Does participating in physical activity in outdoor natural environments have a greater effect on physical and mental wellbeing than physical activity indoors? A systematic review

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CRD summary
The authors concluded that there were promising effects for self-reported mental well-being after exercising in the natural environment, compared with indoors. There was a lack of high-quality evidence on which to base recommendations, indicating a need for further research. The authors’ conclusion and recommendations for research are likely to be reliable.

Authors’ objectives
To assess the effects on a person’s mental and physical well-being, health-related quality of life, and long-term adherence to the activity, of physical activity in natural environments, compared with indoors.

Searching
Twelve data sources, including MEDLINE, EMBASE and sources of unpublished studies, were searched up to June 2010. A search strategy was presented. Relevant websites, specified journals (from first issue to April 2010), and the reference lists of reviews and included papers were searched. There were no language restrictions.

Study selection
Eligible for inclusion were studies comparing the effects of outdoor exercise with those of indoor activity (including virtual reality via a helmet or headset). Studies had to report at least one physical or mental health outcome for adults or children. Conference proceedings were included if they provided enough detail to assess the risk of bias.

Most of the included studies were trials; one was a survey. Most were conducted in the USA; one in the UK. Most of the included participants were students (mean age 25 years), and just over half were women. Initial physical activity levels were described as recreational in most cases. All interventions were a single short episode of walking or running indoors, compared with the same activity outdoors (mostly on the University campus) on a separate occasion. Just over half of the included trials had a crossover design, in which participants completed both interventions. Various outcome measures were used (including attitude to exercise), and those for mental health were collected shortly after the intervention. None of the studies reported physical well-being measures, health-related quality of life, exercise adherence, and other long-term outcomes.

It appears that two reviewers selected studies for inclusion. Disagreements were resolved by discussion, with the involvement of a third reviewer, if necessary.

Assessment of study quality
One reviewer appraised the quality of the included trials, and this was checked by a second reviewer. The quality criteria covered various aspects of reporting, and generally accepted criteria for randomised controlled trials. Disagreements were resolved by discussion, with the involvement of a third reviewer, if necessary.

Data extraction
One reviewer extracted the data, and this was checked by a second reviewer. Disagreements were resolved by discussion, with the involvement of a third reviewer, if necessary. Authors were contacted for missing data, where required.

Methods of synthesis
A narrative synthesis, grouped by length and type of intervention, was presented.

Results of the review
Eleven studies were included. Five were randomised controlled trials (RCT), five were non-randomised trials, and one was a survey; total 833 adult participants (range eight to 269). The quality of the trials was considered to be poor.
largely due to sparse reporting.

Exercising in natural environments resulted in a greater improvements in mental health well-being than indoor activity, in six of the seven trials of walking, and in one of the three trials of running (all included competitive runners).

Specific outcomes included greater feelings of revitalisation, enjoyment, satisfaction, and positive engagement; decreased tension, confusion, anger, and depression; and increased energy. The intention to repeat the activity was also greater with outdoor activity (one walking trial, one survey).

It was suggested that feelings of calmness could be diminished after outdoor exercise (four trials; statistically significant in one trial).

Authors' conclusions
This review showed promising effects for self-reported mental well-being after exercising in the natural environment, compared with exercising indoors. There was a lack of high-quality evidence on which to base recommendations, indicating a need for further research.

CRD commentary
The review question and inclusion criteria were clear. Several relevant data sources were searched with no limitations on publication status and language. The review included steps to minimise error and bias. An appropriate quality assessment tool was used and the results were discussed at length. Study details were presented, and the chosen method of synthesis was justified given the wide variation in the outcome measures and in aspects of the interventions. The authors acknowledged the poor generalisability of the findings, given that the trial participants might not have been representative of those who might benefit from the intervention in practice.

This was a well-conducted review. The authors' conclusion and recommendations for research are likely to be reliable.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that large, well-designed, long-term trials were needed to demonstrate the effects on mental and physical well-being in people who are most likely to benefit from outdoor exercise, and in a variety of green spaces. Research should investigate the influence of these effects on the sustainability of physical activity interventions.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.