



What Works in school based natural environment interventions: A scoping review

Research Briefing

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Children and young people in the UK face a number of health and wellbeing challenges. A recent survey indicated that one in eight 5-19-year olds had at least one mental health disorder in 2017, with rates having increased over the past 20 years [1].

The need to focus on equitably improving children and young people's mental and physical health is clear. The school is one of the most important settings and mechanisms through which we can address the health and wellbeing of children and young people. As a result, there is interest in identifying effective interventions and in understanding how educational cultures, practices and environments can be modified or used to support the equitable physical, social, cognitive, and academic development of children and young people. One approach is to use the natural environment as a setting or resource through which the health and wellbeing and academic development of children and young people can be promoted and protected.

This report details the outcomes of a brief, non-systematic scoping review which was intended to contribute to the process of identifying 'what works' in the design and delivery of schools-based natural environment activities used to, or which may plausibly promote health, wellbeing and a number of other academic and environmental outcomes in children and young people.

Key findings

1. There appears to be little available information about the extent of key types of school based natural environment intervention delivery in the UK, there is no comprehensive or regular survey of provision and uptake in the UK.
2. It appears that the evidence on what works in school based natural environment interventions is limited in extent and is patchy. Some of the existing evidence originates from countries other than the UK and it is not clear whether those findings are applicable to the UK context. We do not have a comprehensive understanding of the processes or impacts of the various different approaches or actions.



3. Despite the limitations of the evidence base, this brief non-systematic scoping review indicated that some approaches promote mental health and wellbeing, and a number of educational and behavioural outcomes in children and young people. Outdoor learning is associated with increased academic progress and positive impacts to outcomes such as self-confidence and rates of physical activity. Greener and the greening of school grounds and offsite experiences in local natural environments is associated with children and young people's psychological restoration and with some behavioural, physical health and physical activity behaviours. There is a small amount of evidence to suggest that school gardens and gardening may positively impact mental health and psychological outcomes. There is some, limited, evidence of a number of positive impacts on mental health and wellbeing associated with participation in school based residential trips to natural environments including increases in resilience and capacity to face challenges, improved relationships, enhanced social skills and motivations to learn.
4. The current evidence suggests that school based natural environmental activities can be of particular benefit to disadvantaged and hard to reach groups, as well as for children and young people with mental health or behavioural challenges.
5. In general, both teachers and leaders, and children and young people appear to have positive perceptions of school based natural environment interventions.
6. Many of the programmes and activities are inherently complex, involving many different components such as teaching styles, inter-personal relationships, types and spaces of delivery. There is very little research of the type or quality which helps identify key contributors to success (or lack of). However, some studies do provide some understanding of likely 'active ingredients' in school based natural environment strategies. These include: positive peer and adult-child relationships; development of self-efficacy resilience and perseverance and feelings of competence; experience of alternative styles of teaching and learning; opportunities to develop independence and leadership capabilities; and the improved environmental quality of the school.
7. Effective approaches to school based natural environment intervention design and delivery include: clarity in the approach and intentions of the intervention; involving children and young people in the development and design of interventions; clarity in the approach and intentions of the school based natural environment intervention; progressive experiences; building up to and then building on the natural environment activities through the school's wider educational delivery and linking the activities and the anticipated outcomes to teacher and school leaders' priorities; and supporting teachers and leaders to develop the skills and competencies necessary to bring about the desired change.
8. A more comprehensive set of synthesis studies which aim to critically examine the existing evidence and to help identify and unpick the relative and contextual importance of the 'active ingredients' of school based natural environment programmes is needed.

Background

The English *Mental Health of Children and Young People* survey highlighted the prevalence of mental health disorders amongst children and young people aged 5 to 19 [1]. The survey found that one in eight 5-19-year olds had at least one mental health disorder in 2017 and 5.8% of children were recorded as having emotional disorders in 2017. Older children and young people are more likely to suffer from poor mental health than younger children: 5.5% 2-4 year old children had poor mental health, 9.5% of 5-10-year olds, 14.4% of 11-16-year olds and 16.9% of 17-19-year olds. Nearly a quarter (23.9%) of girls aged 17-19 were found to have a mental health disorder in 2017. At primary school age boys are more likely than girls to suffer from emotional disorders (4.6%, 3.6% respectively) but by secondary school girls are more likely than boys to suffer from emotional disorders (10.9%, 7.1% respectively). The consequences of poor mental health are considerable: children and young people with poor mental health are more likely to be excluded from school (6.8%) in comparison to children without a disorder (0.8%), and are also more likely to suffer from a



physical health condition (71.7%). The burden of poor health in children and young people falls disproportionately on more socio-economically deprived groups [2]. The *State of Child Health Report 2017* found that across every health indicator considered, bar one, deprived children and young people had significantly worse outcomes than less deprived children and young people [2].

The causes of poor health and wellbeing, and delayed educational development, in children and young people are complex and relate to the socio-economic, structural, cultural and physical environments and conditions in which they and their families and carers live, as well as to behaviours, attitudes and activities [3].

Recognition of the school as a fundamentally important context and mechanism through which to address children and young people's mental and physical health has a long history [4]. More recently we have sought to understand how educational cultures, practices and environments can be modified or used to promote health and wellbeing and to support the social, cognitive, and academic development of children and young people [4-6], as well as the development of important health behaviours [7, 8] and the reduction of inequalities in health [9]. There is now an extensive body of literature which has sought to identify effective school based health interventions [4]. One approach is to use the natural environment as a setting or resource through which the health and wellbeing of children and young people can be promoted and protected.

Aims and scope of the review

This evidence briefing details the outcomes of a brief scoping review (non-systematic with no assessment of the quality or reliability of the evidence (see *About the 'What Works in school based natural environment interventions: A scoping review' project* at end of the briefing for details of methodology)) identifying 'what works' in the design and delivery of schools-based activities which facilitate contact with the natural environment and which are used to, or which may plausibly promote health, wellbeing and a number of other academic and environmental outcomes in children and young people. The review has a particular focus on mental health outcomes and on disadvantaged children and settings.

The aim of the review was to support the delivery of the three objectives of the Defra Children and Nature policy programme. The three objectives are to 1) support approximately 500 target schools to establish either greener school grounds or to deliver a programme of progressive regular off-site visits in natural environments; 2) enable school staff to deliver the quality and range of activities needed to support delivery of benefits for children's mental health & wellbeing, their engagement with learning and other programme outcomes; and 3) gather evidence to complete project monitoring and project reporting and to support programme evaluation (12 month follow up) [10].

The aims of the report are to provide an initial indication of 'what works' for those involved in designing, funding and commissioning schools-based natural environment health interventions. The report is aimed at decision makers primarily in the educational, environment, and planning sectors who may need to know more about if and how schools based natural environment interventions work.

Characterising school based natural environment based interventions and activities

There is much variation in how the environment is used as a setting or tool in health promotion within or through the activities of the school. Examples of four key strategies include:

1. Modifying the school setting to encourage or facilitate changes to behaviour, physical activities and so on.
2. Using the natural environment (campus, local or more distant) as a setting for educational delivery with co-beneficial outcomes (e.g. mental health).



3. Using the natural environment (campus, local or more distant) as a setting for delivery of specific targeted interventions (e.g. for mental health outcomes) delivered through the school.
4. Modifying school culture, practices, and attitudes and so on to encourage or facilitate use of natural environments for educational delivery or for specific targeted interventions.

Some school based natural environment strategies integrate established and well evidenced mental health promotion approaches such as cognitive behavioural therapy or social and emotional learning. However, beyond those formal and direct intervention approaches there are a number of ways in which school based natural environment strategies may influence the health and wellbeing of children and young people:

- Provision of opportunities for increased, or different forms of physical activity. Physical activity may be integrated into the wider learning process or a result of other actions.
- Opportunity to develop new and improved relationships with teachers and peers.
- Educational experiences away from the institutional setting of the school and the inherent norms and cultures of the classroom.
- Opportunity to learn about, develop and demonstrate different skills.
- Developing resilience and self-confidence through taking on challenging tasks.
- Hands on 'real-world' learning, grounding theoretical, abstract concepts.
- A fun, enjoyable experience.

Extent of school based natural environment based interventions and activities

There appears to be little available information about the extent of the four key types of school based natural environment intervention strategies and activities in the UK. A recent review of outdoor learning [11] found that although there is no comprehensive or regular survey of provision and uptake in the UK, several studies show falls in the use of resources such as Field Studies Centres since the 1960s and 70s for subjects such as geography and biology and significant variation in provision within and between Local Authority areas. Despite these potential falls in uptake, many organisations are involved in trying to expand provision of school based natural environment activities. Organisations such as the Royal Society for Protection of Birds offer free taster sessions for schools on its reserves, the Royal Horticultural society runs a Campaign for School gardening, and the London Mayor has made £300,000 available to help improve air quality through school greening programmes [12].

What works in school based natural environment based interventions and activities

The evidence relating to what works in school based natural environment interventions is patchy. There are, however, relatively established bodies of evidence relating to specific types of activity such as adventure education in natural environments.

There are a small number of reviews of different types of school based natural environment interventions, the majority of which did not follow formal systematic review methodologies such as that promoted by the Campbell Collaboration¹ [11, 13-20]. As a result of this small body of evidence we do not yet have a comprehensive understanding of the processes or impacts of the various different approaches or actions [11].

¹ <https://campbellcollaboration.org/> The Campbell Collaboration supports the production of evidence syntheses on topics including education. There is a specific Education sub-group <https://campbellcollaboration.org/about-campbell/coordinating-groups/education.html>



General school based natural environment programme outcomes

There is evidence, from a systematic review and a number of primary studies that outdoor learning is associated with increased academic progress of positive impacts on academic performance and motivations to learn, and with positive impacts on outcomes such as self-esteem and confidence, trust within relationships and a sense of belonging. Further evidence indicates higher rates of physical activity and that school based natural environment activities are associated with short term positive outcomes relating to care and concern for the environment.

Greener and greening of school grounds

The majority of the evidence regarding the benefits of greener school grounds relates to mental health or psychological and physical activity outcomes. The small body of evidence identified suggests that greenspaces in the school setting are associated with children and young people's psychological restoration. Studies have suggested that natural spaces within the school setting provide a refuge for some children, allowing them to escape from pressures and problematic peer or student-teacher relationships, as well as to gain perspective. There is some evidence to suggest that greener school grounds are associated with more positive activity outcomes; greener school grounds appear to facilitate exploratory behaviours, affording children opportunities to investigate a wider range of physical abilities than traditional play settings may allow. It is important to note that not all children will be attracted by more natural spaces. Some children may just not be interested, others may be reluctant to get dirty or messy, and for some natural spaces don't provide a context in which they can undertake the types of activities they are most interested in (e.g. ball sports).

School gardens and gardening

One systematic review was found relating to the health and wellbeing impacts of school gardens and gardening activities [21]. The limited available evidence suggests that there may be a number of positive impacts on mental health and psychological outcomes, and physical activity rates. Benefits include enjoyment and feelings of achievement, satisfaction and pride from nurturing and watching plants grow and the enjoyment of harvesting crops. The majority of the qualitative studies included in the systematic review described how school gardening allowed children, particularly those with learning difficulties, to grow in confidence and self-esteem [14].

Greener community settings

The evidence of whether greener community settings relate to positive health, educational and environmental outcomes originates predominantly from the United States of America and, while it is mixed, does suggest that greater amounts of certain types of natural environment (typically trees) in the community setting of schools is associated with higher academic achievement and psychological outcomes. A controlled Spanish study found that greener school community settings were associated with greater ability to cope with stressful life events and lower overall rates of stress in a sample of urban children [21].

Offsite experiences in local natural environments

The evidence, while mixed (with some studies finding no effect) suggests that regular use of local natural environments can be associated with a number of positive mental health, wellbeing and psychological outcomes, and with increases in physical activity. There is also some evidence that specific activities such as Forest School may have positive impacts on behaviour, particularly for children with pre-existing behavioural difficulties. A comparative study for the US found that children's engagement with learning was significantly better after a lesson in nature in comparison to a previous indoor lesson [22]. There is a small body of evidence that suggests regular educational experiences in local natural environments are associated with greater environmental awareness and empathy and can improve knowledge of local environments



Residential programmes

Although mixed, there is some limited evidence of a number of positive impacts on mental health and wellbeing associated with school based residential trips to natural environments including increases in resilience and capacity to face challenges, improved relationships and enhanced social skills. There is also some evidence of increases in student motivation to learn associated with residential experiences and connection to nature.

The impacts of school based natural environment based interventions and activities for disadvantaged and hard to reach groups

The evidence suggests that school based natural environment activities can be of particular benefit to disadvantaged and hard to reach groups, as well to children and young people with mental health or behavioural challenges. However, the existing evidence is drawn from small scale studies, is patchy on exposure, activity and outcome, and is highly heterogeneous in method.

Key pathways to benefit

While very little of the available research is able to provide evidence of cause and effect, some studies do provide a greater understanding of likely 'active ingredients' in school based natural environment strategies, some of which relate to the wider evidence base of schools based mental health promotion strategies [4]. Natural spaces in the school environment and trips to local or more distant natural environments may help create the conditions in which children and young people's health and wellbeing and learning outcomes are positive impacted by:

- Forming positive social relationships.
- The development of non-cognitive skills such as resilience and perseverance. Helping children and young people in their development of self-efficacy, in new and different skill sets, and feelings of competence. Additional skills development may subsequently impact wider academic achievement.
- Providing opportunities to develop independence and leadership capabilities.
- Giving children a 'break' from place based stresses and anxiety and from normal routines.
- Facilitating increased opportunities for higher intensity, and more varied forms of physical activity.
- Allowing children to take part in 'risky play' and physical activity.
- Contributing to development of supportive school cultures, sense of belonging and a supportive academic community.
- Improved environment quality of the school.

Using broader evidence to understand benefits and pathways

High level evidence (systematic reviews, reviews of reviews, meta-analyses) can be used to examine the evidential backing for some of the key pathways theoretically linking school based natural environment activities and approaches to the key outcomes. This robust evidence suggests that many, but not all, of the key pathways identified are plausible.

Design and delivery of interventions

There are a number of design and delivery factors which are linked to positive outcomes. These include:

- Clarity in the approach and intentions of the school based natural environment intervention.
- Involving children and young people in the development and design of school based natural environment interventions.
- Progressive experiences.
- Integrating the natural environment activities through the school's wider educational delivery.



- Mitigating the potential of natural environment activities on teachers' workloads.
- Supporting teachers and leaders to develop relevant skills and competencies.
- Working with the wider community.
- Ensuring that the experience avoids *unnecessary* risk and is not detrimental to students' wellbeing, welfare or academic progress.

Following best practice in the targeting of interventions and identification of populations of interest is crucial for mental health interventions. Furthermore, providers should be aware of the highly complex ethical considerations of mental health and behavioural interventions in the school setting [4].

School based natural environment intervention and activity evidence needs

A more comprehensive set of synthesis studies which aim to critically examine the existing evidence and to help identify and un-pick the relative and contextual importance of the 'active ingredients' of school based natural environment programmes and activities is needed. The collection of consistent data about the type, extent and reach of school based natural environment activity would help track progress of efforts to promote the approach and ensure equity of engagement.

Conclusions

The evidence indicates that the key school based natural environment activities or exposures may be linked to a range of positive outcomes, with indications of particular benefits for disadvantaged children and young people, and for those suffering with health or behavioural issues. One of the strongest arguments for many forms of schools based natural environment activity is the potential for co-benefits. The greening of school grounds, for instance, has the potential to impact on the health and wellbeing and environmental attitudes of children and young people through several concurrent pathways.

Currently, however, our understanding of what works is limited by a patchy evidence base, a high percentage of lower quality studies with a reliance on self-reported or teacher assessed outcomes, and little understanding of how programmes do, or do not, work. The challenge now is how to use the existing evidence base to design robust interventions which are equitable in outcome and which complement and build on wider classroom-based learning so as to ensure sustained outcomes.

About the 'What Works in school based natural environment interventions: A scoping review' project

A non-systematic scoping review of published and grey literature evidence was used to provide an initial assessment of what is known about the process and impacts of nature-based interventions and activities in schools. Evidence relating to the key programme components was prioritised. Evidence relating to the impact of factors such as multi-component activities, targeting, activity scale and approach, and activity context and setting on outcomes, was also sought.

The review was not systematic or exhaustive but instead aims to indicate the extent and nature of the variety and range of current evidence of 'what works'. The review focuses on current or recent (e.g. previous 10 years) evidence and practice within the UK but does incorporate evidence relating to elsewhere in the world where relevant.

Evidence and practice from elsewhere in the world was included if it was considered to be relevant to the UK context. Techniques common to rapid evidence review methodologies were used to identify evidence. Due to the resources available for the review a combination of targeted searches (i.e. focusing on specific interventions and/or populations) and iterative approaches (for example searching existing evidence reviews) were used. The quality or reliability of the evidence identified and included has not been assessed.



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