/ problem solving, and plan social support/ social change.
- Other techniques which should be considered are those identified by Michie et al (2009): prompt self-monitoring of behaviour, prompt intention formation, prompt specific goal setting, prompt review of behavioural goals, and providing feedback on behaviour.
Issues to consider in training cancer clinicians

Advantages and disadvantages of E-learning technologies
The advantages cited of using eLearning technologies were low cost if used for training many people, potentially large reach, they allow people to go at their own pace, and thereby can take into account existing knowledge. The other main advantage cited is that such learning can be enjoyable, with people able to skip through material they are familiar with, and focus more on unfamiliar material, and experience learning through a variety of media. Convenience was often cited as an advantage of using eLearning technologies, as it does not require clinicians to attend learning events which may involve travelling, scheduling difficulties, cancelling clinics during working hours, or a lack of motivation due to seeing this training as a low priority. A further advantage of using eLearning technologies is that it is an efficient method of training high volumes of staff, which may be particularly important where there is high turnover.

A major disadvantage of using eLearning technologies was that it was thought to not be well suited to producing skilled performance, as opposed to increasing knowledge, or basic skills. Another disadvantage cited of using eLearning technologies to increase knowledge was that, although it offers the potential of large reach, it involves more set-up costs than traditional approaches to training. Assuming the training is delivered on a website, it also has issues concerning who will host the software, and who will update it. It also requires that staff to have access to PCs, usually with an internet connection. This may not always be possible in clinical settings. A further possible disadvantage is that if clinicians are not motivated with regard to the content of training, it is easier to not engage with it than is the case with face to face training. The use of assessments of knowledge acquired, to receive certification of training completed may be helpful in addressing this problem.

Most supported eLearning approaches
The four different models of “eLearning plus” received the most support, where practitioners are trained to deliver a basic intervention, which involves initiating a conversation with a view to referring patients to other services. Options discussed included a booklet or manual which delivers an intervention, a website which delivers the intervention, or to an existing service, e.g. the NHS stop smoking service or commercial weight management services (see Jolly et al, 2011).

The advantage of this approach is that it requires comparatively little training and does not involve a major extension of the practitioner role, which should increase acceptability of training to practitioners. Further, where there is high turnover of staff, it is comparatively cheap to provide the small amount of training to practitioners required to produce competent performance, given that the training may have to be repeated for new staff. The issue of staff turnover is more of a consideration when training staff to deliver interventions as part of routine practice than when training staff to deliver interventions as part of a research study.
Potential options for the design and evaluation of a training intervention

In the light of the above, two main issues arise for the future design and evaluation of a training intervention. First, whether it is appropriate for cancer clinicians to deliver complex health behaviour interventions, or whether it is better to refer to other services. Second, whether eLearning technologies have advantages or disadvantages compared with face-to-face training.

Should cancer clinicians deliver interventions to change health behaviours? Although not the focus of the questions asked during the interviews, a view that was expressed by those with most experience of training health professionals was that health behaviour change interventions may not best be delivered by cancer clinicians.

The reasons provided centred around this requiring clinicians to develop a new skill set, and professional role. Reservations were expressed around how motivated clinicians would be to adopt such a new role. For example, the Advanced Development Programme for clinicians working with long term conditions produced good effects on clinicians’ skills in setting agendas with patients, was less effective at getting clinicians to set goals, and had little effect on following up this initial conversations (Kosmala-Anderson, Wallace & Turner, 2010). Further, even after training they may not be as competent as other people who could deliver such interventions more effectively, and probably much more cheaply. It would also not address the problems of releasing clinicians from training, or fitting interventions which may take time into routine care.

On the other hand, cancer clinicians are clearly well placed to initiate discussions about behaviour change, and refer on to other services, for which there is more evidence of effectiveness, e.g. NHS stop smoking services and commercial weight management services (see Jolly et al, 2011). This would require training to boost confidence and competence regarding initiating such conversations, but would capitalise on the advantages of cancer diagnosis and treatment being a "teachable moment", without the limitations of clinicians struggling with carrying out behaviour change interventions for which they may not be well equipped.

eLearning technologies versus face-to-face training

One option is to rely on face to face training to equip clinicians to deliver health behaviour change interventions, instead of using eLearning technologies. The main advantage of this approach is it does involve a large initial expenditure, although it may be more costly in the longer term, especially if large volumes of people are trained. It may also not be as acceptable or convenient for clinicians, as it involves travelling, scheduling difficulties, cancelling clinics during working hours, or a lack of motivation due to seeing this training as a low priority.

Using eLearning technologies to train cancer clinicians to provide health behaviour change interventions was generally seen as being difficult, and
probably costly. Generally, it was felt that if cancer clinicians were to deliver interventions of any complexity, they should be trained face-to-face.

There was most enthusiasm for using "eLearning plus", where cancer clinicians are provided with brief training to raise the subject of behaviour change with cancer survivors, and refer on. Such training could be conducted online, relatively briefly, or could be carried out face-to-face. The referral could be to existing services, e.g. NHS Stop Smoking, or to new services that could be developed in future, e.g. a weight management interactive website. This training could be delivered using an eLearning approach, but it may be helpful to first demonstrate proof of concept, and a face-to-face delivered training package has worth in its own right.
References


systematic review and meta-analysis. *Journal of Cancer Survivorship, 4*, 87-100.


Williams, S.L., & French, D.P. (2011). What are the most effective intervention techniques for changing physical activity self-efficacy and physical activity behaviour - and are they the same? *Health Education Research, 26*, 308-322.
Appendix 1: electronic search strategies used for SCOPUS and PsycInfo

Scopus

Self-efficacy or Bandura or social cognitive theory
AND
Clinica* tria* or Randomised controlled tria* or Randomized controlled tria* or Blind or Controlled clinical trial or Mask or Random allocation or Double blind method or Intervention or Evaluation or Progra* or Follow-up study or Experiment
AND
Die* or eat or food or vegetabl* or frui* or intake or nutrit or fat or consumption or energy
- Yielded 1,671 hits

Self-efficacy or Bandura or social cognitive theory
AND
Clinica* tria* or Randomised controlled tria* or Randomized controlled tria* or Blind or Controlled clinical trial or Mask or Random allocation or Double blind method or Intervention or Evaluation or Progra* or Follow-up study or Experiment
AND
Physical activity or exercise or fitness or exertion or strength or physical
- Yielded 2,594 hits

PsycInfo

Self-efficacy or Bandura or social cognitive theory
AND
Clinica* tria* or Randomised controlled trial or Randomized controlled trial or Blind or Controlled clinical trial or Mask or Random allocation or Double blind method or Intervention or Evaluation or Progra* or Follow-up study
AND
Die* or eat* or food or intake or nutrit* or frui* or vegetabl* or consumption or energy or fat
- Yielded 860 hits after narrowing down to only include individuals >18 years

Self-efficacy or Bandura or social cognitive theory
AND
Clinica* tria* or Randomised controlled trial or Randomized controlled trial or Blind or Controlled clinical trial or Mask or Random allocation or Double blind method or Intervention or Evaluation or Progra* or Follow-up study
AND
Physical activity or exercise or sport or fitness
Appendix 2: studies included in systematic review

Papers included in physical activity self-efficacy analysis.
* Papers also included in physical activity behaviour analysis.


examining a lifestyle physical activity program for prostate cancer patients. *Psycho-Oncology, 15*(10), 847-862.


Papers concerning healthy eating included in the self-efficacy analysis.

* Papers also included in the healthy eating behaviour analysis.


Appendix 3: definitions of behaviour change techniques (CALO-RE taxonomy)

Full details of the development of the CALO-RE taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours is described in the following paper:


1. **Provide information on consequences of behaviour in general**
   Information about the relationship between the behaviour and its possible or likely consequences in the general case, usually based on epidemiological data, and not personalised for the individual (contrast with technique 2).

2. **Provide information on consequences of behaviour to the individual**
   Information about the benefits and costs of action or inaction to the individual or tailored to a relevant group based on that individual's characteristics (i.e. demographics, clinical, behavioural or psychological information). This can include any costs/ benefits and not necessarily those related to health, e.g. feelings.

3. **Provide information about others' approval**
   Involves information about what other people think about the target person's behaviour. It clarifies whether others will like, approve or disapprove of what the person is doing or will do. NB Check that any instance does not also involve techniques 1 (Provide information on consequences of behaviour in general) or 2 (Provide information on consequences of behaviour to the individual) or 4 (Provide normative information about others' behaviour).

4. **Provide normative information about others' behaviour**
   Involves providing information about what other people are doing i.e., indicates that a particular behaviour or sequence of behaviours is common or uncommon amongst the population or amongst a specified group – presentation of case studies of a few others is not normative information. NB this concerns other people’s actions and is distinct from the provision of information about others’ approval (technique 3 [Provide information about others' approval]).

5. **Goal setting (behaviour)**
   The person is encouraged to make a behavioural resolution (e.g. take more exercise next week). This is directed towards encouraging people to decide to change or maintain change. NB This is distinguished from technique 6 (Goal setting - outcome) and 7 (Action planning) as it does not involve planning.
exactly how the behaviour will be done and either when or where the
behaviour or action sequence will be performed. Where the text only states
that goal setting was used without specifying the detail of action planning
involved then this would be an example of this technique (not technique 7
[Action planning]). If the text states that ‘goal setting’ was used if it is not clear
from the report if the goal setting was related to behaviour or to other
outcomes, technique 6 should be coded. This includes sub-goals or
preparatory behaviours and/or specific contexts in which the behaviour will be
performed. The behaviour in this technique will be directly related to or be a
necessary condition for the target behaviour (e.g. shopping for healthy eating;
buying equipment for physical activity). NB check if techniques applied to
preparatory behaviours should also be coded as instances of technique 9 (Set
graded tasks).

6. Goal setting (outcome)
The person is encouraged to set a general goal that can be achieved by
behavioural means but is not defined in terms of behaviour (e.g. to reduce
blood pressure or lose/maintain weight), as opposed to a goal based on
changing behaviour as such. The goal may be an expected consequence of
one or more behaviours, but is not a behaviour per se (see also techniques 5
[Goal setting - behaviour] and 7 [Action planning]). This technique may co-
occur with technique 5 if goals for both behaviour and other outcomes are set.

7. Action planning
Involves detailed planning of what the person will do including, as a minimum,
when, in which situation and/or where to act. “When” may describe frequency
(such as how many times a day/week or duration (e.g., for how long). The
exact content of action plans may or may not be described, in this case code
as this technique if it is stated that the behaviour is planned contingent to a
specific situation or set of situations even if exact details are not present NB
The terms “goal setting” or “action plan” are not enough to ensure inclusion of
this technique unless it is clear that plans involve linking behavioural
responses to specific situational cues, when only described as “goal setting”
or “action plan” without the above detail it should be regarded as applications
of technique 5 and 6.

8. Barrier identification/Problem solving
This presumes having formed an initial plan to change behaviour. The person
is prompted to think about potential barriers and identify ways of overcoming
them. Barriers may include competing goals in specified situations. This may
be described as “problem solving”. If it is problem solving in relation to the
performance of a behaviour, then it counts as an instance of this technique.
Examples of barriers may include behavioural, cognitive, emotional,
environmental, social and/or physical barriers. NB Closely related to
techniques 7 (Action planning) and 9 (Set graded task) but involves a focus on
specific obstacles to performance. It contrasts with technique 35 (Relapse
prevention/ Coping planning) which is about maintaining behaviour that has
already been changed.

9. Set graded tasks
Breaking down the target behaviour into smaller easier to achieve tasks and enabling the person to build on small successes to achieve target behaviour. This may include increments towards a target behaviour, or incremental increases from baseline behaviour. NB The key difference to technique 7 (Action planning) lies in planning to perform a sequence of preparatory actions (e.g. remembering to take gym kit to work), task components or target behaviours which are in a logical sequence or increase in difficulty over time - as opposed to planning "if-then" contingencies when/where to perform behaviours. General references to increasing physical activity as intervention goal are not instances of this technique.

10. Prompt review of behavioural goals
Involves a review or analysis of the extent to which previously set behavioural goals (e.g. take more exercise next week) were achieved. In most cases this will follow previous goal setting (see technique 5, ‘goal setting-behaviour’) and an attempt to act on those goals, followed by a revision or readjustment of goals, and/ or means to attain them. NB Check if any instance also involves techniques 6 (goal setting - behaviour), 8 (Barrier identification/Problem solving), 9 (Set graded tasks) or 11 (Prompt review of outcome goals).

11. Prompt review of outcome goals
Involves a review or analysis of the extent to which previously set outcome goals (e.g. to reduce blood pressure or lose/maintain weight) were achieved. In most cases this will follow previous goal setting (see technique 6, goal setting-outcome') and an attempt to act on those goals, followed by a revision of goals, and/ or means to attain them. NB Check that any instance does not also involve techniques 5 (goal setting - outcome), 8 (Barrier identification/Problem solving), 9 (Set graded tasks) or 10 (Prompt review of behavioural goals).

12. Prompt rewards contingent on effort or progress towards behaviour
Involves the person using praise or rewards for attempts at achieving a behavioural goal. This might include efforts made towards achieving the behaviour, or progress made in preparatory steps towards the behaviour, but not merely participation in intervention. This can include self-reward. NB This technique is not reinforcement for performing the target behaviour itself, which is an instance of technique 13 (Provide rewards contingent on successful behaviour).

13. Provide rewards contingent on successful behaviour
Reinforcing successful performance of the specific target behaviour. This can include praise and encouragement as well as material rewards but the reward/incentive must be explicitly linked to the achievement of the specific target behaviour i.e. the person receives the reward if they perform the specified behaviour but not if they do not perform the behaviour. This can include self-reward. Provision of rewards for completing intervention components or materials are not instances of this technique. References to provision of incentives for being more physically active are not instances of this technique unless information about contingency to the performance of the target behaviour is provided. NB Check the distinction between this and techniques...
7 (Action planning) and 17 (Prompt self-monitoring of behavioural outcome) and 19 (Provide feedback on performance).

14. Shaping
Contingent rewards are first provided for any approximation to the target behaviour e.g., for any increase in physical activity. Then, later, only a more demanding performance, e.g., brisk walking for 10 minutes on three days a week would be rewarded. Thus, this is graded use of contingent rewards over time.

15. Prompting generalization of a target behaviour
Once a behaviour is performed in a particular situation, the person is encouraged or helped to try it in another situation. The idea is to ensure that the behaviour is not tied to one situation but becomes a more integrated part of the person’s life that can be performed at a variety of different times and in a variety of contexts.

16. Prompt self-monitoring of behaviour
The person is asked to keep a record of specified behaviour/s as a method for changing behaviour. This should be an explicitly stated intervention component, as opposed to occurring as part of completing measures for research purposes. This could e.g., take the form of a diary or completing a questionnaire about their behaviour, in terms of type, frequency, duration and/or intensity. Check the distinction between this and techniques 17 (Prompt self-monitoring of behavioural outcome).

17. Prompt self-monitoring of behavioural outcome
The person is asked to keep a record of specified measures expected to be influenced by the behaviour change, e.g. blood pressure, blood glucose, weight loss, physical fitness. **NB** It must be reported as part of the intervention, rather than only as an outcome measure. Check the distinction between this and techniques 16 (Prompt self-monitoring of behaviour).

18. Prompting focus on past success
Involves instructing the person to think about or list previous successes in performing the behaviour (or parts of it). **NB** This is not just encouragement but a clear focus on the person’s past behaviour. It is also not feedback because it refers to behaviour preceded the intervention.

19. Provide feedback on performance
This involves providing the participant with data about their own recorded behaviour (e.g., following technique 16 [Prompt self-monitoring of behaviour]) or commenting on a person’s behavioural performance (e.g., identifying a discrepancy with between behavioural performance and a set goal – see techniques 5 [Goal setting - behaviour] and 7 [Action planning] – or a discrepancy between one’s own performance in relation to others’ – note this could also involve technique 28 [Facilitate social comparison].

20. Provide information on **where and when** to perform the behaviour
Involves telling the person about when and where they might be able to perform the behaviour this e.g. tips on places and times participants can access local exercise classes. This can be in either verbal or written form. **NB** Check whether there are also instances of technique 21 (Provide instruction on how to perform the behaviour).

**21. Provide instruction on how to perform the behaviour**
Involves *telling* the person *how* to perform a behaviour or preparatory behaviours, either verbally or in written form. Examples of instructions include: how to use gym equipment (without getting on and showing the participant), instruction on suitable clothing, and tips on how to take action *Showing* a person how to perform a behaviour without verbal instruction would be an instance of technique 22 only. **NB** Check whether there are also instances of techniques 5, 7, 8, 9, 22. Instructions to follow a specific diet or programme of exercise without instructions how to perform the behaviours are not included in this definition. Cooking and exercise classes as well as personal trainers and recipes should always be coded as this technique, but may also be coded as 22 (Model/ Demonstrate the behaviour).

**22. Model/ Demonstrate the behaviour**
Involves *showing* the person how to perform a behaviour e.g., through physical or visual demonstrations of behavioural performance, in person or remotely. **NB** This is distinct from just providing instruction (technique 21) because in “demonstration” the person is able to observe the behaviour being enacted. This technique and techniques 21 (Provide instruction on how to perform the behaviour) may be used separately or together. Instructing parents or peers to perform the target behaviour is not an instance of this technique as fidelity would be uncertain.

**23. Teach to use prompts/ cues**
The person is taught to identify environmental prompts which can be used to *remind* them to perform the behaviour (or to perform an alternative, incompatible behaviour in the case of behaviours to be reduced). Cues could include times of day, particular contexts or technologies such as mobile phone alerts which prompt them to perform the target behaviour. **NB** This technique could be used independently or in conjunction with techniques 5 (goal setting - behaviour) and 7 (Action planning) (see also 24 [Environmental restructuring]).

**24. Environmental restructuring**
*The person* is prompted to alter the environment in ways so that it is more *supportive* of the target behaviour e.g. altering cues or reinforcers. For example they might be asked to lock up or throw away or their high calorie snacks, or take their running shoes to work. Interventions in which the interveners directly modify environmental variables (e.g. the way food is displayed in shops, provision of sports facilities) are not covered by this taxonomy and should be coded independently.

**25. Agree behavioural contract**
Must involve written agreement on the performance of an explicitly specified behaviour so that there is a written record of the person’s resolution witnessed by another.

26. Prompt practice
Prompt the person to rehearse and repeat the behaviour or preparatory behaviours numerous times. Note this will also include parts of the behaviour e.g., refusal skills in relation to unhealthy snacks. This could be described as “building habits or routines” but is still practice so long as the person is prompted to try the behaviour (or parts of it) during the intervention or practice between intervention sessions, e.g. as “homework”.

27. Use of follow up prompts
Intervention components are gradually reduced in intensity, duration and frequency over time, e.g. letters or telephone calls instead of face to face and/or provided at longer time intervals.

28. Facilitate social comparison
Involves explicitly drawing attention to others’ performance to elicit comparisons. NB The fact the intervention takes place in a group setting, or have been placed in groups on the basis of shared characteristics, does not necessarily mean social comparison is actually taking place. Social support may also be encouraged in such settings and this would then involve technique 29 (Plan social support/ social change). Group classes may also involve instruction (technique 21 [Provide instruction on how to perform the behaviour]) demonstration (technique 22 [Model/ Demonstrate the behaviour]) and practice (technique 26 [Prompt practice]).

29. Plan social support/ social change
Involves prompting the person to plan how to elicit social support from other people to help him/ her achieve their target behaviour/ outcome. This will include support during interventions e.g., setting up a “buddy” system or other forms of support and following the intervention including support provided by the individuals delivering the intervention, partner, friends, family.

30. Prompt identification as role model/ position advocate
Involves focusing on how the person may be an example to others and affect their behaviour e.g., being a good example to children. Also includes providing opportunities for participants to persuade others of the importance of adopting/ changing the behaviour, for example, giving a talk or running a peer-led session.

31. Prompt anticipated regret
Involves inducing expectations of future regret about the performance or non-performance of a behaviour. This includes focusing on how the person will feel in the future and specifically whether they will feel regret or feel sorry that they did or did not take a different course of action. Do not also code instances of this technique as the more generic providing information on consequences (techniques 1 [Provide information on consequences of}
behaviour in general and 2 [Provide information on consequences of behaviour to the individual]).

32. Fear Arousal
Involves presentation of risk and/or mortality information relevant to the behaviour as emotive images designed to evoke a fearful response (e.g., “smoking kills!” or images of the grim reaper). Do not also code instances of this technique as the more generic providing information on consequences (techniques 1 [Provide information on consequences of behaviour in general] and 2 [Provide information on consequences of behaviour to the individual]).

33. Prompt Self talk
Encourage the person to use talk to themselves (aloud or silently) before and during planned behaviours to encourage, support and maintain action.

34. Prompt use of imagery
Teach the person to imagine successfully performing the behaviour or to imagine finding it easy to perform the behaviour, including component or easy versions of the behaviour. Distinct from recalling instances of previous success without imagery (technique 18 [Prompting focus on past success])

35. Relapse prevention/ Coping planning
This relates to planning how to maintain behaviour that has been changed. The person is prompted to identify in advance situations in which the changed behaviour may not be maintained and develop strategies to avoid or manage those situations. Contrast with techniques 7 (Action planning) and 8 (Barrier identification/ Problem solving) which are about initiating behaviour change.

36. Stress management/Emotional control training
This is a set of specific techniques (e.g., progressive relaxation) which do not target the behaviour directly but seek to reduce anxiety and stress to facilitate the performance of the behaviour. It might also include techniques designed to reduce negative emotions or control mood or feelings that may interfere with performance of the behaviour, and/or to increase positive emotions that might help with the performance of the behaviour. NB Check whether there are any instances of technique 8 (Barrier identification/ Problem solving), which includes identifying emotional barriers to performance, in contrast to the current technique, which addresses stress and emotions, whether they have been identified as barriers or not.

37. Motivational interviewing
This is a clinical method including a specific set of techniques involving prompting the person to engage in change talk in order to minimize resistance and resolve ambivalence to change (includes motivational counselling). NB Only rate this technique if explicitly referred to by name, not if one identifies specific elements of it, this may happen if you have prior experience with this technique.

38. Time management
This includes any technique designed to teach a person how to manage their time in order to make time for the behaviour. These techniques are not directed towards performance of target behaviour but rather seek to facilitate it by freeing up times when it could be performed. **NB** Only rate this technique if explicitly referred to by name, not if one identifies specific elements of it, this may happen if you have prior experience with this technique.

**39. General communication skills training**
This includes any technique directed at general communication skills but not directed towards a particular behaviour change. Often this may include role play and group work focusing on listening skills or assertive skills. **NB** Practicing a particular behaviour-specific interpersonal negotiation e.g., refusal skills in relation to cigarettes or alcohol would not be an instance of this technique.

**40. Stimulate anticipation of future rewards**
Create anticipation of future rewards without necessarily reinforcing behaviour throughout the active period of the intervention. Code this technique when participants are told at the onset that they will be rewarded based on behavioural achievement.