



## *CEE review 08-003*

# *THE IMPORTANCE OF NATURE FOR HEALTH: IS THERE A SPECIFIC BENEFIT OF CONTACT WITH GREEN SPACE?*

## *Systematic Review Protocol*

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## 1. BACKGROUND

The presence of a link between the natural environment and human health and well-being is of current interest to a number of organisations within the public health and environmental sectors. On the basis that this link does exist, several organisations have already invested resources in initiatives which use the natural environment in some way as a means of improving public health (e.g. British Trust for Conservation Volunteer's Green Gym; Parks Victoria's Graded Walks). The aim of such initiatives is not only to promote health but also to conserve biodiversity. However, these initiatives can be costly and can mean resources are diverted from other causes: therefore it is important to ensure that there is a strong and scientifically sound evidence-base supporting them.

The literature on the links between the environment and health covers a wide range of issues from effects of nature on psychological health and well-being (Bird, 2007) to the encouragement of exercise (Kaczynski and Henderson, 2007). A growing number of reviews have been produced that draw together the theory and evidence and offer conclusions on the importance of the environment for health. However, work in progress indicates that, in many cases, it is not clear how much the conclusions from these reviews reflect an objective and unbiased synthesis of the literature. Indeed, many explicitly start out with the assumption that there is a positive link and then discuss the ways in which the environment can promote health. Few reviews specifically address the effectiveness of particular interventions, which would be of particular use to decision-makers.

Systematic review methodology is widely employed in medicine and public health as a way of synthesising the evidence for the effectiveness of a particular intervention (Sackett and Rosenberg 1995; Khan *et al.*, 2003), but is only beginning to be recognised in environmental management (Pullin & Knight 2001, Pullin & Stewart 2006). These reviews differ from narrative reviews in a number of key ways. Essentially, the systematic review process comprises the setting of a clear and focused question which the review will address, a comprehensive search of the literature (both published and unpublished), transparent criteria for including studies captured by the search, critical appraisal of studies included in the review, and extraction and synthesis of data from included studies in order to address the review question (Khan *et al.*, 2003; CRD, 2004). Each component of this methodology is important as it allows confidence to be placed in the findings of the review being both unbiased and based on the best evidence available. Systematic reviews of the effectiveness of the natural environment in promoting health and well-being could also inform policy or practice through highlighting an evidence gap.

This project, a collaboration between Natural England and the CEBC, aims to produce systematic reviews on the effectiveness of specific aspects of the natural environment in the promotion of health and well-being. Questions for review have been formulated following consultation with the project stakeholder group through a workshop held in October 2007 together with email correspondence with others. A report on the outputs of this consultation process is available via [www.cebc.bangor.ac.uk](http://www.cebc.bangor.ac.uk). Question formulation was further informed by an appraisal of literature reviews and other relevant reports on the topic of 'the natural

environment and promotion of human health'. A report (Bowler, Knight and Pullin, 2007) on the findings from this appraisal is in preparation and will also be published on the CEBC website. Stakeholders collectively identified 'effectiveness of measures to improve/increase access to natural environments in order to promote health and well-being' as a core question of importance to decision-makers. This breaks down into two sub-questions:

- 1a: How effective is direct accessing of natural environments<sup>1</sup> in the promotion of health and well-being compared with other forms of 'exposure' to the natural environment or with accessing 'synthetic' environments?
- 1b: What is the effectiveness of interventions aimed at increasing access by people to natural environments?

Question 1a is the focus of this protocol. Direct access refers to direct contact with or physically 'being' within the natural environment, while other forms of exposure include viewing nature through a window, in a picture or on a video. Essentially, this question addresses whether the benefits of green space vary with the type of exposure and whether there is an added benefit to exposure to the natural environment versus an indoor or synthetic environment. Given that this question is still very broad, we propose that it be addressed initially through a two-stage review process. The first stage will be a baseline systematic review, which will allow the identification of pools of research to guide the identification of narrower, more focused questions. The second stage of this review process would focus on these narrower questions and begin with the critical appraisal of the evidence selected during the first stage, followed by data extraction and synthesis.

## **2. OBJECTIVE OF THE REVIEW**

### **Primary question:**

How effective is direct accessing of natural environments in the promotion of health and well-being compared with other forms of 'exposure' to the natural environment or with accessing 'synthetic' environments?

### **Secondary questions:**

Do the benefits vary among different types of natural environment?

Do the benefits vary among individuals, for instance, of different socio-economic status?

What are the barriers and facilitators to the natural environment providing health and well-being benefits?

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<sup>1</sup> 'natural environment' is used broadly to refer to all types of green space, which would more accurately be described as 'semi-natural'. This is further defined in section 3.2.

### **3. METHODS**

#### **3.1 Search strategy**

The search aims to capture an unbiased and comprehensive sample of the literature relevant to the question, whether published or unpublished. Different sources of information will be searched in order to maximise the coverage of the search.

##### *3.1.1. Databases*

The search aims to include the following databases:

- 1) PubMed
- 2) EMBASE
- 3) CINAHL
- 4) PsycINFO
- 5) Science and Social science citation index
- 6) SPORT Discus
- 7) ASSIA
- 8) HMIC- Data
- 9) LILACS
- 10) Department of Health's Research Findings Register
- 11) National Research Register archives
- 12) TRIP database
- 13) National Library for Health
- 14) Index to Theses Online
- 15) Directory of Open Access Journals
- 16) National Library for Public Health
- 17) Combined Health Information Database
- 18) Economic and Social Data Service
- 19) Database of Promoting Health Effectiveness Reviews
- 20) Trials Register of Promoting Health Interventions
- 21) Cochrane Collaboration
- 22) Campbell Collaboration

No restrictions will be applied regarding year of publication, language or document type.

##### *3.1.2. Web sites*

An internet search will be performed using the following web sites:

- 1) [www.google.com](http://www.google.com)
- 2) [www.dogpile.com](http://www.dogpile.com)
- 3) [www.scirus.com](http://www.scirus.com)

The first 50 hits from each search will be checked for relevance. Any links present will be followed only once from the original hit.

Websites of specialist organisations will also be searched (listed in appendix A).

### 3.1.3. Search terms

Combinations of the following search terms (where \* denotes a wild card term) will be used to search the databases and internet web sites:

**Health elements:** Exerc\*, Physical activit\*, Walk\*, Health, Restorati\*, Recovery, Therap\*, Well-being, Wellbeing, Well being, Pyscholog\*, Quality of Life, Life satisfaction, Play, Social, Recreation, Self\*, Personal development, Child development, Happiness, Morale, Anxiety, Depression, Stress, Pain

**Environmental elements:** Park, Parks, Green\*, Natural environment\*, Open space\*, Garden\*, Horticultur\*, Wilderness, Countryside, Outdoors, Nature, Biodiversity, Wood\*, Allotment\*

Search terms from each group will be combined using Boolean terms when possible. Some of the search terms may be too ambiguous (e.g. nature and green), generate spurious hits (e.g. **well-being**) or be too complex for some of the above information resources and so search terms and their combinations will be modified accordingly. In health-specific databases, we will only apply the environmental keywords unless excessive hits are generated. Search terms will also be used to identify relevant index headings assigned by the databases, which will also be used in the search.

References of studies included in the review will also be searched for any further relevant citations missed by the above search. Authors will be contacted for provision of any unpublished material or missing data that may be relevant to the review.

## 3.2 Study inclusion criteria

Inclusion criteria will be applied in order to identify the most relevant articles, from those captured by the search, for the review question. Essentially, these criteria define the scope of the review.

Citations captured from computerised databases will be imported into an Endnote library. In the first instance, the inclusion criteria, identified below, will be applied on title only, to remove spurious citations. Articles remaining will then be filtered by the abstract, and further by viewing the full text.

Hits from web searches will be filtered initially with the inclusion criteria on the title and abstract of articles (or introduction section if an abstract is not available), and then at full text. URLs for hits deemed relevant at title and abstract will be maintained within an Excel spreadsheet, and subsequently filtered at full text.

To check for consistency of application of inclusion criteria, two reviewers will apply the inclusion criteria to at least 200 articles, at the title and abstract filter. The kappa statistic, which measures the level of agreement between reviewers, will be calculated. If kappa is less than 0.6, the reviewers will discuss the discrepancies and clarify the interpretation of the inclusion criteria. This may entail a modification in

the criteria specification. After this discussion, one reviewer will apply the inclusion criteria to the rest of the citations.

Each article must meet each of the following criteria in order to be included after each filter. In cases of uncertainty, the reviewer will tend towards inclusion.

**Relevant subject(s):** Human population(s) in any part of the world

**Types of intervention:**

In this review, an intervention does not refer to policies or programmes which enable or encourage specific human behaviour. Instead, it refers broadly to a human action, which may or may not be encouraged by a policy, and falls into one or more of the following categories:

- An activity involving direct interaction with the natural environment e.g. gardening.
- Physically being present in a form of natural environment e.g. hiking
- Other forms of exposure to natural environments e.g. videos, pictures, views from windows
- Physically being present or carrying out an activity in a ‘synthetic’ environments e.g. any indoor environment activity such as exercising in a gym

Previous studies have used a range of words to describe the environment e.g. green space, natural environment and the outdoors. Here, we employ the term ‘natural environment’ in our question to encompass all types of outdoor, urban and rural environments from gardens, allotments and parks through to woodland, forests and so-called ‘wilderness’ while recognising that these environments are not truly natural.

The review does not include studies of the impacts of environmental hazards such as air pollution, or indoor plants and domestic pets.

**Types of comparator:**

The review will include studies that compare at least two of the types of interventions listed above.

**Types of outcome:**

Health and well-being has many components and so a broad range of outcomes will be included. These are expected to fall in the following categories.

- Increased frequency, duration, quality and sustainability of physical activity
- Physical health outcomes, for example, changes in physiological measurements
- Mental health and well-being measures using validated scores.
- Social health such as measures of social contact, play and recreation.

**Potential reasons for heterogeneity:**

There are a number of variables that may explain variation in effectiveness of exposure to the natural environment among studies, which include:

- Exposure is incidental, a health promotion intervention or experiment
- Type of exposure
- Type of natural environment
- Individual factors such as socio-economic group
- Environmental context such as urban or rural

Additional reasons for heterogeneity will be identified with each pool of research identified and may be used in the analysis of the data (section 3.3).

**Types of article:**

There will be no restrictions on year of publication or language, as long as there is an English version of the title and abstract. Only articles which contain empirical data will be included in the review. Narrative literature reviews will be recorded in a separate library and used to search for relevant references.

**Types of study:**

Studies are included if they compare the effect of the intervention and comparator on the outcome. A hierarchy of evidence has been used in medicine and public health which is based on the internal validity of different study designs (Stevens and Milne, 1997). In this review, types of study to be included are: (randomised) controlled trials and studies, cohort or case-control studies. Studies without one of our specified comparators will be excluded.

**3.3. Data extraction and synthesis**

The literature will be grouped into pools of literature on different topics. Summary tables will be produced which present the classification of studies by type of study and study topic. Classification will be developed once studies that meet the above inclusion criteria have been identified.

The availability of quantitative data in each pool will not be known until study classification. If sufficient relevant data is available, we aim to carry out a quantitative synthesis of one or more of the pools of literature, and explore the impact of the potential reasons for heterogeneity. However, where possible, we also aim to extract data from relevant qualitative research and integrate this with the information from quantitative studies. Supplementary searching for qualitative research may be carried out as the pools of literature are identified. The quality of studies will be assessed in terms of the methodology used and conclusions drawn in the review will be weighted by the quality of studies available. This section of the methodology will be developed further when the pools of literature have been identified.

#### 4. POTENTIAL CONFLICTS OF INTEREST AND SOURCES OF SUPPORT

None declared. This project is funded by Natural England.

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#### 6. APPENDIX A

The websites of the following organisations will be searched for publications. This list will be expanded as further relevant organisations are identified.

British Heart Foundation National Centre for Physical Activity and Health  
British Trust for Conservation Volunteers  
Canadian Health Network  
Commission for Architecture and the Built Environment  
Centre for Child and Family Research  
Countryside Recreation Network  
Department of Health  
Environment agency  
EU Cost Action E39  
European Environment Agency  
Forest Research  
Forestry Commission  
Glasgow Centre for Public Health  
Greenspace (including Greenspace Scotland)

Groundwork  
Health Development Agency  
Health Protection Agency  
Institute of Rural Health  
Mind  
Medical Research Council  
National Trust  
Natural England  
The new economics foundation  
NICE  
OPENSspace  
Parks Victoria  
Royal Society for the Protection of Birds  
Scottish Executive  
Sustainable Development Commission  
Sustainable Development Research Network  
Scottish Environment Protection Agency  
Scottish Natural Heritage  
SNIFFER  
Sustrans  
The Nature Conservancy  
The Woodland Trust  
UK MAB Urban Forum  
UK Public Health Association  
World Health Organisation  
Wildlife Trusts  
World Wide Fund for Nature