

# Some Impacts on Health and Wellbeing from School-Based Outdoor Learning



Sue Waite and Jennie Aronsson

## 1 Introduction

In this chapter, we explain some contemporary challenges to public health, focusing on the case for England and similar Western societies. We argue that school-based outdoor learning represents a medium through which health and wellbeing promoting initiatives to address these challenges can be distributed more equitably. We describe three case studies that illustrate how schools might implement and monitor such initiatives and discuss their implications for making schools a focal point for developing happier and healthier people.

## 2 Public Health Challenges

The health of those living in more deprived areas in England is worsening with health inequalities increasing over the last decade (Marmot et al., 2020). This is reflected in a range of health and wellbeing outcomes across the life span (Public Health England (PHE) 2019a). One of Public Health England's top priorities for 2020–2025 is to give each child the best start in life and the foundations of good health into adulthood (PHE, 2019b), yet children today increasingly face physical and mental health challenges. For example, about one quarter of children aged 4–5 are overweight or obese; by the age of 10–11, this number is a third (NHS Digital, 2019). In both age

---

S. Waite (✉)  
Church Road, Lympstone EX8 5JT, Devon, UK  
e-mail: [S.J.Waite@plymouth.ac.uk](mailto:S.J.Waite@plymouth.ac.uk)

J. Aronsson  
School of Nursing and Midwifery, University of Plymouth, Rolle building Level 4, Drake Circus,  
Plymouth 4 8AA, UK  
e-mail: [jennie.aronsson@plymouth.ac.uk](mailto:jennie.aronsson@plymouth.ac.uk)

groups, children living in the most deprived areas are twice as likely to be obese as those living in the least deprived areas (ibid). Children and young people nowadays spend a lot of time on screens. This is associated with a higher calorific intake together with missed opportunities to be physically active, socialise and get a good night's sleep—activities that promote good health and wellbeing (Royal College of Paediatrics and Child Health, 2019). In England, one in eight children aged 5–19 suffers from at least one mental disorder; a number that has increased over the last 20 years (NHS Digital, 2018). Mental health problems have been exacerbated by the COVID-19 pandemic, particularly in children and young people from socioeconomically deprived households, with reports of sleep difficulties, feeling lonely and worrying about leaving the house (Newlove-Delgado et al., 2021). Spencer (2013) presents a range of adverse child health outcomes that would be reduced by between 18 and 59% if all children had the same outcomes as those most socially advantaged. There is an urgent need to address such health inequalities and enable all children and young people to access health and wellbeing promoting initiatives, such as spending time in greenspaces (Roberts et al., 2020).

### **3 What School-Based Outdoor Learning Offers in Terms of Universal Access**

Unfortunately, inequalities in public health challenges are also mirrored, and indeed intensified, by uneven access to quality natural environments, which can offer so many benefits for health and wellbeing. Areas of deprivation usually have inferior quality public greenspace (Schüle et al., 2019). Inadequate access to and use of good quality greenspace exacerbates poor health outcomes for deprived communities (Allen & Balfour, 2014), yet these communities can potentially gain most from such spaces (Lovell et al., 2020). Monitoring of Engagement with the Natural Environment (MENE) surveys over a period of years have shown that infrequent users of greenspace tend to be people who are: female; older; in poor health; of lower socioeconomic status; with a physical disability; ethnic minorities; living in deprived areas; with less local access to greenspace; and living further from the coast (Boyd et al., 2018). This enormous data set has enabled analyses that show marked disparities in the amount of time families from low socioeconomic groups and ethnic minorities spend in green spaces. This may be due partly to the quality and amount of green space in local parks in areas of deprivation, problems in affording additional costs such as travel and food to go to more distant green spaces as well as cultural mismatches in current offers supporting engagement (Waite et al., 2021). However, adults spending just two hours per week in greenspace are more likely to experience better health and wellbeing than those who do not, regardless of whether they have one long, or several short visits, who they are and where they live, or what kind of natural environment they visit (White et al., 2019). The effect on their health was equivalent to improvements through living in an area of lower deprivation; being

employed in a higher social grade occupation; and achieving recommended levels of physical activity (PHE, 2020).

A similar situation has been noted in the US, where access to nature is also divided along cultural and socioeconomic fault lines (Warren et al., 2014). There are attempts to redress these inequalities through community-based initiatives<sup>1</sup> but these approaches are frequently hampered by ongoing problems in attracting ‘hard-to reach’ groups (Waite et al., 2021). The fact that most children attend school irrespective of cultural or socioeconomic background presents a useful entry point for inclusive access to natural environments and healthy lifestyle programmes (Day et al., 2019). A further advantage of schools being a principal access point to nature is that they can embed outdoor learning provision *within* the curriculum (Waite et al., 2016), so that extra time and resources are not required to spend time and be active in nature.

## 4 Health and Wellbeing Responsibilities of Schools

Schools today are expected to provide a healthy learning environment, which promotes physical and mental health and wellbeing opportunities in addition to education. The World Health Organisation (WHO) developed the health promoting schools (HPS) concept in 1992, with a recent launch of a new initiative to make every school a health promoting school by developing and promoting global standards for HPS (WHO, 2020). In England, health and wellbeing is embedded within the Relationships Education curriculum, compulsory in primary schools since September 2020 (Department for Education, 2019). As part of this curriculum, children learn about the benefits of time spent outdoors; however, it is up to individual schools how this is implemented. Schools may choose to re-evaluate their school grounds from the perspective of providing high-quality outdoor learning environments, installing school gardens, wildlife zones and areas that can be used in all weathers with open-ended play materials, such as logs, boxes, tyres. These features can offer greater awareness of healthy eating, appreciation of and attachment to other species and enhanced physical mobility and creative play. Schools may offer lessons that enable children to learn about the natural environment and sustainability; whilst others engage pupils in curriculum learning outside the classroom across a broad range of subjects and topics.

Several countries have adopted this integrated approach to outdoor learning, for example Denmark, where *udeskole*—regular curriculum outdoor learning—is becoming more widespread supported by governmental policy (Mygind et al., 2019), or Finland, where there is a requirement to adopt experiential education in outdoor environments within the national curriculum (Sjöblom & Svens, 2019).

---

<sup>1</sup> WWF: People and Communities. <https://www.worldwildlife.org/initiatives/people-and-communities>; Children & Nature Network: Cities. <https://www.childrenandnature.org/cities/> (both accessed 30/4/2021).

## 5 Combining Educational and Health Outcomes

There is growing evidence that spending time outside in natural environments, often school-based, is associated with improvements in children's skills and development (Lovell et al., 2020; PHE, 2020). Green school grounds that include natural features are associated with better behaviour and attention restoration (Fiennes et al., 2015), better learning processes and outcomes (Natural England, 2016a), and attainment of higher levels of achievement than control groups in reading, mathematics, science and social studies, physical education and drama (Browning & Rigolon, 2019). Waite et al. (2016) attribute these educational improvements to children's enjoyment of, and greater engagement with, their lessons and their experiences of success through different pedagogies and places, which together raise their self-confidence and motivation to learn. The number and breadth of research reports from multiple perspectives and disciplines have reached a critical mass, strongly indicating that positive educational and wellbeing outcomes for children derive from increased opportunities to learn in natural environments (e.g. Natural England, 2016a, b). Evidencing educational benefits is necessary to persuade school leaders to adopt such practices.

Additionally, time in nature and outdoor learning have been shown to increase physical activity levels and reduce sedentary behaviour (Calogiuri & Chroni, 2014; Aronsson et al., 2015; see Mygind: *Udeskole—Pupils' Physical Activity and Gender Perspectives* in this volume), and positive associations between access to greenspaces and mental wellbeing have been observed, including reductions in attention deficit and hyperactivity (McCormick, 2017; Tillmann et al., 2018). Vanaken and Danckaerts (2018) suggest these effects on mental health and wellbeing vary depending on children's developmental stages and types of environment. Thus, outdoor learning has demonstrable potential to combine health and wellbeing outcomes with educational aims.

In the following sections, we describe three projects that illustrate ways in which outdoor learning can make a valuable contribution to decreasing sedentary behaviour; supporting children's sense of wellbeing and enjoyment of school; and contributing to teachers' own wellbeing.

## 6 Case Study 1: Woodland Health for Youth (WHY): Where to Maximise Physical Activity

The first case study outlines a small-scale partnership between health, education and environmental sectors: the Woodland Health for Youth (WHY) project, undertaken in the spring of 2014 and funded by Plymouth University's Faculty of Health, Education and Society, the BIG Lottery programme *Good from Woods* and the Plymouth City Council's Green Infrastructure Team. A specialist community public health nurse/school nurse was employed as a practitioner-researcher working collaboratively with a local primary school that delivered learning outside the classroom

in natural environments. This form of outdoor learning was supported through the Natural Connections Demonstration Project (Waite et al., 2016, see Passy & Blackwell: [Natural Connections: Learning About Outdoor-Based Learning](#) in this volume).

The aim of the WHY project was to evaluate the physical health benefits of outdoor learning through an action research approach. Meyer and Cooper (2015) describe action research as an approach to improve practice through a participatory research process in a real-world context. Adopting this approach, the practitioner-researcher participated in outdoor sessions at the primary school, helping the teaching staff with group management. This facilitated an understanding of the context of outdoor learning sessions and an insight into the participating children's views. Observations, discussions, thoughts and ideas were captured through a reflective log.

The school where the research took place was situated in an area of high deprivation, with many parents reliant on state support. At the time of the research, a year 2 class had weekly outdoor lessons—some within the school grounds and some in a nearby woodland. Participants were recruited from this class through information letters sent to all parents/carers of the 25 children in the class; the first ten consent forms (of equal gender distribution) returned were included in the study. Due to one girl's parent withdrawing her from the study, a boy took her place, resulting in six male and four female participants.

Quantitative data measuring children's physical activity were collected through accelerometry. An accelerometer is a device that measures acceleration of movement, which is subsequently translated into different levels of physical activity. The WHY study used wrist-worn accelerometers which had been validated on children, with cut-points developed by Phillips et al. (2011) to translate raw data into physical activity levels. For five weeks, the ten participants wore their accelerometers on the day when they had their outdoor learning session. Through statistical data analysis, activity levels during their morning indoor lessons were compared to the activity levels during their afternoon outdoor session, to test the hypothesis that children are more active when they learn outdoors.

Meyer and Cooper (2015) argue that any type of data can be collected in action research depending on the social situation and the evolving research process. The reflective evidence collated by the practitioner-researcher during outdoor learning included comments made by children:

This is fun! (girl looking for insects on a tree)

I love nature. (boy in the woodland)

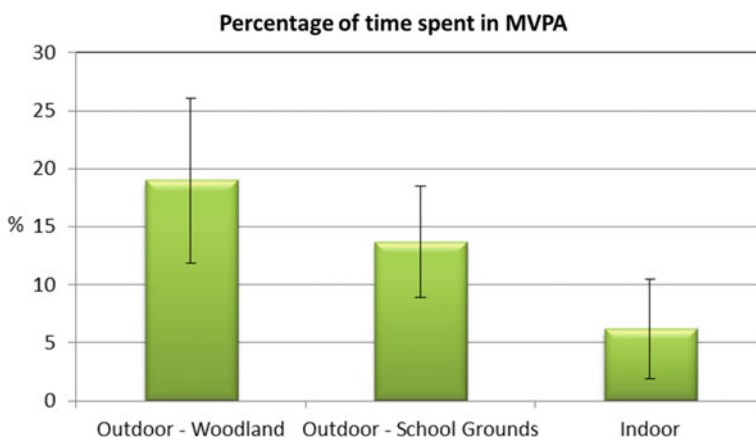
I can feel the sun in my face and the fresh air. (girl in the woodland)

Correspondingly, children were observed as active during outdoor learning; when allowed, children would run instead of walk, climb on fallen trees and tree stumps, throw stones in the stream, jump between rocks, use a stick to dig in the soil and so on. The children's body language, together with their comments, reflected the joy that these activities and the outdoor environment engendered. This is likely due to a combination of well-documented mental health benefits for children that come

with accessing the outdoors (McCormick, 2017) and mental health benefits related to being physically active (Department of Health and Social Care, 2019). Observational data also highlighted many other skills that developed through outdoor learning, including gross and fine motor skills; risk-taking behaviour and safe practice; curricular learning such as literacy and biology; creative activities such as art and imagination; social skills such as listening, taking turns and working together on a project; and building confidence and self-efficacy.

The main focus of the accelerometry measurements was to compare moderate-to-vigorous physical activity (MVPA) between outdoor and indoor lessons, as there is a national target in England for children aged 5–18 to spend 60 min or more a day in MVPA (Department of Health and Social Care, 2019). Additionally, the national recommendation stipulates a need to minimise sedentary behaviour, so we compared the proportion of time spent in sedentary phase during outdoor compared to indoor lessons. The results showed that children spent a significantly larger proportion of the time in MVPA during outdoor learning sessions ( $17.0\% \pm 6.7$ ) than during indoor lessons ( $6.2\% \pm 4.3$ ),  $p < 0.001$ . Since some outdoor sessions were held in the school grounds and some in the nearby woodland, a sub-analysis was performed to explore whether there was a difference in physical activity levels between the two; this showed significantly higher levels of MVPA during woodland outdoor learning ( $19.0\% \pm 7.1$ ) than during school grounds outdoor learning ( $13.7\% \pm 4.8$ ),  $p < 0.05$ . Figure 1 shows the difference between the proportion of time children spent in MVPA depending on if they were engaged in woodland outdoor learning, school grounds outdoor learning, or an indoor lesson. Furthermore, children spent a significantly smaller proportion of their time being sedentary during outdoor sessions ( $44.2\% \pm 11.6$ ) than during indoor lessons ( $60.4\% \pm 11.0$ ),  $p < 0.001$ .

The WHY project indicated through a range of data that children were more active during outdoor sessions than during indoor lessons, and that this had a positive effect on their physical health and mental wellbeing. The higher levels of physical activity



**Fig. 1** Percentage of time spent in MVPA

in the woodland compared to the school grounds might be explained by the bigger and less familiar space that the woodland offered compared to the school grounds. Passy and Waite (2011) identify several benefits to woodland-based learning, including greater freedom, wilder and more natural space, child-led learning, negotiated boundaries, created activities and managed risk. Our study was undertaken in an area of high deprivation, which is a known factor in reduced access to, or use of, green spaces (Boyd et al., 2018). To expose children to natural environments as part of the curriculum removes these barriers and provides all children, regardless of their socio-economic background, the same opportunities to learn, explore, and enjoy the health and wellbeing benefits of being outdoors.

## **7 Case Study 2: Mapping and Measuring Healthy Outcomes: Capturing School Progress**

In this next case study, we look at how schools can monitor physical activity and wellbeing to inform school development for pupils' health and wellbeing.

The Mapping and Measuring Healthy Outcomes (MMHO) research project was funded by the Naturally Healthy Devon Schools (NHDS) Project partnership of the Campaign to Protect Rural England (Devon), Natural England, Devon County Council and Plymouth University's Institute of Health and Community. The NHDS project was intended to help schools to align outdoor learning and the promotion of health and wellbeing through reducing sedentary behaviour during schooling. MMHO was small-scale research that supported the evaluation of NHDS by exploring school-friendly methods of assessing physical activity levels and wellbeing.

Accelerometers are commonly used to measure and inform health related research with both adults and children, but the cost and complicated analysis of accelerometer data are generally prohibitive for regular school-based assessments of physical activity (PA). While self-report is generally considered appropriate to measure subjective wellbeing as this concerns how an individual feels about their wellbeing, it may be biased by social desirability responses in reporting actual physical activity levels (Robson, 2011). Furthermore, Baquet et al. (2007) warn that children's PA patterns are highly variable compared to adults and that they may be less able to self-report accurately. On the other hand, the competence of children to be actively involved in research is often underestimated (Alderson, 2000), especially within medicalised literature (Montreuil & Carnevale, 2016). Our study provided an opportunity to explore whether children aged over 7 years would be capable of assessing how physically active they had been in lessons. We also considered it important to discover the extent to which less expensive technical measures, such as pedometers, might give practically valuable information for schools about pupils' levels of PA and sedentary behaviour, given schools' role in monitoring weight and reducing risks of obesity through Relationships Education responsibilities. The value of using

three methods was not only that we could triangulate the results, but that children might become more aware of their PA through comparisons of their self-report and objective measures. Children's involvement in monitoring their PA would give them agency in making changes in their behaviour, whilst also offering opportunities for curricular maths, science and Relationships Education.

Over a summer term in 2015, children aged between 7 and 10 years from two primary schools in Devon, England, were given pedometers or accelerometers and questionnaires to measure sedentary behaviour and levels of PA. The two schools were purposively chosen as they were interested in finding out more about the benefits of outdoor learning. The pedometers measured the number of steps; the accelerometers measured the intensity of the activity levels; and the questionnaires were devised as a comparative tool using self-report.

For the questionnaire, children and teachers were asked to rate their perceptions of levels of activity during lessons inside or outside using a four-point scale, linked to categories of physical activity recorded by the accelerometers—sedentary, low-level, medium-level and vigorous. By comparing the quantifiable questionnaire responses from teachers and pupils with quantitative data from the measuring instruments, we intended to assess the accuracy of pupils' and teachers' perceptions of children's PA and determine whether perceptions of levels of activity correlate with actual PA.

The results were analysed using SPSS. Cross-tabulations showed that when children's responses were compared to the total counts per hour for sedentary, light to medium and moderate to vigorous activity levels, they correlated with the objective measurements to a statistically significant degree ( $p < 0.05$ ).

The descriptions of activity level that discriminated most successfully in terms of objective measurement were "I moved and ran around most of the time" and "I mostly sat down a lot". These statements are in line with national targets for children aged 5–18 years not only to spend more time in moderate-to-vigorous physical activity but also to minimize sedentary behaviour (DHSC, 2019). Combining the intermediate categories (light and moderate physical activity levels) provided the best fit with the pedometer and accelerometer data, suggesting that children found it more difficult to distinguish finer grades of activity levels.

Figure 2 illustrates variation in individual interpretations and uptake of opportunities to be more physically active, but that on average, self-report represents PA as measured by pedometers. Similar individual variation was noted in the WHY study.

Comparisons of pupil responses with teacher reports can help to identify children who are outliers, perhaps very active in class or mostly static, even when outdoors. In the WHY project, there were marked differences between individual levels of PA in woodland, school grounds and during outdoor learning and play times. The differences between individual children's activity levels during outdoor learning were flatter compared to during free play, possibly because assigned learning tasks incorporated requirements for more PA by all children.

As Fig. 3 shows, while children and teacher assessments correspond on average, interesting anomalies may be missed. Taken together, case study 1 and 2 point to the value of outdoor learning sessions in motivating less-active children to move more, and the positive contribution that monitoring PA can have in identifying less-mobile



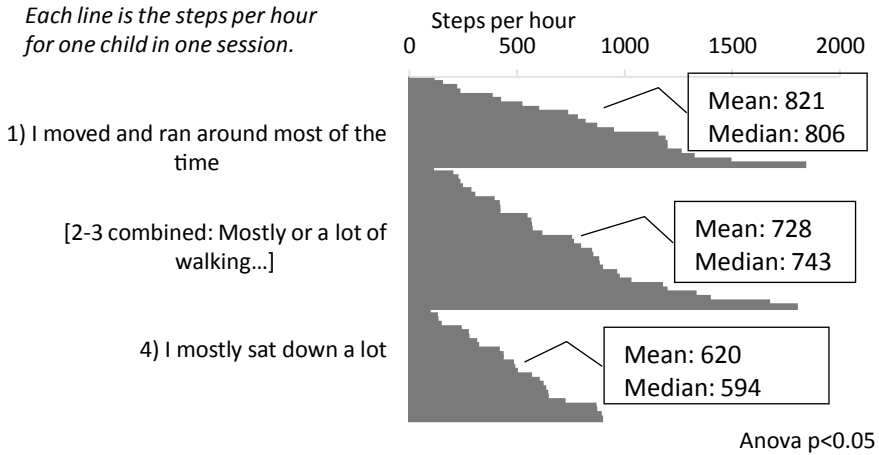


Fig. 2 Comparison of pedometer steps and self-reported activity levels

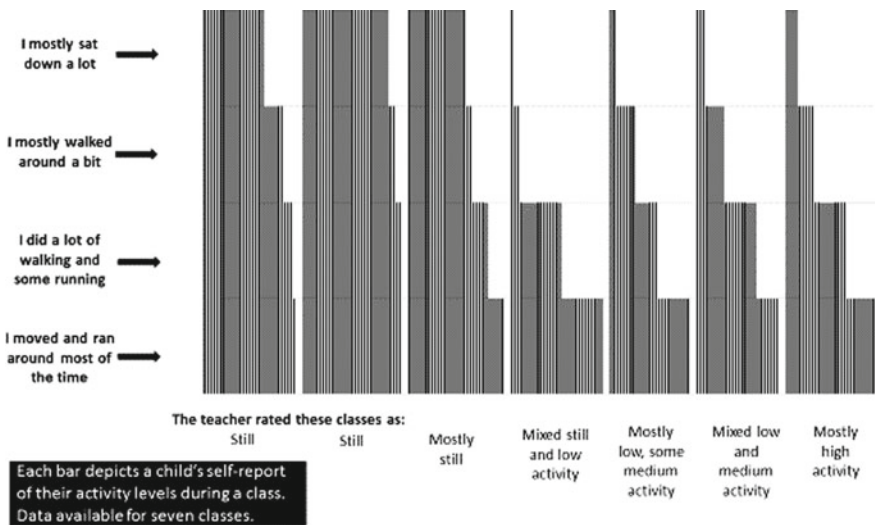
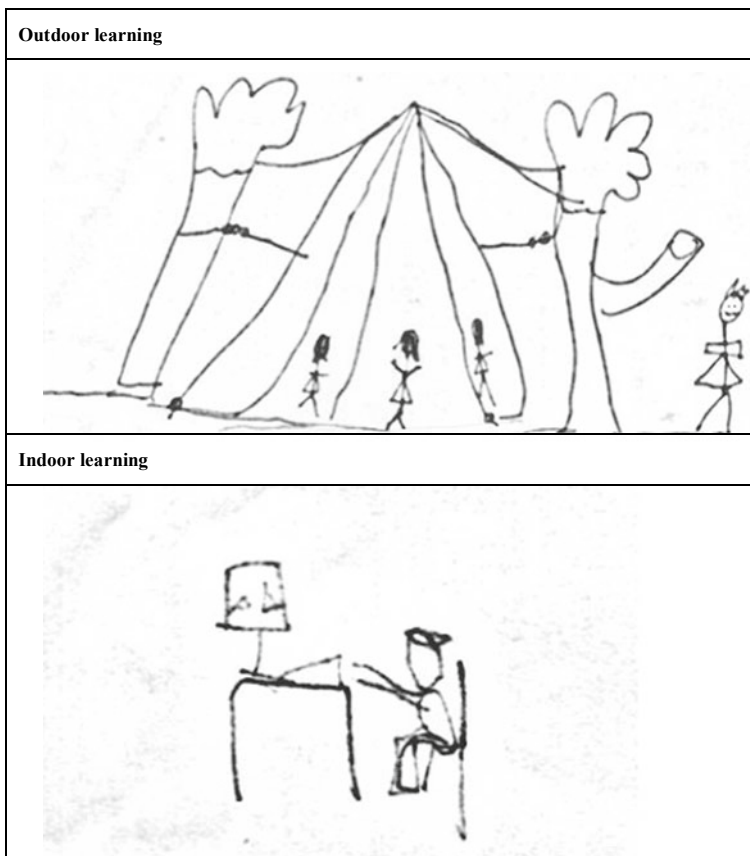


Fig. 3 Comparison of pupil and teacher perceptions of lessons

children. Greater awareness on the part of teachers and children of mismatches in their assessments, coupled with corroboration through pedometers, could help address meeting the needs of outliers in terms of appropriate physical activity levels for different lessons. The WHY project showed that outdoor learning provided a more equitable and consistent way of increasing physical activity levels for all children, compared to breaktime when greater variations were seen between individual children.

Our study also used qualitative methods that showed how lessons inside and out might be differently experienced by children. Most of the children's drawings of outdoor learning featured a social scene with two or more people, while inside activity depicted solitary children sitting still or simply the task without people included (Fig. 4), providing further evidence of the wider wellbeing benefits of outdoor learning, such as enhanced social skills.

Our trial of multiple methods of measuring activity levels suggests that schools do not need to use expensive instruments to provide evidence of reducing sedentary behaviour. Children's perceptions appear sufficiently accurate to provide indicative data and can be fruitfully compared to accepted objective measures, such as pedometers, to raise personal awareness of and engagement with healthy activity levels. The self-report questionnaire is available to show the levels of PA stimulated by different outdoor learning lessons and those delivered inside the classroom in an open access toolkit: *Creating Happy and Healthy Schools through Outdoor Learning* [https://www.plymouth.ac.uk/uploads/production/document/path/10/10803/RFJ27519\\_Education\\_folder\\_and\\_amends\\_CORRECTProof\\_3A.pdf](https://www.plymouth.ac.uk/uploads/production/document/path/10/10803/RFJ27519_Education_folder_and_amends_CORRECTProof_3A.pdf) (accessed 30/4/2021).



**Fig. 4** Children's depiction of outdoor and in-classroom learning

## 8 Case Study 3: Doing the Best for Their Pupils: Outdoor Learning and Teacher Wellbeing

In Case Study 3, we consider how outdoor learning impacts on teacher wellbeing, based upon data from the Natural Connections Demonstration project (NC) (see Passy & Blackwell: [Natural Connections: Learning About Outdoor-Based Learning](#) in this volume), and the Naturally Healthy Devon Schools project evaluation, described above.

Schools are frequently called upon to deal with many societal problems and teachers can feel overwhelmed by the number of roles they are expected to fulfil, a situation sharpened during the COVID-19 crisis and its multiple adverse effects on children and schooling. We were pleased to find that NC teachers experienced benefits for themselves as well as their pupils in adopting outdoor learning practice. For example, teachers at one primary school reported enjoying their lessons in the natural environment as much as the children. They felt staying indoors all day was oppressive and going outside was important for their mental health (case study notes, primary school, NC). Overall, in the survey data from our NC evaluation, we found that seventy-two percent of project schools reported positive impacts on participating teachers' own health and wellbeing.

Yet, in interviews with teachers, personal pleasure was less apparent. While some teachers mentioned their own experiences of childhood spent in nature and their continuing enjoyment of being outdoors, the most common route to wellbeing seemed through their professional commitment to doing the best for their pupils.

I get a lot of personal satisfaction from it but I think that is from seeing the engagement, the enjoyment...just the joy of [children] being outside in the fresh air engaged with nature watching the seasons change... (outdoor learning lead, primary school, NC)

...one of the key bits of the science curriculum is the wonderment of science. I think it is hard to bring in the wonderment of science stuck in a science lab for the whole year whereas if you get outside you can give some people a real...oh my gosh! (teacher, case study, secondary school, NC)

This interpretation of an indirect route to teacher wellbeing is further supported by school survey results which showed that teachers saw positive effects on their teaching practice (79%) and their professional development (69%) which were accompanied by strong impacts on teachers' job satisfaction (69%). For some teachers, support was needed to translate their own passion and enjoyment into meaningful learning for pupils.

I know what my childhood was like, so I knew the trees and birds and I wanted to pass that to my class [...] but since then we've been on some real good quality training (teacher, primary school, NC)

Staff also commented on improved relationships with children in an outdoor context.

I feel I can let them go I don't have to have them within my sight every moment 'cos I think they are learning to be responsible in their own right... without an adult present (teacher, primary school, NC)

Good staff-pupil relationships are foundational to teacher wellbeing (Roffey, 2012).

Naturally Healthy Devon schools (NHDS) started from a high baseline of pupil health and wellbeing but still reported gains through curriculum outdoor learning and other health and wellbeing initiatives, including healthy eating lessons and participation in the Food for Life scheme during the project.

Positive impacts for teachers' wellbeing through outdoor teaching were also noted.

Everyone loves teaching outside when they can, and this has been said many times across the school (survey comment, NHDS)

Teachers' enjoyment of taking their pupils outside to learn fed through to pupils' pleasure too.

[Working outdoors] gives teachers more enjoyment and more confidence. And I think that is the number one thing that is going to help those children; the teachers, the way they are teaching (headteacher, NHDS)

However, even though this sub-project was focused on health and wellbeing,

The health and wellbeing aspect [...] hasn't been a big part of what they are doing. (hub leader, NHDS)

A lack of emphasis on health and wellbeing may stem from recognition that the principal drivers for schools in England are standards of educational attainment, evaluated by the Office for Standards in Education (OFSTED). As in the wider NC data, teachers' source of satisfaction and wellbeing appeared to derive principally from their sense that they were improving pupils' experience of schooling.

It has helped inspire myself, the school and our children to get out of the classroom setting. We hope that OFSTED will see the benefits that this has had on our teaching and the pupils' learning progress. (survey comment, NHDS)

In effect, teaching outside provided an antidote to the

pressured environment for teachers where they are being told what to do and that they are not doing it very well and need to do it better. (hub leader, NC)

[Outdoor learning] has helped staff and had a big impact, specifically it has given the staff the confidence to stand up for what they think is right and do what they think they are doing well and not go round spinning plates trying to do all these different things. (outdoor learning team, primary school, NC)

It seems that outdoor learning reconnected some teachers with their personal values and clarified their priorities (Waite, 2011). The experience may support staff and pupil wellbeing because it offers learning by the back door, reducing pressure to cram knowledge into the timetable.

It is generally more relaxing for both staff and children. There's not that rigidity there of 'we're in this learning space to learn'—they're almost sat (sic) there learning and not realising they're doing it. (head teacher, NHDS)

Of course, some teachers were less enthusiastic about teaching outdoors for a variety of reasons, including lack of confidence or personal interest in nature. For these teachers, team teaching and practical continuing professional development through

which outdoor learning was fostered in NC, coupled with witnessing the benefits for pupils first-hand as fellow teachers embraced the opportunities, provided positive experiences to build their willingness to take part. Experiencing outdoor teaching and its benefits appeared to be an effective way to influence hearts, minds and practice.

## 9 Discussion

The three case studies presented here all point to positive health and wellbeing impacts on children from school-based outdoor learning. Recognition of the importance of experiences in nature is not new; in 1984, Wilson formed his biophilia hypothesis, which proposes that humans have an innate love for nature, and in 2005, Louv argued that depriving children of nature experiences can lead to nature deficit disorder, with poor physical and mental health outcomes as a result. However, recent years have seen a significant increase in a robust evidence-base related to health and wellbeing benefits of being outdoors as we outlined in the introduction to the chapter.

The main finding from the WHY project (case study 1) was that children spent significantly more time in moderate-to-vigorous physical activity and less time being sedentary when learning outdoors (particularly woodlands), than in indoor lessons. This supports findings from a systematic review by Gray et al. (2015), which found positive effects of outdoor time on physical activity, sedentary behaviour, and cardiorespiratory fitness in children aged 3–12 (28 studies from nine countries; a cumulative sample of 13,798 participants). While sport is sometimes championed to address health challenges, these results indicate there are other school-based routes to reach children who are reluctant to participate in physical exercise per se.

The second case study charted the development of an evidence-based tool for schools to assess health outcomes from outdoor teaching without having to buy expensive equipment. This offers potential to increase schools' ownership of their outdoor teaching, through evaluating the outcomes of outdoor sessions, and evidencing the value that they bring. Participatory action research involving 75 teachers from five primary schools in the Netherlands identified that some of the barriers to outdoor education were related to a lack of formal status of outdoor learning, and a need for structure or a framework (van Dijk-Wesselius et al., 2020). The *Creating Happy and Healthy Schools through Outdoor Learning* toolkit provides such a framework and can support teacher confidence in adopting outdoor pedagogies. Children's involvement encourages greater responsibility for their own healthy lifestyles, whilst providing schools with data to inform effective changes to school policy and practice. In addition, empirical demonstration of these benefits at a local level should appeal to schools looking for evidence to share with staff, governors, parents and pupils that justifies the pedagogical choices they make, underpins parental and managerial understanding, and grows practitioners' confidence in taking children's learning outdoors.

The final case study allowed us to consider the impact of outdoor teaching on staff wellbeing. We found teacher wellbeing was frequently interconnected with pupil wellbeing; if teachers felt that their pupils enjoyed and benefitted from outdoor sessions, it gave them job satisfaction. Therefore, since being outdoors is good for children's wellbeing (McCormick, 2017), we can infer a knock-on effect for staff wellbeing. In a similar way, teachers' professional pride in meeting children's cognitive and affective needs through alternative teaching approaches and consequent higher levels of personal wellbeing appeared to contribute to increases in many children's enjoyment of and satisfaction with their learning experiences. Our research also suggested that for some teachers, the outdoor experience reconnected them to their own happy childhood or contemporary experiences in nature, reinforcing a sense of wellbeing. Significant life experience research suggests that adults who spent time in nature as a child have a greater possibility of working in an environmental field or, at least, have a greater environmental commitment than those who did not (Wells & Lekies, 2006). This also aligns with the biophilia hypothesis (Wilson, 1984) suggesting a need for humans to connect with nature and other living creatures, which has been reaffirmed by recent studies (Roberts et al., 2020). Positive teacher-pupil relationships fostered outdoors were also linked to teacher wellbeing (Roffey, 2012).

However, not all teachers or children will currently experience these opportunities. Through embedding school-based outdoor learning, it is possible to break cycles of disconnection from nature and create new generations that regard school time spent learning outdoors as normal and necessary.

## 10 Implications for Policy and Practice

A step-by-step approach is recommended for schools wishing to promote health and wellbeing outcomes through outdoor learning. First, inclusion of principles of children's voice and agency in school policy documents makes it clear to all staff, parents and governors that listening to children's opinions and providing space for them to shape how they experience school is important. Outdoor learning provides an ideal space for that to happen.

### **Shared steps to outdoor-based healthy outcomes**

1. Form a working group with representation of managers, staff and pupils (parents and governors) for planning and progress monitoring.
2. Get children involved in design, activities, analysis and dissemination stages. Taking notice of their priorities and what they would like to include will increase their motivation.

3. Use questionnaires to find out the extent and impact on physical activity of different lessons, how children and teachers feel when learning outside, how much learning time is spent outside. Devise outdoor lesson plans that encourage movement necessary to achieve goals.
4. Use pedometers to quantify steps taken during inside and outside lessons, incentivise increased physical activity, and provide data for children to use in maths, science and PSHE lessons back inside. Monitoring personal activity levels using pedometers may encourage less-active children.
5. Use creative methods, such as writing, drama and art, to help children express what learning outside and moving more means to them.
6. Present the results to class, assembly, parent and governors' meetings, and other schools.
7. Review progress regularly.
8. Plan next actions.

### **Shared steps to outdoor-based wellbeing outcomes**

1. Integrate children's voices into school improvement and curriculum planning to address how the outdoor learning environment (and indoor!) can be enhanced and better used for children's learning and wellbeing.
2. 'Family groups' with a teacher and children of mixed ages that report to School Council and/or the governors of the school can be effective in ensuring even the youngest children's voices are heard. It also builds a sense of community across the school.
3. Be alert to other times when children express their wishes; these often emerge during outdoor sessions where relationships between teacher and children are less formal.
4. Create action plans from these consultations that include children's active contribution. This might be through design input, fundraising, monitoring progress, for example.
5. Document and explain how children's views have shaped the curriculum and how it is delivered.
6. Remember to celebrate achievements in meeting expressed wishes, letting children have a say and role in how these are highlighted.
7. Keep the cycle going so that all children experience agency throughout their learning journey at school, and the outdoor learning environment and curriculum remain a living relevant context.
8. Check that similar respect is shown for all staff views, modelling inclusivity.

## 11 Conclusion

Perhaps the most compelling aspect of our case studies is linked to the stark evidence that children from lower socioeconomic backgrounds have poorer health and well-being outcomes (Marmot, 2020). Our case studies were conducted in areas with high levels of deprivation because we wanted to focus on those children who might benefit the most. The positive results from our studies suggest that integrating outdoor learning in the school curriculum represents an equitable and efficient way to promote positive health and wellbeing for all children attending school. Nature is a resource that can offer physical and mental space for children and young people to explore and develop; but as Maller et al. (2006) note, its potential as an upstream health promoting resource is not always realised. We hope that this chapter will provide some inspiration to maximise its rich potential.

### Recommended Further Reading

1. Barton, J., Bragg, R., Wood, C. & Pretty (2016). *Green Exercise: Linking Nature, Health and Wellbeing*. London: Routledge.
2. Stevens, T. (2019). *Physical Activity and Student Learning*. Abingdon: Routledge.
3. Lambert, D., Roberts, M. & Waite, S. (2020). *The National Curriculum Outdoors: A complete scheme of work*. London: Bloomsbury Publications.

**Acknowledgements** We would like to thank our many funders (Natural England, Department for the Environment, Food and Rural Affairs, Historic England, Good from Woods BIG Lottery fund, the University of Plymouth School of Nursing and Midwifery Alumni fund, Campaign for the Protection of Rural England (Devon), Devon County Council, Devon Local Nature Partnership and the Institute of Health and Community, University of Plymouth), and our research collaborators: Maria Tighe-Clarke (Woodland Health for Youth); Louise Graham and Naomi Wright (Mapping and Measuring Healthy Schools); Andy Edwards-Jones, Martin Gilchrist and Rowena Passy (Natural Connections) and of course, all the children and staff who took part.

## References

- Alderson, P. (2000). Children as researchers: the effects of participation rights on research methodology. In P. Christensen & A. James (eds.), *Research with children: Perspectives and practices*. Falmer Press.
- Allen, J., & Balfour, R. (2014). *Natural solutions for tackling health inequalities*. University College London Institute of Health Equity.
- Aronsson, J., Waite, S., & Tighe-Clarke, M. (2015). Measuring the impact of outdoor learning on the physical activity of school age children: The use of accelerometry. *Education and Health*, 33(3), 57–62. <https://sheu.org.uk/sheux/EH/eh333ja.pdf>. Accessed 4 Apr 2021.



- Baquet, G., Stratton, Van Praagh, E., & Berthoin, S. (2007). Improving physical activity assessment in prepubertal children with high-frequency accelerometry monitoring: A methodological issue. *Preventive Medicine, 44*, 143-147.
- Boyd, F., White, M. P., Bell, S. L., & Burt, J. (2018). Who doesn't visit natural environments for recreation and why: A population representative analysis of spatial, individual and temporal factors among adults in England. *Landscape and Urban Planning, 175*, 102-113.
- Browning, M. H. E. M., & Rigolon, A. (2019). School green space and its impact on academic performance: A Systematic literature review. *International Journal of Environmental Research and Public Health, 16*(3), 429.
- Calogiuri, G., & Chroni, S. (2014). The impact of the natural environment on the promotion of active living: An integrative systematic review. *BMC Public Health, 14*(1), 873.
- Day, R. E., Sahota, P., & Christian, M. S. (2019). Effective implementation of primary school-based healthy lifestyle programmes: A qualitative study of views of school staff. *BMC Public Health, 19*, 1239.
- Department for Education. (2019). Relationships Education, Relationships and Sex Education (RSE) and Health Education. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/908013/Relationships\\_Education\\_\\_Relationships\\_and\\_Sex\\_Education\\_\\_RSE\\_\\_and\\_Health\\_Education.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908013/Relationships_Education__Relationships_and_Sex_Education__RSE__and_Health_Education.pdf). Accessed 10 Mar 2021.
- Department of Health and Social Care. (2019). UK Chief Medical Officer's physical activity guidelines. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/832868/uk-chief-medical-officers-physical-activity-guidelines.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832868/uk-chief-medical-officers-physical-activity-guidelines.pdf). Accessed March 13, 2021.
- Fiennes, C., Oliver, E., Dickson, K., Escobar, D., Romans, A., & Oliver, S. (2015). The Existing Evidence-Base about the Effectiveness of Outdoor Learning. UCL; Giving Evidence: IOL; Blagrave Trust. (See Jucker: [How to Raise the Standards of Outdoor Learning and its Research](#) in this volume).
- Gray, C., Gibbons, R., Larouche, R., Sandseter, E. B. H., Bienenstock, A., Brussoni, M., Chabot, G., Herrington, S., Janssen, I., Pickett, W., Power, M., Stanger, N., Sampson, M., & Tremblay, M. S. (2015). What is the relationship between outdoor time and physical activity, sedentary behaviour, and physical fitness in children? A Systematic Review. *International Journal of Environmental Research and Public Health, 12*(6), 6455-6474.
- Lovell, R., White, M. P., Wheeler, B., Taylor, T., & Elliott, L. (2020). A rapid scoping review of health and wellbeing evidence for the Green Infrastructure Standards. <http://publications.naturalengland.org.uk/publication/4799558023643136>. Accessed 15 Mar 2021.
- Louv, R. (2005). *Last child in the woods*. Algonquin Books.
- McCormick, R. (2017). Does access to green space impact the mental well-being of children: A systematic review. *Journal of Pediatric Nursing, 37*, 3-7.
- Maller, C., Townsend, M., Pryor, A., Brown, P., & St Leger, L. (2006). Healthy nature healthy people: 'Contact with nature' as an upstream health promotion intervention for populations. *Health Promotion International, 21*(1), 45-54.
- Marmot, M., Allen, J., Boyce, T., Goldblatt, P., & Morrison, J. (2020). *Health equity in England: The marmot review 10 years on*. Institute of Health Equity.
- Meyer, J., & Cooper, J. (2015). Action research. In K. Gerrish & J. Lathlean (Eds.), *The research process in nursing* (7th ed.) Wiley.
- Montreuil, M., & Carnevale, F. A. (2016). A concept analysis of children's agency within the health literature. *Journal of Child Health Care, 20*(4), 503-511.
- Mygind, E., Bølling, M., & Barfod, K. S. (2019). Primary teachers' experiences with weekly education outside the classroom during a year. *Education, 3-13, 47*(5), 599-611.
- Natural England. (2016a). Links between natural environments and learning: Evidence briefing (EIN017). <http://publications.naturalengland.org.uk/publication/5253709953499136>. Accessed 30 Apr 2021.

- Natural England. (2016b). Links between natural environments and physical activity: Evidence briefing. (EIN019) <http://publications.naturalengland.org.uk/publication/6719816098906112> Accessed 30 Apr 2021.
- Newlove-Delgado, T., McManus, S., Sadler, K., Thandi, S., Vizard, T., Cartwright, C., & Ford, T. (2021). Child mental health in England before and during the COVID-19 lockdown. *The Lancet Psychiatry*, 8(5), 353–354. [https://doi.org/10.1016/S2215-0366\(20\)30570-8](https://doi.org/10.1016/S2215-0366(20)30570-8). Accessed 30 Apr 2021.
- NHS Digital. (2018). Mental health of children and young people in England, 2017. <https://digital.nhs.uk/data-and-information/publications/statistical/mental-health-of-children-and-young-people-in-england/2017/2017>. Accessed 10 Mar 2021.
- NHS Digital. (2019). National child measurement programme, England 2018/19 school year. <https://digital.nhs.uk/data-and-information/publications/statistical/national-child-measurement-programme/2018-19-school-year>. Accessed 10 Mar 2021.
- NHS Digital. (2020). National child measurement programme. <https://digital.nhs.uk/services/national-child-measurement-programme/>. Accessed 11 Mar 2021.
- Passy, R., & Waite, S. (2011). School gardens and Forest Schools. In S. Waite (Ed.), *Children learning outside the classroom from birth to eleven* (pp. 162–175). SAGE.
- Phillips, L., Parfitt, G., & Rowlands, A. (2011). Calibration of the GENE accelerometer for assessment of physical activity intensity in children. *Journal of Science and Medicine in Sports*, 16(2), 124–128.
- Public Health England (PHE). (2019a). Healthy beginnings: Applying All Our Health. <https://www.gov.uk/government/publications/healthy-beginnings-applying-all-our-health/healthy-beginnings-applying-all-our-health>. Accessed 10 Mar 2021.
- Public Health England (PHE). (2019b). PHE Strategy 2020–2025. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/831562/PHE\\_Strategy\\_2020-25.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/831562/PHE_Strategy_2020-25.pdf). Accessed 10 Mar 2021.
- Public Health England (PHE). (2020). Improving access to greenspace: A new review for 2020. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/904439/Improving\\_access\\_to\\_greenspace\\_2020\\_review.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904439/Improving_access_to_greenspace_2020_review.pdf). Accessed 30 Apr 2021.
- Roberts, A., Hinds, J., & Camic, P. (2020). Nature activities and wellbeing in children and young people: A systematic review. *Journal of Adventure Education and Outdoor Learning*, 20(4), 298–318.
- Robson, B. (2011). *Real world research*. Wiley.
- Roffey, S. (2012). Pupil wellbeing-teacher wellbeing: Two sides of the same coin? *Educational and Child Psychology*, 29(4), 8–17. <https://www.sueroffey.com/wp-content/uploads/import/32-Roffey%20ECP29-4.pdf>. Accessed 30 Apr 2021.
- Royal College of Paediatrics and Child Health. (2019). The health impacts of screen time: A guide for clinicians and parents. [https://www.rcpch.ac.uk/sites/default/files/2018-12/rcpch\\_screen\\_time\\_guide\\_-\\_final.pdf](https://www.rcpch.ac.uk/sites/default/files/2018-12/rcpch_screen_time_guide_-_final.pdf). Accessed 13 Mar 2021.
- Schüle, S. A., Hilz, L. K., Dreger, S., & Bolte, G. (2019). Social inequalities in environmental resources of green and blue spaces: A review of evidence in the WHO European region. *International Journal of Environmental Research and Public Health*, 16(7), 1216.
- Sjöblom, P., & Svens, M. (2019). Learning in the Finnish outdoor classroom: Pupils' views. *Journal of Adventure Education and Outdoor Learning*, 19(4), 301–314.
- Spencer, N. (2013). Reducing child health inequalities: What's the problem? *Archives of Disease in Childhood*, 98, 836–837. <https://doi.org/10.1136/archdischild-2013-304347>. Accessed 30 Apr 2021.
- Tillmann, S., Tobin, D., Avison, W., & Gilliland, J. (2018). Mental health benefits of interactions with nature in children and teenagers: A systematic review. *Journal of Epidemiology and Community Health*, 72(10), 958–966.

- van Dijk-Wesselius, J. E., van den Berg, A. E., Maas, J., & Hovinga, D. (2020). Green schoolyards as outdoor learning environments: Barriers and solutions as experienced by primary school teachers. *Frontiers in Psychology, 10*, 2919–2919.
- Vanaken, G. J., & Danckaerts, M. (2018). Impact of green space exposure on children's and adolescents' mental health: A systematic review. *International Journal of Environmental Research and Public Health, 15*(12).
- Waite, S. (2011). Teaching and learning outside the classroom: personal values, alternative pedagogies and standards. *Education, 3–13, 39*(1), 65–82.
- Waite, S., Husain, F., Scandone, B., Forsyth, E., & Piggott, H. (2021). Moving towards nature? Exploring progressive pathways to engage children and young people from disadvantaged backgrounds in nature-based activities. In M. Baker, E. Stewart & N. Carr (Eds.), *Leisure activities in the outdoors: Learning, developing and challenging*, Chapter 11, pp.130–144. Wallingford, UK: CABI (Centre for Agriculture and BioScience International).
- Waite, S., Passy, R., Gilchrist, M., Hunt, A., & Blackwell, I. (2016). Natural Connections Demonstration Project 2012–2016: Final report. Natural England Commissioned report NECR215. <http://publications.naturalengland.org.uk/publication/6636651036540928>. Accessed 16 Sep 2020. (See Passy & Blackwell: [Natural Connections: Learning about Outdoor-Based Learning](#) in this volume).
- Warren, K., Roberts, N. S., Breunig, M., & Alvarez, M. A. T. G. (2014). Social justice in outdoor experiential education: A state of knowledge review. *Journal of Experiential Education, 37*(1), 89–103.
- Wells, N. M., & Lekies, K. S. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments, 16*(1), 1–24.
- White, M. P., Alcock, I., Grellier, J., Wheeler, B. W., Hartig, T., Warber, S. L., et al. (2019). Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Scientific Reports, 9*(1), 7730.
- Wilson, E. O. (1984). *Biophilia*. Harvard University Press.
- World Health Organisation. (2020). Meeting report: Global standards for health promoting schools and their implementation guidance. <https://www.who.int/publications/i/item/9789240011069>. Accessed 10 Mar 2021.



**Sue Waite** is visiting Associate Professor at Jönköping University, Sweden, and former Reader in Outdoor Learning at the University of Plymouth, UK. She has researched and published widely regarding outdoor learning and health and wellbeing benefits from nature and is a member of Natural England's Strategic Research Group on Connecting People with Nature.



**Jennie Aronsson** is a Lecturer in Nursing at the University of Plymouth. A specialist community public health nurse by background, she is passionate about promoting health and well-being for children and families, particularly through nature-based methods.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

