Lessons learned from interventions and evaluations[1]

Contents

List of Tables

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Lessons learned from interventions and evaluations

Introduction

This document provides a review of the evidence on evaluations of interventions that have been used to change behaviour across a range of policy sectors, such as health, transport and the environment. Our primary aim in reviewing this body of evidence is to identify key aspects of interventions that have been particularly successful so that the FC and other relevant bodies can learn from both achievements and failures in encouraging positive behaviour change. With this in mind, we focussed on literature that identified methods used and effectiveness of the approach(es) taken. The review covers two broad categories of intervention – those that are not related to greenspace (e.g. health, travel, energy use, pro-environmental behaviour) and those where greenspace and nature represent a key dimension.

Accompanying review reports establish the policy context, and cover theories and models of behaviour and behaviour change. A summary review report is also available, together with a discussion paper which explores how behaviour and behaviour change relate to forestry.

Methods

The following databases were searched to identify primarily academic evidence:

- Science direct
- Taylor and Francis on line
- Google Scholar
- Web of Science

Grey literature was searched for using Google and by viewing government department websites such as the Department of Health (DoH), Department for Environment, Food and Rural Affairs (DEFRA), Department for Transport (DfT), Department for Energy and Climate Change (DECC) and the Cabinet Office. Table 1 shows the search terms used.

Table 1. Indicative terms and key words used for database searches

Behaviour	Change Maintain Understand	Natural settings, landscape, forest, wood, countryside, green space	Grants, interventions, regulation, campaign, events

Approximately 103 relevant references were identified. Literature searches for non-greenspace evaluations produced 53 references. These were assessed for relevance and, given the large amount of literature available, reviews of reviews were prioritised for inclusion and further analysis. 25 documents were selected for inclusion in the review (see Table 2).

Table 2. Literature on interventions not related to greenspace/nature

Behaviour category	Behaviour sub-category	References
Health	Diet / weight control / physical activity	12
	Health risk behaviours	3
Travel	Health (active travel)	3
	Low carbon	2
Pro-environmental	Sustainable consumption	5

For greenspace and nature-based interventions 50 reports, leaflet-style summaries and journal articles were identified. 18 relevant examples (where authors provided some level of evaluation of the intervention(s)) were selected for inclusion in the review. These interventions can be broadly divided into three themes: Health and Physical Exercise, Health and Mental Well Being, and Improving Quality of Life in Communities. However, there are overlaps between the themes. For example, many of the health projects in Table 3 were also targeted at hard to reach groups.

Table 3. Literature on interventions related to greenspace/nature

Behaviour Category	References
Health and Physical Exercise	7
Health and Mental Well Being	8
Improving Quality of Life	3

Full details of the interventions are provided in Appendix 1 and 2.

Non-greenspace interventions and evaluations

Non-greenspace interventions and evaluations fell into three categories of target behaviour; health behaviour, travel behaviour and pro-environmental behaviour. These are reviewed separately below:

Evaluations and interventions related to health behaviours

A summary of evaluative evidence relating to health behaviour interventions is provided in Appendix 1 (Table 1). A number of recent studies report on interventions or reviews of interventions addressing the problem of childhood obesity (Golley et al. 2010, Lloyd et al. 2011, Sargent et al. 2010, Van Cauwenberghe et al. 2010). The review presented by Golley et al. (2010) reports on interventions to increase physical activity levels, improve diet, reduce sedentary behaviours and change weight status amongst obese children. Most of the interventions and related evaluations are underpinned by so-called 'ecological' models where the approach is holistic and focuses broadly on the physical and social environment of obese children. This is in contrast to more narrowly focused interventions where the individual patient is the sole recipient of behavioural treatment. The authors conclude that the adoption of such an holistic approach, whereby parents are involved as active participants in the design and implementation of the intervention, and where attention is given to the structuring of the child's physical environment (in most cases, the home), significantly enhances the effectiveness of the intervention.

Some key factors determining the effectiveness of health behaviour interventions emerge from the body of evaluative evidence:

- Interventions which target the social environment of individuals are more effective than those which just focus on the individual (Davey et al. 2011, Golley et al. 2010, Greaves et al. 2011, Lloyd et al. 2011, Pomerleau et al. 2005, Jepson et al. 2010). Working with families and delivering workplace interventions, for example, result in an effective mixture of social pressure and support which are strongly correlated with positive outcomes.
- Interventions that involve social contact between patients and practitioners are more effective than more detached approaches, such as information provision and written advice (Fjeldsoe et al. 2011, Lombard et al. 2009, Falk & Magnusson 2011).
- Interventions which adopt a multi-faceted approach are more effective than single approach measures (Davey et al. 2011, Lombard et al. 2009, Sargent et al. 2010, Van Cauwenberghe et al. 2010).
- Some specific behavioural change intervention approaches and techniques emerge as particularly effective. These include goal setting (Cullen et al. 2001, Gardner et al. 2011, Golley et al. 2010, Greaves et al. 2011), self-monitoring (Gardner et al. 2011, Golley et al. 2010, Greaves et al. 2011), provision of feedback on performance (Gardner et al. 2011, Pomerleau et al. 2005), motivational interviewing (Greaves et al. 2011, Sargent et al. 2010). Information provision, educational approaches and passive forms of advice-giving emerge as less effective (Van Cauwenberghe et al. 2010, Falk & Magnusson 2011).

Evaluations of interventions related to travel behaviours

A summary of evaluative evidence relating to travel behaviour interventions is provided in Appendix 1 (Table 2). Two reviews report on evaluations of interventions that address people's perceptions, beliefs and attitudes to car use and alternative modes of transport through so-called Travel Feedback Programmes (TFPs) (Graham-Rowe et al. 2011, Fujii et al. 2006). TFPs are implemented in schools, workplaces, or residential areas and involve personalised forms of communication to encourage changes in travel behaviour. Typically TFPs involve motivational techniques, the production of individualised travel plans and the provision of feedback to participants on their performance. Fujii et al. (2006) conclude that behavioural plans were a key component of successful TFPs in Japan, with successful interventions resulting in substantial reductions in CO2 emissions (19%) and car use (18%), and increasing participants' use of public transport by about 50%.

Some key factors determining the effectiveness of travel behaviour interventions emerge from the body of evaluative evidence:

- Interventions that adopt a participatory approach where participants are actively involved in the process of intervention design and are, therefore, able to make it relevant to their personal circumstances, emerge as more effective than more passive methods of participant involvement, such as the provision of information and advice (Ogilvie et al. 2004, Fujii et al. 2006).
- Motivated subgroups (Yang et al. 2010) and interested households (Graham-Rowe et al. 2011) are more receptive to behavioural interventions, enhancing effectiveness and efficiency.

Evaluations of interventions to encourage pro-environmental behaviours

A summary of evaluative evidence relating to pro-environmental behaviour interventions is provided in Appendix 1 (Table 3). Moloney et al. (2010) present a review of over 100 local programmes in Australia aimed at realising carbon neutral communities. A key conclusion drawn from the review is that community-based projects with high levels of participant involvement and control are more effective than top-down, information provision and awareness-raising campaigns. A key advantage of community-based approaches is that they are better able to identify and address locally specific barriers, and to adopt a 'trail and error' approach allowing 'social learning in practice' through which viable solutions are developed. They also found that projects with a strong education and awareness raising emphasis delivered through workshops and training programmes are successful because they allow participants to develop a 'discursive consciousness', whereby groups explore and discuss their own practices and values, and reflect on differing social norms and standards.

Some key factors determining the effectiveness of pro-environmental behaviour interventions emerge from the body of evaluative evidence:

- Localisation and embedding changes in behaviour and attitude within community structures and social networks are more effective than population level approaches (Moloney et al. 2010, Seyfang 2006). Related to this, the use of social norms and the exertion of social pressure to comply with accepted modes of behaviour (e.g. recycling) are strongly correlated with success (Barr 2003).
- Projects that combine technical / infrastructure approaches with education, training and community-based interventions are more likely to have more profound and lasting affect on behaviour than those that just offer technical fixes and audits (Moloney et al. 2010).
- Projects that focus on individuals and households without addressing wider, systemic institutional and regulatory changes will have limited effectiveness (Moloney et al. 2010).
- Awareness raising and information provision relating to environmental issues is not an effective way of encouraging responsible environmental behaviour. Interventions to encourage pro-environmental action need to address the environmental values, attitudes and other psychological factors influencing the behaviour of participants (Barr 2003, Cornelissen et al. 2008).

Greenspace and nature interventions and evaluations

The physical, psychological and physiological benefits of greenspace and other natural settings have been widely reported (e.g. Morris 2003, Pretty et al. 2005, Mitchell and Popham 2008, O'Brien et al. 2010, Moseley & Marzano 2012). There is some debate over whether current evidence proves that there is a positive association between natural areas and improved health (Tzoulas et al. 2007). However, access to the natural environment can increase physical activity and provide high quality 'restorative' places where people can socialise, relax and de-stress as well as providing opportunities for community-based activities such as volunteering or environmental education (Giles-Corti et al. 2005, Croucher et al. 2007, Greenspace Scotland 2011).

Nature-based interventions discussed are local or regionally based projects (e.g. Branching Out, Chopwell Wood) or one of many initiatives under the umbrella of a national programme (e.g. Green Exercise, Active England, BTCV Green Gym). Most of the interventions involved one or a combination of the following:

- A series of events (e.g. led walks, conservation activities, family days, volunteering opportunities)
- Physical improvements to the environment or infrastructure (renovating parks, building cycle trails and play areas)

- Supported activities (a structured programme with a specific group of individuals).

The studies used a wide range of measures to evaluate effectiveness of the interventions. Qualitative and quantitative methods were used to measure benefits to individuals or groups from increases in physical activity, improved cognitive functioning and emotional states of individuals participating in interventions and enhanced quality of life within communities. Other factors that were investigated included the range and type of activities, referral/recruitment processes and barriers to attendance or involvement. Some examples of evaluations undertaken are provided in Tables 1-3 in Appendix 2. In Appendix 3, three interventions are presented in more detail to provide a better insight into the types of interventions aimed at improving physical and mental health and well-being for adults and children. These examples also provide details on evaluation methodologies as well as highlighting the range of partnerships that take place between different organisations.

Greenspace and nature-based interventions to improve physical and mental health, well-being and quality of life

Many of the interventions aimed at increasing physical activity were targeted at hard-to-reach groups including children, women and girls, women with children, ethnic minority groups, older people, mental health service users, people with disabilities and low income groups. However, these categories are not mutually exclusive and one individual could belong to several of these groupings (O'Brien and Morris 2009). Interventions within the mental health and well-being category were targeted at groups or individuals suffering from stress and anxiety, mental or attentional fatigue, depression and other mental health issues or addiction. Two out of the three projects in Appendix 2 (Table 3) focussed on nature-based interventions to improve quality of life in deprived urban communities.

Physical health interventions recorded increased and sustained visits post-intervention, an increase in physical activities following improvements to the environment and associated infrastructure and reported weight loss amongst participants. Projects focused on mental health and well-being highlighted improved capacity to direct attention following time spent in nature while participants cited the benefits of participating in activities with people who have shared similar experiences. One of the projects within the 'improving quality of life in communities' theme noted a positive change in people's attitudes and values towards local woodlands. Common benefits within all three themes include: confidence building and increased self-esteem; 'inclusive' learning and skills development relating to wildlife and nature, knowledge of greenspace locations, conservation activities and people skills; the social experience and a sense of belonging. Staff and support workers also learnt new skills such as how to develop appropriate interventions for different vulnerable groups and emphasised improved staff/client relations.

Lessons learned are derived from the experiences of projects from all three themes. The difficulties of isolating positive impacts of an intervention from other initiatives have been highlighted by O'Brien and Morris (2009) and Ward Thompson et al. (2010). Control groups or sites were considered to be useful in identifying how and when benefits occur but are rarely included in evaluations. More longitudinal data was also considered necessary by many projects to identify whether there were any medium to long term changes in activity, use of target sites, reduction in medical needs or enhanced integration back into the community. Brown et al. (2011) note that a number of projects often implement the follow-up evaluation soon after the baseline data collection in order to ensure a higher level of participation in the evaluation. The authors suggest that this can limit the ability to track long-term impacts, although they concede that follow-ups post interventions are notoriously difficult and marred by incomplete submissions and low levels of participation.

Enthusiastic project staff are an important asset for any project as they are able to make the linkages necessary with partner organisations and health professional to encourage involvement and recruitment of participants. Ensuring that project staff and key workers are retained throughout the project is important as this provides continuity and reassurance to vulnerable participants. Employing key workers on short-term contracts runs the risk that they will leave to take up other employment opportunities before the end of the project. Provision of transport, although potentially expensive, could enhance participation in interventions as lack of transport is often cited as a barrier. However, these factors may only be relevant during the project life-cycle.

Sustained improvement in individual and community physical and mental health and wellbeing often requires long term initiatives. Brown et al. (2011) suggest that evaluation methods and approaches include a mixture of quantitative and qualitative methods with a clear description of the way data has been analysed for quality assurance and transparency. Hynds (2011) maintains that short-term interventions will be unlikely to significantly change people's behaviour unless it occurs at a transition point in the lives of participants. One study (Nordh et al. 2009) highlighted the disappointment participants felt with the lack of follow-up to the intervention they participated in. An example of a post-intervention opportunity involved a conservation programme at a nature reserve. Participants were given the opportunity to continue volunteering within a structured programme, at a site they were familiar with and people they felt comfortable around (Hynd 2010). Another programme involved a stakeholder panel where community representatives were given a level of power and influence over the design of the programme increasing the legitimacy of the interventions (Carter et al. 2011). A positive effect was that five members of this group set up a trust to continue supporting community projects. O'Brien and Morris (2009) suggest that sustainability should be a core feature of an intervention and include actions such as training participants to continue to run activities as volunteers or providing signposting to relevant opportunities. Based on a review of ten green exercise initiatives, Pretty et al.

(2005) highlight what they regard as best practice in green exercise initiatives, which include attention to good partnerships, opportunities for feedback (e.g. to suggest improvements or highlight problems), clearly marked routes, good information (e.g. on time needed to complete a route, relative ease and length of route), facilities (e.g. car parking, toilets etc.), successful market research, good staff, a programme of events with clear dates and locations, personality of group leaders and advertising to local people.

Tester and Baker (2009) suggest that attracting under represented groups requires more than physical changes to the environment. Supported activities (such as led works or a programme of events) are crucial (see also O'Brien and Morris 2009). However, people's choices over where they will visit will likely change over time (Tester and Baker 2009).

Links with theoretical frameworks and models

Adopting a theory-based approach to the design and implementation of behavioural interventions is advocated by a number of commentators (Michie et al. 2008, Steg and Vlek 2009), and through guidance on intervention design and evaluation (Campbell et al. 2007). Michie et al. set out three main reasons for advocating the use of theory in designing interventions:

> *'First, interventions are likely to be more effective if they target causal determinants of behaviour and behaviour change; this requires understanding these causal determinants, i.e., theoretical mechanisms of change. Second, theory can be tested and developed by evaluations of interventions only if those interventions and evaluations are theoretically informed. Third, theory-based interventions facilitate an understanding of what works and thus a basis for developing better theory across different contexts, populations and behaviours.' (2008: 5)*

Despite the seemingly strong basis for adopting a theory-based approach, none of the evaluations of greenspace interventions reviewed in sub-section 5.2 discussed any links with behaviour change theories or models. Furthermore, amongst the evaluations of non-greenspace interventions discussed in sub-section 5.1, some reviewers found little evidence of theory being used to inform intervention design. For example, of the ten studies into gestational weight gain reviewed by Gardner et al. (2011), only two reported using theories to inform intervention design. A systematic review of the use of Theory of Planned Behaviour, for example, concluded that the theory was used to understand behaviour, but rarely for intervention design (Hardeman et al. 2002). Michie et al. (2008) also note that theory is often used to *explain* behaviour, but rarely to *change* it, and they observe a lack of guidance on the application of theory to intervention design. Similarly, Steg and Vlek (2009) provide a useful discussion of the theoretical constructs that have been used to explain behaviour and how these have contributed to an understanding of the determinants of (environmental) behaviours, but

do not demonstrate how this understanding gets fed into intervention design, beyond the effective targeting of the intervention at particular behaviours:

> *'...when behaviour is strongly related to attitudes, one can try to promote attitude changes towards particular pro-environmental behaviour. When contextual factors inhibit particular behaviours, one can try to remove those barriers.' (2009: 313)*

However, some of the non-greenspace reviews covered interventions informed by behaviour change theories. An overview of the main relevant points of discussion from the reviews are set out below.

Interventions informed by theories of individual behaviour and behaviour change

Theories of individual behaviour adopt a cognitive approach to explaining behaviour which centres on individual's attitudes and beliefs and include the Theory of Planned Behaviour, the Health Belief Model and the Stages of Change or 'Trans-theoretical' model.

In their review of dietary and physical activity focused interventions to tackle Type 2 diabetes, Greaves et al. (2011) cover interventions informed by Social Cognitive Theory, and Theory of Planned Behaviour. They conclude that these were no more effective in producing changes in either weight or in combined dietary and physical activity outcomes than interventions with no stated theoretical basis. However, two studies included in their review did find an association between the use of 'self-regulatory' intervention techniques (specific goal-setting, prompting self-monitoring, providing feedback on performance, goal review) and increased effectiveness. However, the Greaves et al. review is the only one that provides an assessment of the effectiveness of theory-based approaches. Van Cauwenberghe et al.'s (2010) review of school-based interventions to promote healthy eating, for example, states merely that the majority of the projects with children using a theory-based approach reported the use of the social cognitive theory, and provides no discussion of how the theory was applied, or how it improved behaviour or health outcomes. Similarly, Riemsma et al.'s (2003) review of smoking cessation interventions shows that many interventions adopted a stage based approach, which largely use the transtheoretical model, whilst Lombard et al. (2009) report some interventions informed by social cognitive theory. Again, discussion of how theories were applied or how they affected outcomes is not forthcoming.

Interventions informed by social and technological theories of behaviour and behaviour change

In their review of interventions to promote the transition to low carbon communities in Australia, Moloney et al. (2010) show that interventions informed by social and technological theories of behaviour change (those that acknowledge social practices and social contexts and their effects on behaviour) are more effective than those predicated

on theories of rational choice which prioritise technological solutions and which are based on a theorisation of individual responsibility for environmental problems.

Some of the studies reviewed by Davey et al. (2011) and Lloyd et al. (2011) adopt the Intervention Mapping (IM) approach, which is a stepwise procedure for the systematic development, implementation and evaluation of programmes using the social ecological approach. IM is based on the recognition that individuals' behaviours are determined by a range of external factors in addition to those relating to individual choice (e.g. social context and physical environment). These factors operate at multiple levels and, accordingly, IM adopts an integrative problem driven approach to explore mediators of behaviour change and to identify potential behaviour change strategies.

At a broad scale the evaluations described in this section echo a number of important aspects of behaviour identified by theoretical analyses. They include:

- the significant impact of social context on behaviour and the limitations of focusing behaviour change interventions only upon individuals and their cognitive processes;
- the strength of deliberation and reflection, especially within participatory processes, as a driver of behaviour change;
- the need for behaviours to 'fit' with the values and everyday lives of potential adopters;
- the usefulness of being introduced to a new behaviour and being able to trial it;
- the importance of time as a dimension of behaviour change processes;
- the impact of self-efficacy (and self-esteem) upon the adoption of behaviour.

Conclusions

The evidence suggests that interventions which target the wider social environment of individuals are more effective than those which just focus on the individual. Families and wider social contexts, such as community structures and social networks can play a pivotal role in bringing about and sustaining positive behavioural change. Evidence also implies that certain positive behaviours, such as those involving physical activities in nature, are often more enjoyable as part of social experiences that can increase a sense of social belonging. There is further evidence which shows that participating in programmes with others who have similar backgrounds or shared experiences can have a positive impact on motivation and facilitate sustained participation.

Interventions which adopt a multi-faceted approach are more effective than single approach measures. Projects that combine technical / infrastructure approaches with education, training and community-based interventions, for example, are more likely to have a more profound and lasting affect on behaviour. Longer-term initiatives, run on a regular basis are more effective than one-off events. Furthermore, interventions that

adopt a participatory approach, whereby participants are actively involved in the process of intervention design, emerge as more effective. Enthusiastic project officers and key workers who remain in post for the duration of the programme can help to build trust and provide a sense of structure and continuity, which has been identified as important at least for some hard-to-reach groups.

Some behavioural change intervention approaches and techniques emerge as particularly effective. These include goal setting, self-monitoring, provision of feedback on performance, and motivational interviewing. Information provision, educational approaches and more passive forms of advice-giving emerge as less effective. This is not to say that information and advice are ineffective, but that successful interventions tend to be those that go further. Raising awareness of programmes through information campaigns can be central for interventions seeking to recruit participants from the wider public. An example would be increasing awareness of health professionals of local physical exercise programmes. However, this is just the first step in a wider process of engaging health professionals and their patients.

Many of the studies included in our review of evaluations highlight the need for evaluations to enable the identification of causal factors (Golley et al. 2010, Gardner et al. 2011, Dombrowski et al. 2010, Steg and Vlek 2009, Seyfang 2006, Greaves et al. 2011, Brown et al 2011). Whilst rare, evaluations which establish causality are able to explain which aspects were successful or not and can, therefore, inform about the need to refine or replace a given component, or suggest how it might be adapted to increase its effectiveness (Steg and Vlek 2009). Some have suggested the use of control groups or sites to identify where beneficial effects occur (e.g. Ward Thompson et al. 2010) and longer term monitoring post-intervention to identify any sustainable changes to behaviour, barriers and future needs (Gidlow et al. 2010), although Brown et al. (2011 – citing Peacock et al. 2007) note the difficulties of random control trials in evaluating the benefits of green exercise. For example, the outcomes of green exercise such as improved wellbeing are not easily measurable.

Commentators highlight a lack of evidence relating to the long-term outcomes of behavioural interventions, calling for longitudinal studies (Jepson et al. 2010, Wilson 2009, Gidlow et al 2010, Hynds 2011). Looking at the long-term impacts would allow the focus of analysis to broaden beyond changes in behaviour themselves to consider the outcomes of behaviour change. Positive changes in environmental impact brought about by the adoption of pro-environmental behaviours is a good example of this.

A number of studies take issue with the reliability of the methods employed in the evaluation of behavioural interventions. Greaves et al. (2011) highlight the need for more rigorous evaluations of the effectiveness of specific intervention components and clusters of techniques for promoting and maintaining change in diet and physical activity, whilst Pomerleau et al. (2005) suggest that more in-depth studies are needed to examine the effectiveness of specific components of dietary behaviour interventions, and

how these effects vary in different populations. Steg and Vlek (2009) observe that most evaluations of pro-environmental behaviour interventions rely on self-reports of changes in behaviour by participants (see also Brown et al. 2011). Although some studies believe that self-reports are adequate indicators of actual behaviour change, others reported low correlations between self-reported and independently observed behaviour change (see also Bennet et al. 1998). They argue that evaluations should adhere to strict experimental research design principles, with changes in the relevant behaviour, behavioural antecedents, environmental quality, and individual quality of life all being assessed before and after the intervention, and that 'treatment' effects should be compared to those in a control group.

A further criticism of evaluations is that they do not adequately cover all aspects of the intervention in question. In relation to evaluations of pro-environmental behavioural interventions, Steg and Vlek (2009) argue that more attention is given to information provision at the expense of structural strategies. This is regrettable, they argue, because society's organisational and incentive structures strongly influence environmental behaviour, making structural strategies arguably more effective in promoting pro-environmental behaviour than information provision.

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Appendix 1. Interventions not related to greenspace

Table 1. Interventions related to travel behaviours – summary of evidence

Target travel behaviour	Reference	Problem / intervention:	Success / failure factors:
Travel and health behaviours	Ogilvie et al. (2004)	Car use and sedentary lifestyles. Systematic review to assess interventions to promote shift from using cars towards walking and cycling and to assess the health effects. 4 x intervention types: 1. Targeted behaviour change programmes – target motivated subgroups by offering information and advice tailored to people's particular requirements – e.g. 'Walk In to Work Out' in Glasgow. 2. Agents of change and publicity campaigns (non-targeted) - e.g. school travel coordinator working with school pupils. 3. Engineering measures – e.g. improving and extending cycle route networks. 4. Financial incentives – e.g. subsidies to staff who commute by modes other than driving.	Interventions that engage people in a participative process and address factors of personal relevance are more effective than those that simply aim to raise awareness or impose changes in the physical and economic environments. Targeted behaviour change programmes can change the behaviour of motivated subgroups. Commuter subsidies and a new railway station showed positive effects. Publicity campaigns and engineering measures not effective.
	Yang et al. (2010):	Car use. Review of interventions to promote cycling and their health effects. 3 x interventions types: 1. Promotion interventions: e.g. intensive	Individualised marketing of "environmentally friendly" modes of transport to interested households reported modest but consistent net positive effects. This approach is only effective with people who are already interested in changing their behaviour.

		individual intervention, based on the trans theoretical model of behaviour change, that included free bikes. 2. Individualised marketing ('IndiMark') of "environmentally friendly" modes of transport: e.g. provision of tailored information, advice, and incentives to encourage change in travel behaviour. 3. Interventions to change travel behaviour in general: e.g. City CarShare club; Marketing campaign, based on theory of planned behaviour, that involved leaflets, exhibitions, and talks to raise awareness of environmental effects of car use; Cash subsidy offered by employers to staff who did not require a parking space.	Other interventions that targeted travel behaviour in general were not effective.
	Rose & Marfurt (2006)	Car use. Intervention = major ride to work day event.	Being part of a large event that promotes cycling and seeing lots of people riding to work, along with a free breakfast, were substantial motivators according to survey respondents.
Travel and carbon emission behaviours	Fujii et al. (2006)	Car use. Reviews of Travel Feedback Programmes (TFPs) - personalised communication aimed at changing travel behaviour. Examples include individualised marketing, travel blending, and personalised travel plans.	TFP interventions that required participants to create a behavioural plan for their travel behaviour resulted in a dramatic change in behaviour. Advice based on rich information tended to be more effective.
	Graham-Rowe et al. (2011)	Car use. Interventions categorised as structural or psychological: Structural - involve modification of the physical and/or legislative structures to decrease opportunities and appeal of car travel (e.g. road pricing, road closures, and bus priority lanes). Psychological - designed to change perceptions, beliefs and attitudes and, thereby, motivate voluntary change in travel behaviour (e.g. TFPs).	Interventions that target drivers who have both a strong driving habit and a strong moral motivation to reduce car use and more effective. Effective to target people who have just moved residence and have yet to establish new travel patterns and habits. Relocating employees to reduce commuting time can also be effective.

Table 2. Interventions related to healthy behaviours – summary of evidence

Target travel behaviour	Reference	Problem / intervention:	Success / failure factors:
Diet / weight control and physical activity	Cullen et al. (2001)	Poor diet. Review of goal-setting dietary interventions. Four steps in goal-setting approaches (recognising need for change; establishing a goal; monitor goal-related activity; reward goal attainment).	Goals that are specific and difficult more effective than vague 'do your best' goals. Feedback through self monitoring is effective. Rewards (external or self) are effective.
	Davey et al. (2011)	Sedentary lifestyles. Community-led intervention to change local neighbourhood environments to support physical activity and healthy eating.	Community-led and multi-disciplinary approach to modifying environmental factors that support healthful behaviours more successful than focusing on individual behaviour change.
	Dombrowski et al. (2010)	Adult obesity and additional morbidity risk factors. Behavioural recommendations (e.g. healthy eating advice, physical activity recommendation).	Difficult to identify causal factors within behavioural interventions. Success of many interventions was short-term (6 months) with weight re-gain thereafter.
	Fjeldsoe et al. (2011)	Sedentary lifestyles and poor diet amongst adults. Behavioural interventions aimed at sustained health behaviour change – 3 types: relapse prevention, follow-up prompts, and self monitoring.	Longer term intervention periods more likely to achieve sustained behaviour change. Face-to-face contact during the intervention also positively correlated with sustained change.
	Gardner et al. (2011)	Gestational weight gain. Behavioural interventions aimed at improving diet and increasing physical activity.	Self-monitoring of behaviour, provision of feedback on performance, and setting behavioural goals associated with success. However, each of these techniques was present in effective and ineffective interventions, so no clear conclusions possible.
	Golley et al. (2010)	Childhood obesity. Behavioural interventions with parents as active participants, involving information provision, goal setting, self monitoring, building self-efficacy and independence, preventing and managing relapse.	Success enhanced in interventions where parents are responsible for participation and implementation, and in those with a higher degree of meaningful parental involvement. Environmental restructuring, specific goal setting, monitoring and barrier identification also correlated with success.

	Greaves et al. (2011)	Type 2 diabetes. Behavioural therapy - aims to provide individuals with coping skills to handle various cues to overeat and to manage lapses in diet and physical activity, provide motivation to maintain adherence to programme. Techniques include stimulus control, self-control and therapist- controlled contingencies, self-monitoring, problem solving, goal setting, behaviour modification, reinforcement.	Effectiveness increased by engaging social support (usually from family members), targeting both diet and physical activity, and using well-defined/established behaviour change techniques (e.g. goal-setting, self-monitoring). Motivational interviewing significantly more effective than traditional advice-giving.
	Lloyd et al. (2011)	Childhood obesity. Intervention mapping (IM). 6 steps of IM: i) needs assessment; ii) detailed mapping of programme objectives; iii) selecting techniques and strategies to modify behaviour; iv) producing intervention components and materials; v) planning for adoption, implementation and sustainability; and vi) creating evaluation plans and instruments.	IM protocol proved useful for developing a feasible, theory based intervention aimed at motivating children and their families to make small sustainable changes to their eating and activity behaviours.
	Lombard et al. (2009)	Adult obesity. Behaviour modification strategies: goal setting, problem solving, relapse prevention and self-monitoring.	Interventions that included mixed modes of delivery with some personal contact were successful. Successful interventions included face-to-face contact and individualised advice, plus regular contact throughout the intervention. Some confounding cases (where no significant weight loss was achieved).
	Pomerleau et al. (2005)	Poor diet. Behavioural interventions to increase fruit and veg intake amongst adults: Prompt sheets, point of purchase information, computer based tools, personal counselling / education, group counseling / education, peer education, multicomponent community or worksite interventions.	Computer-tailored nutrition education is an innovative and promising tool to motivate people to make healthy dietary changes. Effective features are individualised feedback about their dietary behaviours, motivations, attitudes, norms, and skills, and ability to mimic the process of face-to-face dietary counselling. Work-place interventions also successful due to social support mechanisms and environmental support. However, they are resource intensive.

	Sargent et al. (2010)	Childhood obesity. Behavioural interventions, including motivation or support, counselling or education, provision of written resources, provision of physical activity sessions, physical activity and dietary prescription.	Effective interventions reported employing multifaceted approach, including counselling or education, provision of written resources and motivation or support. Motivational interviewing shown to outperform traditional advice giving (in 80% of studies).
	Van Cauwenberghe et al. (2010)	Childhood obesity. School-based interventions to promote healthy eating: Educational (classroom-based activities e.g. an adapted curriculum and distribution of educational materials), environmental modifications to stimulate healthy diet (e.g. increased availability of healthy foods).	Multicomponent interventions on fruit and vegetable intakes most effective (combination of improved availability of fruit and vegetables with a nutrition education curriculum delivered by the teacher and at least some parent involvement). Limited evidence of effect was found for educational interventions, and for environmental interventions on fruit and vegetable intakes. Interventions that targeted children from lower socio-economic status groups showed limited effect on behaviour.
Risk behaviours	Falk & Magnusson (2011)	Sun exposure. GP-mediated sun protection and sun exposure measures, including information provision, verbal advice, advice + phototest during GP appointment.	Sun protection advice, mediated personally by the GP during a doctor–patient consultation, can lead to improvement in sun protection over a prolonged time period of at least three years. Effectiveness of written sun protection advice more doubtful.
	Jepson et al. (2010)	Six health risk behaviours (poor diet, sedentary lifestyles, smoking, alcohol misuse, sexual risk taking, illicit drug use. Review of interventions with behavioural +/or education component.	Most successful measures included: Workplace interventions to support smoking cessation, physical activity and healthy eating; School based interventions across the health behaviours; Individual-level interventions drawing on physician advice to promote healthy eating, smoking cessation and safe levels of alcohol use; Counselling for tobacco and alcohol use.
	Riemsma et al. (2003)	Smoking. Review of the effectiveness of stage based interventions to promote smoking cessation. Stage based interventions apply the trans-theoretical model.	Evidence suggests that stage based interventions are no more effective than non-stage based interventions or no intervention in changing smoking behaviour.

Table 3. Interventions related to pro-environmental behaviours – summary of evidence

Target travel behaviour	Reference	Problem / intervention:	Success / failure factors:
Pro-environmental behaviour – sustainable consumption	Barr (2003)	Focus on five environmental behaviours (water conservation, energy saving, sustainable transport use, waste management and noise reduction). Interventions to increase awareness, using a range of media to disseminate environmental information. E.g. Defra's 'Are you doing your bit?' Campaign.	Awareness raising of environmental issues not an effective way of encouraging responsible environmental behaviour - environmental action is open to a range of influences, focusing especially on environmental values, situational characteristics and psychological variables: Situational factors: 1. Those who live in larger homes are more likely to recycle more of their waste. 2. Extent to which individuals were aware of what could be recycled locally. 3. Access to a recycling service which was convenient was one of the most crucial factors eliciting participation. Psychological variables: Awareness and acceptance of the norm to recycle a significant variable increasing recycling rates. 'Social pressure' also effective (exerted by public nature of kerbside recycling where wheeled bins are left at the bottom of driveways for collection). Environmental values - Those who believed in the intrinsic importance of nature and those who accepted human priority for action on the environment more likely to reduce their waste.

	Cornelissen et al. (2008)	Unsustainable consumer behaviours – e.g. dropping litter. Assessment of 'positive cueing' – i.e. encouraging commonly performed ecological behaviours (e.g. not dropping litter) by creating an association with environmentally friendly and sustainable behaviours.	Positiving cueing makes people's attitudes to ecological behaviours more favourable, makes them perceive themselves as more environmentally friendly, and increases their sense of moral obligation to the environment.
	Seyfang 2006:	Unsustainable consumption patterns (food). Assesses a local organic food network as an intervention to encourage ecological citizenship and sustainable consumption: Eostre Organics – organic farming co-operative, creation of network for distribution of produce, education and training programme.	Sustainable consumption demands localisation and re-embedding the food economy within social networks. This network approach is successfully used as a mechanism for community-building and social cohesion, while delivering sustainable rural livelihoods and a channel for the expression of alternative values about society, environment and the economy.
	Moloney et al. 2010	Carbon emissions. Review of over 100 local programmes in Australia aimed at realising carbon neutral communities. Behaviour change intervention categories: Audits, capacity building, commitments (e.g. pledges, target setting), education, equipment / appliance change, energy infrastructure, information, retrofit assistance (guidance or material supply to enable increased energy efficiency of buildings), sustainable housing development, training.	Characteristics of successful projects: Delivery of education and awareness raising through participatory workshops. Combination of technical and social / behavioural approaches. Community-based approaches. Addressing wider, systemic and structural factors. Less successful: Conventional, top-down, information provision and awareness-raising campaigns.

	Steg and Vlek (2009)	Review of pro-environmental behaviour approaches. 4 categories of approach identified: **Antecedent strategies** are aimed at changing factors that precede behaviour. They may raise problem awareness, inform about choice options, and the likelihood of positive or negative consequences, e.g. information provision, education, prompting, modelling, behavioural commitments, and environmental design. **Consequence strategies** are aimed at changing the consequences following behaviour. Examples are feedback, rewards, and penalties. **Informational strategies** - aimed at increasing actors' knowledge so as to heighten their awareness of environmental problems, the environmental impacts of their behaviour, and their motivation to change. **Structural strategies** - Structural strategies are aimed at changing contextual factors such as the availability, costs and benefits of behavioural alternatives.	Interventions are generally more effective when they are systematically planned, implemented and evaluated. Four key issues to be addressed are: (1) identification of the behaviour to be changed, (2) examination of the main factors underlying this behaviour, (3) application of interventions to change the relevant behaviours and their determinants, and (4) evaluation of intervention effects on the behaviour itself, its main determinants, environmental quality, and human quality of life.

Appendix 2. Interventions relating to greenspace

Table 1. Interventions to improve health through increased physical exercise

Project	Country	Problem Type / Intervention	Evaluation	Success Factors	Lessons learned
CHOPWELL WOOD HEALTH PROJECT (Snowdon 2006)	England	(1) *Gateshead Opportunities for Active Lifestyle* (GOAL) tackling physical health issues amongst adults. Self-referral or referral by health professionals, 13 week programme involving a range of physical activity opportunities, (2) *Healthy schools Programme* – four local primary schools (four half day visits) – increase physical activity, awareness of healthy living	GOAL Initial consultation & completion of health and well-being questionnaire Those that did not complete the course interviewed via telephone. Focus group with those that did complete the course. Topics focus on the referral process, activities, barriers to attendance. HEALTHY SCHOOLS Pre-and post- visit questionnaires with children and staff during first and final visit	Increase visits to woods; woodland-based activities facilitate 'inclusive' learning; weight loss amongst GOAL participants; continued participation in Chopwell Wood activities; raising profile of the woods.	Role of Physical Activity Area Co-ordinator highlighted as important for motivating individuals Lack of transport and low level of awareness of the programme amongst health professionals a barrier Employing key workers on short-term contracts carries the risk that they will leave before the programme ends Quantifiable M&E data could be collected through tracking changing medical needs of participants.

			Focus group with school staff at the end of the programme Questionnaire sent to parents of participating children		
PARK RENOVATION AND PHYSICAL ACTIVITY (Tester and Baker 2009)	U.S.A.	Study of the impact of playfield renovation in two urban parks in low income neighbourhoods plus one control site Both sites were renovated but only one of the parks took park in an initiative to provide a programme of activities	Findings compared at baseline and one year post renovation Observational methods used to compare numbers of visitors to the playfields, gender, stage of life and levels of physical activity (sedentary, moderate and vigorous)	Increase in the average number of children of both genders. Adults and seniors also increased at both parks Increase in female teenagers at the park with programme of activities	Increasing attendance of under-represented groups (e.g. female teenagers) requires more than improvements to built environment.
GREEN EXERCISE PROGRAMME EVALUATION (Hynds 2011)	England	Aimed at hard to reach people with the objective of increasing their levels of physical activity and connection to local greenspaces Eight pilot projects running over 3 years targeting a	Qualitative interviews with 34 participants who volunteered to take part from 6 of the projects (21 adults and 13 young people). Participants were questioned on green exercise/outdoor activities they had	Green exercise programme has enabled a variety of hard to reach groups to access greenspaces and increase levels of physical activity (although questionnaire results showed no significant different between pre-	Due to the diverse nature of the projects and sensitivities associated with the target groups, a flexible and adaptable approach to evaluation was necessary Difficult to detect changes in behaviour without taking a longitudinal approach. This evaluation involved limited contact post-intervention apart from the one follow-up. The most effective route to engaging hard to reach

		range of audiences and offering various interventions Approximately 18,000 people involved	participated in before and after the intervention 8 interviews with project officers or other key workers who were asked to identify how participants had benefited from the intervention, any noticeable differences in participants' attitudes/behaviour and lesson learnt Data collected over two phases: Phase 1 – week 2-3 of the interventions (interviews) Phase 2 – 3-6 months after the end of the intervention or Phase 1 contact (mostly self-completion questionnaires)	and post- intervention activities). Projects have facilitated increased knowledge and awareness of where local greenspaces are, increased confidence, improved social skills, work experiences	groups is through established groups Role of project officer is important – having the same project officer each week can be reassuring for participants A model deemed to be successful for certain target groups (retired or suffering physical/mental health) is to allow participants to volunteer at a greenspace site post-intervention

ACTIVE ENGLAND: THE WOODLAND PROJECTS (O'Brien and Morris 2009)	England	Aim of the programme was to increase participation of under-represented groups in sport and physical activity. Target groups include women and girls, the disabled, Black and Minority Ethnic groups, those under 16 years of age, those aged over 45 and people on low income Interventions include play areas, walking and cycling trails, mountain bike trails, series of events	Focus on 5 woodland projects (3 site based and 2 community forest projects) Development of 17 Key Performance Indicators (KPI) as a focus for quantitative data gathering. 2800 on-site questionnaires completed across 8 sites (starting with a baseline survey) Spatial profiling of the catchment area around each woodland to identify under-representation of each target group Qualitative research with surrounding communities (users and non-users) to explore barriers and benefits of using greenspace for physical activity	Increase in proportion of people (15-44 age category) visiting site-based projects Increase in visits by Black and Minority Ethnic (BME) groups, particularly at site-based projects Investments in infrastructure and equipment at site-based project saw an increase in activities such as cycle, mountain biking and use of play areas	Three-stage evaluation approach more suited to site-based interventions as it easier to track changes through visitor surveys on a single site. Led activities and facilitated access are critical to reaching under-represented groups Led activities run on a regular basis are more likely to bring about sustained changes in behaviour than one-off events Physical activity is often more enjoyable as part of a social experience Including non-users of woodlands in research provides valuable insights into potential barriers. Can be difficult to separate out impacts of Active England from other initiatives

			Interviews with project staff to explore challenges and successes of each project		
WYE WOOD: THE WIDER WOOD (Howie et al 2007)	England	Maximising the health benefit of the wood Aim was to increase opportunities for hard to reach groups and individuals with particular needs to be physically active in the outdoor environment Target groups: older people, young people including those in contact with probation service, people with mental health issues, mothers with young children Programme of activities primarily walking and coppicing	Anecdotal evidence Interviews with 8 participants (2 working on the support side) Focus group with 5 participants (2 working on the support side)	Tailoring activities to suit the target groups Participants like social nature and structure of the activities Building confidence and self esteem Provision of transport where necessary	Lack of available transport an issue for participants Volunteers (e.g. trained walk leaders) important Easier to be product-led than audience led e.g. create a programme of activities and inviting participants. Easier to recruit sign-posted (referred) people Working with one enthusiastic community worker better than approaching many groups and trying to target too many people at once

		Local community project officer (Health Development worker) supporting people on one-to-one basis to make healthy choices			
BTCV GREEN GYM (Yerrell 2008)	U.K.	52 projects across the UK Physical activities linked to environmental conservation Mixture of recruitment – self-referral volunteers and voluntary involvement of 'referred' participants	Introductory and continuation questionnaires – demographic data was collected as well as data on health status, physical activities, motivations for joining green gym and benefits to the community 703 participants completed the Introductory questionnaire Continuation questionnaires completed between 3-8 months 194 participants completed the Introductory and Continuation questionnaire	Green Gym increase health, confidence, skills and training and contributes to the environment	More focus on recruiting participants in a vulnerable state of health, physically and mentally as it is believed that Green Gym facilitate a greater rate of improvement A control group would be necessary More controlled data collection to identify where beneficial effect occur (e.g. types of activities, time periods or locations)

EVALUATION OF CHANGES TO PHYSICAL ACTIVITY (WHI & PTH) (Dawson et al 2006)	England Scotland	Walking the Way to Health Initiative (200 schemes) & Paths to Health Initiative (25 schemes 750 participants in the evaluation Participants predominantly female, in older age group who mostly live alone Led walks	Evaluation aimed to evaluate the extent of changes to physical activity among participants Self- completed questionnaire response rate 75% at baseline, 80% after 3 months and 74% at 12 months Index of Multiple Deprivation index rating based on individual postcodes	Participation in led walks made a significant contribution to overall physical activity Other benefits includes increased confidence and sense of well-being Funded led walks provide socio-psychological support or rehabilitation for people recovering from illness or crises Good retention – at least 72% of respondents had been on a led-walk at least once a fortnight during previous 9 months	Recruitment can be slow – need to increase awareness amongst health professionals

Table 2. Interventions to improve mental health and well-being

Project	Country	Problem Type/ Intervention	Evaluation	Success Factors	Lessons learned
REHABILITATION BACK INTO THE WORK PLACE (Nordh et al 2009)	Sweden	Intervention aimed at participants who suffer from mental fatigue or exhaustion and stress –related illnesses. Three groups (34 participants)- outdoor activities become more physically and mentally demanding over the 10 week intervention. Participants also develop individual mapping (where you are now) and guidance plans (where you want to be and how to get there)	24 out of 34 participants took part in the evaluation. Quantitative: Participants completed 6 psychological questionnaires at beginning and end of programme measuring symptoms of exhaustion, functioning ability and QOL Qualitative: (1) Participant observation and interviews with 9 participants from one group. (2) Telephone interviews 5.5 months after intervention Information sought on participants' satisfaction with the intervention and forest	Participants stated they enjoyed being outdoors, taking part in physical activity, having a routine and being with people who share similar problems and experiences Some improvement in symptoms of illness and functioning	Mapping was a negative experience as it forces participants to think about the future Participants experienced increased anxiety and stress linked to uncertainty about their future, which affected QOL Need to address the difficulties of balancing expectations of individuals with different physical and mental capacities Disappointment amongst participants that there was no follow-up to the intervention. Evaluators felt this type of demanding programme was too advanced for many participants. Participants found quantitative methods too tiring and difficult to complete.

			activities, general well-being and group dynamics		
WOODS FOR HEALTH ON KINNOULL HILL (Greenspace Scotland 2011)	Scotland	Pilot rehabilitation programme for participants' who suffer from mental health issues such as anxiety, depression and schizophrenia 8 week programme based around the John Muir Award to encourage increased knowledge, confidence and self- esteem, reduce social isolation and enable integration back into mainstream community life 8 participants from three mental health services with a staff member from each service also	Two surveys based on personal health and self-esteem completed before and three weeks after the intervention Focus group held with four participants and all staff after end of the pilot to identify and changes in health and wellbeing	7 out of 8 participants completed the programme Confidence and self-esteem increased amongst participants as well as physical activity, social connections, learning new skills and having fun. Staff taking part in activities reduced the identifying tag of mental illness for participants Rangers who participated in the scheme learnt new skills and awareness of specific needs of this group Staff from mental health services cited personal and professional	Not all participants comfortable with taking part in surveys – a need to ensure that participants know it is not compulsory Need more formal monitoring of benefits for support staff Mechanisms needed for capturing where and how improvements in health and wellbeing are explicitly linked to participation in the programme.

		participating		development and improved staff/client relationship	
NATURAL SETTINGS AND CRISES MANAGE-MENT (Ottosson & Grahn 2008)	Sweden	A study investigating how people suffering from a crises (which can affect attention and lead to fatigue, depression) respond to experiences of nature	Questionnaire evaluating frequency stress conditions, level of crises retention, completed by 574 participants included students and patients/people living in nursing homes	This was not based on a specific intervention but the study does highlight that nature has a restorative effect on people affected by crises and that access to nature in everyday life can facilitate rehabilitation	
BRANCHING OUT (Greenspace and conservation on referral) (Wilson 2009)	Scotland	Ecotherapy intervention for participants who use mental health services Referral system Consists of 3 hours of activity per week in an outdoor woodland setting over 12 weeks. Groups of 6 -12 participants. At the point of evaluation the programme had 125 referrals, 110 who attended at least one session and 77	Questionnaire measuring health administered before and one week after intervention Semi-structured interviews with random selection of clients (N=29, maximum of 3 per group), Observational journal (project staff N=2), 2 focus groups (facilitating staff N=8)	Diversity of activities delivered in a non-institutional setting identified as key to success and high attendance rate Physical activity outdoors increased. Clients also reported increased self-confidence and self-esteem. Increased structure and focus facilitates reintroduction to community engagement.	Major limitation – no data collected from those who dropped out as interviews took place during the latter part of the programme representing a lost opportunity to find out more about potential negative dimensions of programme Did not originally seek consent to collect further information No robust method developed to collect data on the extent to which the programme helped clients to become involved in other community activities after the intervention

		who completed the programme. More males than females (20 females completed the programme)		Anecdotal evidence that some clients progressed onto voluntary or higher education work independently	
MENTAL HEALTH ANONGST BREAST CANCER PATIENTS (Cimprich and Ronis 2003)	U.S.A.	Natural Restorative Environmental (NRE) intervention to address 'attentional fatigue' (loss of ability to focus and concentrate) in newly diagnosed breast cancer patients Regular participation in modest and easy-to-perform natural restorative environmental activities before surgery can maintain or improve capacity to direct attention (CDA) Intervention	Sample of 157 participants randomly assigned to intervention and non-intervention group. Many of the participants were showing varying degrees of impairment in CDA CDA assessed 17 days before surgery and 19 days after surgery (before start of radiation therapy or chemotherapy) Participant kept a daily log to record type of nature activity and time spent (minutes) in each activity. Non-intervention group asked to record relaxation time	Those who participated in the intervention showed significant CDA recovery or improvement	More questions raised over whether there is a minimal dose of NRE needed to achieve beneficial effects on cognitive functioning or whether certain types of outdoor activities are more beneficial than others

		involved a home-based programme of exposure to a natural environment for2 hours per week			
FEEL BLUE, TOUCH GREEN (Townsend 2006)	Australia	Pilot project involving people suffering from depression and related disorders in nature-based activities within forests Recruitment based on self-selection and referral from medical practitioners and support workers Participants undertake at least 10 hours of supported nature-based activities	Interviews with professionals to identify barriers to participation Experiences of participating in activities recorded and impacts on health and wellbeing evaluated	Membership of activity groups contributes to better health e.g. more physical activity and a sense of social belonging (increased social capital) Increased mental/spiritual wellbeing from shared fun with others and widening of social circle Mental relaxation	Barriers highlighted e.g. Overcoming fear/lack of motivation to being involved, lack of transport and lack of awareness of the possibilities of becoming involved
ATTENTION PROMOTION SETTINGS FOR PRE-SCHOOL CHILDREN (Mårtensson et	Sweden	A focus on whether the outdoor environment with different play potential can impact on directed	Evaluation instruments used to measure the outdoor environment: (1) outdoor play environment categories (OPEC), (2) sky view	Pre-school children with green, spacious and well-integrated outdoor environments	ECADDES based on observations of teachers. There may be scope for developing cognitive test appropriate to age groups linked to how they experience the outdoors Increased length of time playing outdoors is

al 2009)		intention and involuntary attention (soft fascination) of children in 11 pre-schools	factor Evaluating attention: The Early Childhood Attention deficit Disorders Evaluation Scale (ECADDES)		negatively correlated with attention span
ADVENTURE THERAPY (Bennet et al 1998)	U.S.A	Adults and adolescents who suffer from drug and alcohol abuse. 3 day programme attempting to integrate outdoor therapeutic activities to positively impact on stress, negative thoughts, problem solving, automatic arousal and drug/alcohol craving 13 participants from the relapse prevention programme. A further 18 participants act as a control group	Pre – and post-questionnaires to adventure therapy and control group. Individuals from both groups interviewed 10 months after end of intervention	Authors stress the limitations oft this study but indicate that adventure therapy group showed a reduction in automatic arousal, frequency of negative thoughts and craving.	The evaluation did not measure how long each participant had been in the recovery programme before taking part in the intervention. Some individuals may have been more advanced towards recovery with higher motivation than others. Calls for quantitative post – intervention evaluation in addition to interviews which only provide self-reported results.

Table 3. Improving quality of life in communities

Project	Country	Problem Type/ Intervention	Evaluation	Success Factors	Lessons learned
WOODLANDS IN AND AROUND TOWNS (WIAT) EVALUATION (Ward Thompson et al 2010)	Scotland	Aim to increase the contribution of woodlands to improving quality of life in urban Scotland. The evaluation aimed to measure the impact of WIAT investment on deprived communities in Scotland particularly quality of local environment and benefits accrued in the local population Longitudinal study comparing perception and use of woodlands pre-WIAT (2006) and post-WIAT (2009)	Household surveys 333 (2006) and 334 (2009). Six people took part in both surveys. Sampling quotas for both surveys were similar in terms of age, gender, location, ethnicity and socio-economic background. Questions focused on attitudes. Perceptions and values associated with local open space/woodlands, how this space is used and how it can be improved Environmental audits	Evidence of change in people's attitudes, perceptions and values related to local woodlands in Glasgow (non control site) Environmental audits reveal substantial improvement in physical and spatial quality of case study sites.	Wider contextual factors such as increased car use and other social, environmental and economic interventions may have contributed to positive shifts in QOL. There is a need to monitor other contextual changes Pairing a case study site with control site is a useful tool for identifying changes

		Two intervention sites in Glasgow and Aberdeen with one additional control site in Glasgow			
PROMOTING GREEN SPACE IN STOKE-ON-TRENT (Gidlow et al 2010)	England	Aim to promote and improve neighbourhood greenspace to encourage greater use in deprived areas of Stoke-on-Trent. Baseline data revealed that major barriers for local residents were anti-social behaviour and inadequate facilities Focus on a specific neighbourhood park – selected following community consultation A partnership	Four part evaluation: (1) *postal survey*- Pre- and post-intervention sample of 1075 households – all adults in each household requested to complete the survey. (2) Focus group with adults and young people (3) Direct observation of park use (4) Greenspace quality audit	Perceptions of the park improved amongst those who visit the park Quality audit score identified improvements	Longer follow-up period needed to assess whether there were any changes in use of the park. Direct observations within the time period identified lower level of use although external factors such as other events may explain this. Control data needed

		between local agencies to implement a 12 month intervention including a programme of child/parent and youth activities, introduction of natural play area and other improvement to improve site quality and visibility			
NEROCHE LANDSCAPE PARTNERSHIP SCHEME (Carter et al. 2011)	England	Landscape and heritage-based activities to maximise the vale of the northern part of the Blackdown Hills AONB One of the aims was to attract new and existing users to the area. Activities and projects included long-distance trails, forest school, family days	Evaluation based on experiences and views of the NLPS (1) Interviews with the landscape partnership board, project team, local stakeholder group (representing community interests) and beneficiaries (2) Focus groups with local stakeholder group members and forestry apprentices (3) Questionnaire to	Wide range and diversity of activities enabled existing users to benefit from new experiences and facilitated the targeting of new audiences Various activities promoted increased confidence amongst participants through learning new skills and knowledge about	Speed and scale of tree clearance to open up the landscape was a negative experience for some Care should be taken to identify synergies between partner work streams and projects

		and volunteering opportunities	beneficiaries	the area Giving stakeholders influence and power over design of the programme increased legitimacy and accountability Five members of the stakeholders panel set up the Blackdown Hills Trust to continue the legacy of supporting landscape and community projects	

Appendix 3. Key interventions aimed at improving physical and mental health and well-being

1. CHOPWELL WOOD HEALTH PROJECT
(Snowdon 2006)

The Chopwell Woods Health project focussed on two interventions, one of which involved self-referral or referral by a health professional to woodland-based activities (Gateshead Opportunities for Active Lifestyle (GOAL)). The GOAL scheme included a total of 33 referrals from local GP practices across Gateshead mediated through a Physical Activity Area Co-ordinator (P.A.A.C.). Chopwell Wood was included as part of a broad range of physical activity opportunities available to participants over a 13 week period. There were free activities such as walking or woodland gardening but also some that required a small fee such as cycling and tai chi. The other intervention concerned a programme of four half day school visits to the woods (Healthy School) over the academic year. Four local primary schools were involved with 200 pupils and staff participating in the programme ranging from pond dipping and orienteering to health education.

Evaluation of the Chopwell Woods Health project involved several methods (Snowdon 2006). For the GOAL scheme, each participant was asked to complete a health and well-being questionnaire during the initial consultation with the P.A.A.C. Participants that had been referred were then divided into three categories: completers, non-completers (did not complete the 13 week programme) and those who did not attend the initial consultation or activities (DNAs). The 'non-completers' and 'DNAs' were invited to take part in a telephone interview covering topics related to the scheme, referral process, activities, barriers to attendance and suggestions for improvement. The same topics were covered during a focus group with 'completers', with an additional theme focussed on impacts and benefits of woodland-based activities at Chopwell Woods. Pre-and post-visit questionnaires were completed by children and staff during their first and final visit. At the end of the programme focus groups were also held with school staff to discuss the programme and to elicit opinions on the impact participation in the scheme has had on the children. A further questionnaire was sent to parents of participating children. In addition, the friends of Chopwell wood conducted a survey of visitors over a one year period but the results are not reported here.

Findings from the evaluation of children, staff and parents highlight that woodland-based activities facilitate learning, enabling children of all academic abilities to participate with an increase in environmental awareness and levels of recall. Further, there was an increase in visits to Chopwell Wood by staff, pupils and their families following the programme, an increase in physical activity and a higher awareness of healthy eating. The GOAL programme aimed to improve the health and wellbeing of participants.

Findings indicate that many participants achieved weight loss and anecdotal evidence from the coordinators highlight that most of the individuals continued to participate in Chopwell Wood activities after the programme ended thereby raising the profile of the Wood.

The Chopwell Wood Health Project (Snowdon 2006) helped to establish an effective working partnership between the Forestry Commission, local community and health sector. The role of the P.A.A.C was considered instrumental in promoting the scheme and facilitating continued engagement of participants. However, it was noted that as a pilot project, key workers were on short-term contracts and therefore likely to leave for other employment before the end of the programme disrupting the continuity and relationship building. Key barriers identified in the GOAL programme were low levels of awareness of the scheme amongst health professionals and lack of transport to and from Chopwell Woods (free transport was provided for schools). It was also suggested that quantifiable monitoring and evaluation data could be collected by tracking the changes in medical needs of participants although this would require ethical approval.

2. REHABILITATION BACK INTO THE WORK PLACE
(Nordh et al. 2009)

A Swedish intervention aimed at participants on long-term sick leave suffering from mental fatigue or stress-related illnesses provided activities, recreation and teaching in a forest setting. Activities became more physically and mentally demanding as the intervention progressed. Three groups were set up overall with two groups initially taking part in the intervention followed by a short evaluation and then a third group. Out of 34 participants in the rehabilitation programme which lasted 10 weeks, 24 agreed to take part in the evaluation.

The project used quantitative and qualitative methods to measure symptoms of exhaustion, functioning ability (i.e. so that he or she can return to work) and quality of life. Participants were asked to complete six forms at the beginning and end of the 10 week programme. In addition, one of the researchers observed and interviewed 9 participants that made up one of three groups over a three week period. Interviews were carried out during the walks and took place at the beginning, middle and end of the programme. Telephone interviews were conducted five and a half months after the end of the programme. Qualitative data collection focussed on participants' satisfaction with the intervention, forest activities, their general well-being and how they felt as part of the group.

Participants highlighted that they enjoyed being outdoors, taking part in physical activity, having a routine and being with people who share similar experiences. However, most found that developing a mapping or strategy plan for the future to be a negative experience with the associated pressure to think about the future. The quantitative data suggests that there was some improvement in terms of symptoms of illness and functioning although the quality of life protocols revealed an increase in

anxiety and stress, which was linked to the uncertainty participant's felt about their future after the intervention.

Nordh et al. (2009) note the difficulties of balancing the expectations of individuals with different physical and mental capacities, particularly when taking part in group activities although sharing life experiences with others was a positive aspect. Follow-up interviews post-intervention also revealed that while participants enjoyed the experience they felt that 10 weeks was not long enough. There was also disappointment that there was no follow-up to the intervention such that participants felt that any progress made had not continued. Expectations were mismanaged and lack of clarity from the organisers about the goals and outcomes of the intervention meant that some participants, for example, were expecting work. The authors point out that this type of physical rehabilitation programme may have been too advanced for many of the participants who also found the quantitative evaluation methods tiring and difficult to complete.

3. WOODS FOR HEALTH ON KINNOULL HILL

Greenspace Scotland (2011) has conducted 'Social Return on Investment' evaluations in four urban nature sites. The intervention reported here is the 'Woods for Health on Kinnoull Hill', a pilot rehabilitation programme in Perth, Scotland. Led by the Perth and Kinross Countryside Ranger Service, the Woods for Health scheme involved 8 clients from three mental health services with a staff member from each service also participating. The participants suffered from a variety of mental health issues such as anxiety, depression and schizophrenia. The 8 week programme was based around the John Muir Award (http://www.jmt.org), a non-competitive award which encourages the exploration, enjoyment and care of a wild place. The aim of this programme of outdoor activities is to provide support for participants to increase knowledge, confidence and self-esteem and to reduce social isolation and enable them to integrate back into mainstream community life.

The 'Woods for Health on Kinnoull Hill' evaluation focussed on demonstrating health benefits and used two survey formats both of which were completed before and three weeks after the pilot intervention (Greenspace Scotland 2011). A focus group was also held with 4 of the participants and all staff after the end of the pilot to identify any changes in health and wellbeing as a result of the programme.

Seven out of the eight participants completed the John Muir Award as part of the 'Woods for Health on Kinnoull Hill' programme (Greenspace Scotland 2011). Evaluation results indicate that confidence and self-esteem increased as participants were involved in the making decisions about the activities they were involved in. The fact that staff also participated in the activities helped to reduce some of the stigma associated with being identified as having a mental illness. The pilot intervention facilitated an increase in physical activity, social connections, learning new skills and having fun. There is also evidence to suggest an increase in the speed of recovery during the programme. Several participants have continued on to the next award level. The ranger service and mental

health services also benefited from participation in the scheme with the rangers gaining new skills and awareness relating to the specific needs of this type of group. Staff from the mental health service cited personal and professional development and improved staff/client relationships.

Not all participants felt comfortable in completing the surveys and one of the recommendations from the 'Woods for Health on Kinnoull Hill' programme is to ensure that participants are aware that taking part in the monitoring and evaluation is not compulsory (Greenspace Scotland 2011). It was felt that more formal monitoring of the benefits of this type of programme for support staff was needed as well as mechanisms for capturing where and how improvements in health and wellbeing are explicitly related to participation in Woods for Health (Greenspace Scotland 2011)