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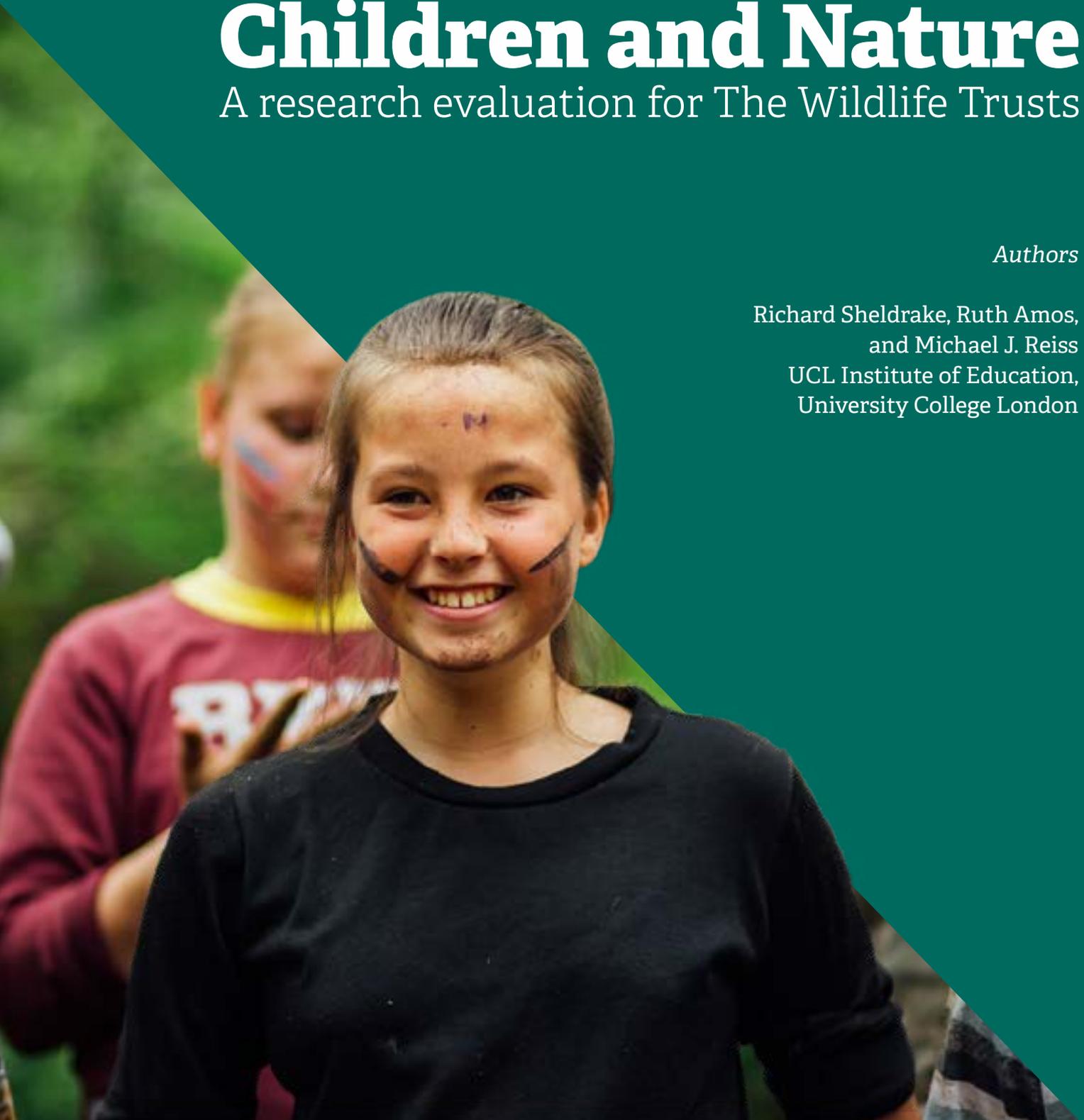


Children and Nature

A research evaluation for The Wildlife Trusts

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Protecting **Wildlife** for the Future

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Acknowledgements

The authors are grateful for the help and support from staff from across The Wildlife Trusts, including Nigel Doar and Leanne Manchester, and to the children and teachers who participated in the research. The research was conducted independently by the UCL Institute of Education with funding from The Wildlife Trusts.

Abstract

This study looked at the impact of Wildlife Trust events that involved children learning about nature while out of doors. The research surveyed 451 children before and after they undertook Wildlife Trust events, and also undertook observations of and interviews with 199 of the children, 17 of their teachers, and 17 Wildlife Trust practitioners delivering the events.

The quantitative analysis accounted for children having different characteristics (such as gender and age), undertaking different Wildlife Trust events, having different initial levels of engagement with nature-related aspects of life (such as spending time outdoors in nature or reading books about nature), and having different initial levels of well-being, nature connection, and pro-environmental values. Increases were revealed over time for the children's subjective well-being, nature connection, and pro-environmental values.

These findings were supported through the children's reflections on their own experiences, and through the observations and interviews. Children's enjoyment levels were seen to be high; their motivation and engagement were high; and they exhibited curiosity, active observation, and engagement with nature.

Executive summary

In England, and across the wider United Kingdom, contemporary policies aim to connect people with nature in order to improve their health and well-being, and include a specific focus on facilitating children to undertake regular visits to nature. Across England, visits to nature appear to be frequent but not for everyone, where around 62% of adults and 70% of children are estimated to visit nature at least once a week.

Someone's 'nature connection' reflects their personal affinity and orientation towards nature, and encompasses someone inherently valuing experiences of nature, enjoying being in nature, and feeling a perceived responsibility and sympathy towards nature. Existing research has revealed positive associations between spending time outdoors in nature, subjective health and well-being, and people's nature connection. Much evidence has only arisen through research with adults, however, and it remains less clear how particular events and activities may foster well-being, nature connection, or other pro-environmental orientations in children. The research presented here aimed to provide new insight, through considering the impact of Wildlife Trust events that involved children learning about nature while learning within nature.

The research surveyed children and also undertook interviews with and observations of children, teachers, and Wildlife Trust practitioners. The research occurred across 12 participating Wildlife Trusts in England, which were located within the East, in London, the North West, the South East, the South West, the West Midlands, and in Yorkshire and the Humber. The quantitative analysis considered 451 children (mostly aged 8 or 9 years old) who completed questionnaires before and after undertaking events delivered by the Wildlife Trusts. The qualitative approaches entailed observing 199 children taking part in these events, together with 17 teachers and teaching assistants, 17 Wildlife Trust practitioners, and 1 parent/carer.

The outcomes focused on: children's subjective health and well-being measured through questionnaire items such as 'My health is good' and 'I generally feel happy'; children's nature connection measured through questionnaire items such as 'Being outdoors makes me happy' and 'Humans are part of the natural world'; and children's pro-environmental values measured through questionnaire items such as 'People should protect plants and animals' and 'People should care for the environment'.

Engaging and connecting with nature

Detailed quantitative modelling compared the children's questionnaire responses from before and after undertaking the Wildlife Trust events, while accounting for the children undertaking different events and having different characteristics (such as their age and gender) and also accounting for the children having different levels of prior engagement with nature-related aspects of life and different initial levels of well-being, nature connection, and pro-environmental values. After accounting for these various factors, the modelling revealed overall increases for the children's personal well-being and health, nature connection, and pro-environmental values. Children

with low initial levels of well-being, nature connection, and pro-environmental values were revealed to show the highest increases. Boys and girls were revealed to have similar changes.

These findings were affirmed through the children's reflections on their experiences, expressed through the questionnaire that they completed after undertaking the events. The majority of children reported positive experiences and believed that they gained benefits. These included: 'I enjoyed it' (where 94% of children expressed agreement or strong agreement); 'It showed me that people should care for the environment' (90%); 'It showed me that people should protect plants and animals' (89%); 'I enjoy being outdoors more' (83%); 'It made me feel calm and relaxed' (81%); 'It made me feel refreshed and revitalised' (79%); and 'I would like to spend more time in nature in the future' (78%). These findings were supported through the observations and interviews: children's enjoyment levels were seen to be high; children's motivation and engagement were high; and children exhibited curiosity, active observation, and engagement with nature.

Learning within nature and learning about nature

The majority of the children indicated that they gained various educational benefits, again through the questionnaire that they completed after undertaking the events. These included: 'I learned something new about the natural world' (where 90% of children expressed agreement or strong agreement); 'I learned something new that might help my school work' (79%); 'I think I will be better at my school work' (77%); and 'I think I will enjoy my school work more' (73%). The majority of the children also believed that they gained wider personal benefits via the event that they undertook, including that 'It showed me that I can do new things if I try' (84%) and 'I now feel more confident in myself' (79%), together with wider social benefits including that 'I get on better with my teachers' (81%), 'I get on better with other people in my class' (79%), and 'It helped me feel part of my school' (76%).

The observations of children, teachers, and Wildlife Trust practitioners during the events helped elaborate on the various educational benefits that may arise from learning about nature while learning within nature. Children learnt about many aspects of the natural environment, particularly within ecology and geology given the underlying foci of the events. The children were also seen to apply wider ideas and skills from across the curriculum; specifically, nature was productively used as a context and avenue to support areas such as literacy, numeracy, art, design, and technology. The various pursuits within the events often involved physical activity and dexterity through construction and play. Children were seen to learn collaboratively and actively, and were provided with space to express ideas confidently and creatively. Teachers and teaching assistants reported that their children developed self-confidence, positive behaviours, motivations to learn, independence, and a willingness to take risks; these were variously attributed to opportunities for free play and roaming, while the peacefulness of being in nature was also considered to be beneficial. Teachers and teaching assistants also expressed that they valued longer-term programmes, noting that, over time, the children relaxed, opened up more, engaged with learning, took ideas and skills back to school, and looked forward to returning to the Wildlife Trust events. Some

teachers and teaching assistants also explained that they then applied more nature-inspired pedagogical strategies within their teaching back at school.

Wider implications

Overall, the findings indicate that experiences in and of nature can help support children's well-being and aspects of their connections to nature.

Benefits to health or well-being from nature may arise in various ways. Theoretical perspectives have proposed and explained that nature may help to facilitate recovery from stress and facilitate recovery from fatigue, following from aspects of natural environments, people's reactions to them, and any compatibility with people's inclinations and actions. Concurrently, well-being has been considered to follow from achieving underlying needs, such as for autonomy, competence, and also relating, connecting, and belonging with others. Autonomy involves someone being able to follow their intrinsic motivations towards doing activities that are personally enjoyable and rewarding; people can also undertake activities in order to help realise their self-identity, and/or to help express their identity to others, in order to become who they want to be in life. Someone's well-being may link with their nature connection, given that nature connection encompasses an intrinsic motivation towards enjoying and engaging with nature (through expressions such as 'Being outdoors makes me happy', 'Being outdoors in nature makes me feel peaceful', and 'When I feel sad, I like to go outside and enjoy nature'), together with a perceived responsibility and sympathy towards nature.

Accordingly, supporting children's well-being, and benefits to well-being arising from nature, may need to involve the following.

- Further opportunities for children to engage with nature. Children's accessibility to nature can be limited by their location and by various other barriers. For some children, visiting nature through their school may provide opportunities that they would not otherwise be able to gain. For children at school, learning about nature while learning within nature can help cover aspects of the national curriculum while providing enjoyable and beneficial experiences.
- Support to foster children's motivations to engage with nature. Children will likely want to engage with nature if they think that they will enjoy it and/or if they are interested in doing so. Positive early experiences and support may be important. Explaining that nature can be beneficial to health and well-being offers an initial extrinsic motivation for someone to engage with nature, which can develop into intrinsic motivation when engaging with nature is found to be enjoyable and has increasing internalised personal meaning.
- Support to foster links between children's personal identities and nature. Supporting children's varied interests, and also recognising and supporting the diverse ways in which someone can be a 'nature person', remain important. Some children may prefer outdoor activities and adventure, for example, while others may prefer learning about plants and animals.

- Support to increase accessibility. Wider socio-cultural norms, stereotypes, and/or expectations may facilitate or constrain people's motivations and/or developing personal identities. Recognising the diverse ways in which people can engage with nature, and the diverse people who do so, may help ensure that more children can see that nature is accessible for 'people like me'.

1. Background

Engaging with nature has been reported to associate with various benefits, including to physical health and subjective well-being (Bragg, Wood, Barton, & Pretty, 2015; Lovell, 2016b, 2016c; Rogerson, Barton, Bragg, & Pretty, 2017). Programmes and initiatives to increase engagement with nature, such as '30 Days Wild' from The Wildlife Trusts, have also shown that engagement with nature can be increased, well-being can be improved, and personal affinities towards nature can be fostered (Icarus, 2014; Nisbet, 2013; Richardson, Cormack, McRobert, & Underhill, 2016). While much evidence has followed from research with adults, children's engagement with nature is receiving increasing attention, and benefits to children's health, well-being, and other aspects of life are increasingly plausible (Adams & Savahl, 2017; Gill, 2014; Lovell, 2016a; Moss, 2012; Muñoz, 2009; RSPB, 2010; Woolley, Pattacini, & Somerset-Ward, 2011).

1.1. Engaging and connecting with nature

In England, and across the wider United Kingdom, contemporary policies aim to connect people with nature in order to improve their health and well-being, and include a specific focus on facilitating children to undertake regular visits to nature (Department for Environment, Food and Rural Affairs, 2011, 2016, 2018). Across England, visits to nature appear to be frequent but not for everyone, where around 62% of adults and 70% of children aged 16 and below are estimated to visit nature at least once a week (Natural England, 2018, 2019).

More frequent visits to natural areas in England have associated with various benefits such as higher well-being, although most studies have only considered adults and not children (Dallimer, et al., 2014; White, Pahl, Wheeler, Depledge, & Fleming, 2017). For adults, research undertaken within various countries has highlighted that visiting nature, being outdoors in nature, and/or otherwise engaging with nature has broadly associated with positive aspects of well-being such as happiness and vitality (Bakolis, et al., 2018; Bratman, Daily, Levy, & Gross, 2015; Hartig, Evans, Jamner, Davis, & Gärling, 2003; MacKerron & Mourato, 2013; Nisbet & Zelenski, 2011; Ryan, et al., 2010; van den Berg, et al., 2016). Similarly, visiting nature has associated with lower stress and/or higher feelings of comfort and relaxation (Hazer, Formica, Dieterlen, & Morley, 2018; Lee, Park, Tsunetsugu, Kagawa, & Miyazaki, 2009; Marselle, Irvine, & Warber, 2014; Park, Tsunetsugu, Kasetani, Kagawa, & Miyazaki, 2010). Many people have also considered natural places to be among their favourite places, and benefits such as feeling relaxed have also associated with, and/or been heightened by, visiting these favoured natural places (Korpela & Ylén, 2007; Korpela, Ylén, Tyrväinen, & Silvennoinen, 2008; Korpela, Ylén, Tyrväinen, & Silvennoinen, 2010; Scannell & Gifford, 2017). Engaging with nature has also associated with various other views and aspects of life for adults, for example including: higher general enjoyment of nature (Broom, 2017; Kals, Schumacher, & Montada, 1999; Hynds, 2011), higher attachment to places (Ryan, 2005), and having an affinity or connection towards nature (Beery, 2013; Hunt, et al., 2017; Nisbet, 2013, 2014, 2015; Lawton, Brymer, Clough, & Denovan, 2017); and also more positive attitudes towards the environment (Ewert, Place, & Sibthorp,

2005; Lohr & Pearson-Mims, 2005; Wells & Lekies, 2006) and undertaking pro-environmental behaviours (Asah, Bengston, Westphal, & Gowan, 2018; Lohr & Pearson-Mims, 2005; Wells & Lekies, 2006).

Some, but fewer, studies have considered children. For children, visiting and engaging with nature has associated with various benefits, including: being physically active (Ward, Duncan, Jarden, & Stewart, 2016; Wheeler, Cooper, Page, & Jago, 2010); higher subjective well-being (Li, Deal, Zhou, Slavenas, & Sullivan, 2018; McCracken, Allen, & Gow, 2016; Mennis, Mason, & Ambrus, 2018; Ward, Duncan, Jarden, & Stewart, 2016); higher positive attitudes towards the environment (Collado, Corraliza, Staats, & Ruiz, 2015; Harvey, 1990); enjoying nature (Bixler, Floyd, & Hammitt, 2002; Harvey, 1990); and having an affinity or connection towards nature (Cheng & Monroe, 2012; Richardson, Sheffield, Harvey, & Petronzi, 2015). From a wider perspective, positive experiences in nature, as children, appear to be beneficial towards developing affinities towards nature and environmentalism, together with support from family members, teachers, and other people, and with influences from various other aspects of life such as educational experiences (Chawla, 1998; Corcoran, 1999; Palmer, 1993; Tanner, 1980).

Children across the United Kingdom have expressed, on average, positive affinities or connections towards nature (RSPB, 2013). Girls have often expressed higher nature connection than boys, although other differences across children (such as across those in urban or rural areas) have varied across different studies (Kerr, 2015; Richardson, Sheffield, Harvey, & Petronzi, 2015; RSPB, 2013). More generally for children, nature connection has associated with: visiting and engaging with nature (Cheng & Monroe, 2012; Richardson, Sheffield, Harvey, & Petronzi, 2015; Stapleton, 2015); having and/or perceiving more local nature near their home (Cheng & Monroe, 2012); engaging with media such as books or films about nature (Eagles & Demare, 1999); and having family members who value and/or enjoy nature (Cheng & Monroe, 2012). Children's nature connection has associated with other aspects of their lives, including: their knowledge about the environment (Cheng & Monroe, 2012); their pro-environmental behaviours (Cheng & Monroe, 2012; Krettenauer, 2017; Richardson, Sheffield, Harvey, & Petronzi, 2015); and their subjective well-being (Kerr, 2015; Leong, Fischer, & McClure, 2014; Richardson, Sheffield, Harvey, & Petronzi, 2015). Children's views concerning nature and the environment have generally associated, for example where children's pro-environmental intentions and behaviours have closely associated with their emotional affinity toward nature (Collado, Staats, & Corraliza, 2013) and with their nature connection (Otto & Pensini, 2017).

Engaging with nature may be one aspect potentially linked with children's well-being, together with many other aspects of their lives. Children's well-being has linked with, and potentially followed from and/or been influenced by, aspects of their family context and circumstances, their relations with their family and peers, aspects of their education (including their sense of school belonging and their confidence in their abilities and attainment), and various other aspects of their lives (Allen, Kern, Vella-Brodrick, Hattie, & Waters, 2018; Bradshaw, Keung, Rees, & Goswami, 2011; Gustafsson, et al., 2010; McMunn, Nazroo, Marmot, Boreham, & Goodman, 2001; Patalay & Fitzsimons, 2016; Suldo, Riley, & Shaffer, 2006). Similarly, children's experiences and views related to their learning have generally associated, including their sense of school belonging, their various motivations and interests towards their studies, their attainment, and their confidence in their abilities and attainment (Allen, Kern, Vella-Brodrick, Hattie, & Waters, 2018; Green, et al., 2012; Guay, Ratelle, Roy,

& Litalien, 2010; Jose, Ryan, & Pryor, 2012; Spinath, Spinath, Harlaar, & Plomin, 2006; Valentine, DuBois, & Cooper, 2004). More specifically, for example, children's intrinsic motivation towards their studies (undertaking learning because it is personally interesting and enjoyable) has associated with their academic attainment (Gottfried, 1990; Guay, Ratelle, Roy, & Litalien, 2010; Lazarides, Rohowski, Ohlemann, & Ittel, 2016; Spinath, Spinath, Harlaar, & Plomin, 2006; Taylor, et al., 2014).

1.2. Learning within nature and learning about nature

In England, contemporary policies aim to facilitate children to undertake regular visits to nature and also to learn about nature (Department for Environment, Food and Rural Affairs, 2011, 2016, 2018). These aims are reflected within the contemporary National Curriculum in England: children learn about aspects of nature, especially within science and geography; and some learning and developmental activities are also recommended or required to be undertaken in nature, for example where children can explore and undertake fieldwork within the local natural environment and/or undertake outdoor or adventurous activities as part of their physical education (Department for Education, 2014). Across these various areas, the National Curriculum aims to foster 'a sense of excitement and curiosity about natural phenomena' and to inspire children with 'a curiosity and fascination about the world and its people that will remain with them for the rest of their lives' (Department for Education, 2014, pp. 198, 240). Learning within nature (often referred to as 'outdoor learning') has been historically promoted so that children can receive a range of experiences, including across diverse natural environments and including residential stays, in order to enrich learning about various topics within the curriculum and to also help develop children's personal and life skills (Department for Education and Skills, 2006; House of Commons Education and Skills Committee, 2005; House of Commons Science and Technology Committee, 2011; Rickinson, et al., 2004).

Contemporary theories and models of learning broadly recognise that learning occurs in various different contexts, including social contexts and via interactions with teachers and others, and recognise the relevance of learners' subjective values, attitudes, and wider feelings (such as their excitement and interests) on their studying and learning actions and outcomes (Schunk, 2014). As a specific example, it used to be thought that if people knew more about environmental issues, then they would be more likely to hold favourable attitudes towards the environment and undertake pro-environmental actions. Subsequently, theory and practice also recognised the relevance of varied personal, contextual, and socio-cultural factors (Chawla & Flanders Cushing, 2007; Bamberg & Möser, 2007; Kollmuss & Agyeman, 2002). Essentially, while curricula and educational systems often appear to visibly focus on children's knowledge (considered via examinations), contemporary learning theories and practices also recognise the importance of children's wider subjective values and other aspects of their lives.

Learning about nature can occur in various contexts, and may not necessarily always be undertaken within nature; similarly, learning within nature can cover various content, and may not necessarily involve learning about aspects of the natural environment. Considered broadly, learning about nature such as through environmental education programmes has fostered aspects of children's

environmental knowledge and skills, awareness of environmental issues, and their enjoyment of environmental education (Leeming, Dwyer, Porter, & Cobern, 1993; Stern, Powell, & Hill, 2014). Less research has explored the implications of learning about nature, perhaps because these areas are expected to be undertaken as an inherent part of the curriculum; more research has explored the implications of learning within nature, perhaps because this approach has often been optional (and hence has often been compared against classroom teaching and learning).

Learning within nature (considered across various specific activities, programmes, field-trips, and adventurous expeditions) has associated with various benefits, including: knowledge about aspects of nature and the environment (Bradley, Waliczek, & Zajicek, 1999; Cronin-Jones, 2000; Dismore & Bailey, 2005; Murray & O'Brien, 2005); positive attitudes concerning nature and the environment (Bradley, Waliczek, & Zajicek, 1999; Dettmann-Easler & Pease, 1999; Johnson & Manoli, 2008; Sellmann & Bogner, 2013); pro-environmental intentions and/or behaviours (Collado, Staats, & Corraliza, 2013; Duerden & Witt, 2010; Stern, Powell, & Ardoin, 2008); and subjective nature connection (Collado, Staats, & Corraliza, 2013; Sellmann & Bogner, 2013; Stern, Powell, & Ardoin, 2008), nature being valued as an aspect of someone's personal identity (Gillett, Thomas, Skok, & McLaughlin, 1991; Hinds, 2011), and with various indicators of enjoyment and appreciation of nature (Alexander, North, & Hendren, 1995; Bogner, 1999; Lindemann-Matthies, 2002, 2005).

Relatively few studies have explicitly explored the health and well-being implications of learning within nature, although this has generally involved children being more physically active (Dettweiler, Becker, Auestad, Simon, & Kirsch, 2017; Mygind, 2007; Schneller, et al., 2017; Schneller, Schipperijn, Nielsen, & Bentsen, 2017), and some benefits for children's personal and social skills and behaviour have often been observed (Armour & Sandford, 2013; Kendall & Rodger, 2015; Robinson & Zajicek, 2005; Waite, Passy, Hunt, & Blackwell, 2016). Learning within nature has also been observed to link with positive attitudes and motivations concerning learning at school (Kendall & Rodger, 2015; Plymouth University, 2016; Waite, Passy, Hunt, & Blackwell, 2016), and with children enjoying the outdoor learning activities (Ballantyne & Packer, 2002; Bogner, 1998; Kenney, Militana, & Donohue, 2003; Waite, Passy, Hunt, & Blackwell, 2016).

2. Research design and methods

Given the diverse scope of existing research studies, it remains less clear which benefits arise from engaging with nature in particular contexts, and how and why any benefits arise, especially in children.

The research presented here aimed to provide further insight into these areas, through considering the impact of Wildlife Trust events that facilitated children's engagement with nature, and included the children learning about nature while learning within nature. This research aimed to measure aspects of primary school children's subjective health and well-being, and their wider affinities and attitudes towards nature, and then to determine any changes over time following the children's attendance at Wildlife Trust events. The research surveyed children before and after undertaking the events, and also undertook interviews and observations of children, teachers, and practitioners during the events. The research involved data collection between spring 2017 and spring 2018.

2.1. Wildlife Trusts and events

From across the 37 Wildlife Trusts in England, 12 were able to participate in the research. These 12 participating Wildlife Trusts were variously located within the East, in London, the North West, the South East, the South West, the West Midlands, and in Yorkshire and the Humber.

Children were surveyed across the 12 Wildlife Trusts, and interviews and observations were undertaken within 6 of the 12 Wildlife Trusts. These 6 Wildlife Trusts were variously located in the East, in London, the South West, and the West Midlands. The interviews and observations considered children, teachers, and practitioners across 6 events, which were selected to cover shorter and longer durations, different geographical regions, and urban and rural locations. The survey considered children across 22 events within the 12 Wildlife Trusts, depending on the available provision and participants, given that different Wildlife Trusts could offer multiple events.

The Wildlife Trust events involved various activities designed for children to learn about nature, often covering the ecology of plants and animals (such as identifying flowers and trees, considering plants as sources of materials, and habitats and needs), via learning within nature. The 6 events considered through the qualitative approaches encompassed ecological and also wider aspects of the Key Stage 2 curriculum (Department for Education, 2014), via documentation from the Wildlife Trusts and conversations with tutors and teachers. The activities involved various approaches and avenues aimed at fostering and/or enhancing children's learning, such as collaborative work, creative arts, building dens, and also encouraging free play (see the appended supplementary material).

2.2. Participants

The quantitative analysis considered 451 children who each completed questionnaires both before and after taking part in the Wildlife Trusts events; 52% identified as girls and 48% identified as boys. These children were aged 7 years old and below (9%), 8 years old (36%), 9 years old (43%), to 10 years old and above (11%). Many reported that either of their parents or guardians went to university (53%), while fewer reported that neither of their parents or guardians went to university (28%), and the remainder did not answer the question and may not necessarily know (19%). The children reported the dates when they completed the questionnaires, which broadly reflected the durations of the events or programmes. These ranged in duration from one day to a week (5 events), one to two weeks (3 events), from two to four weeks (3 events), from four to six weeks (5 events), and over six weeks (6 events).

The qualitative analysis encompassed observations of 199 children who took part in six events. These children were aged from 7 to 11 years old, and included boys and girls (all children were from mixed-gender primary schools). The children were accompanied by a total of 17 teachers and teaching assistants with one volunteer parent/carer. The events/activities were provided by 17 Wildlife Trusts practitioners (field tutors) and volunteers.

2.3. Questionnaires and quantitative analytical approaches

2.3.1. Questionnaires

Teachers and staff at various Wildlife Trusts arranged for children to complete questionnaires before and after undertaking events. The questionnaires were designed to cover a range of areas, informed by prior research studies and using validated measurement items, while also including some new items in order to gain greater insight.

For most items on the questionnaire, children expressed their agreement or disagreement against various statements, with response categories of 'Strongly disagree' (scored as 1), 'Disagree' (2), 'Neither agree nor disagree' (3), 'Agree' (4), and 'Strongly agree' (5). Engagement frequencies were measured from 'Never or almost never' (scored as 1), 'A few times a year' (2), 'A few times a month' (3), 'A few times a week' (4), to 'Every day or almost every day' (5). Across the analysis, higher response values therefore reflect more positive experiences and/or views.

2.3.1.1. Children's characteristics and contexts

The questionnaires asked for the children's **gender**, **age**, and **whether either of their parents or guardians went to university**. Higher levels of family education reflect one aspect of generalised advantage in society: lower health, for example, has been seen in families with lower levels of education and with disadvantaged socio-economic circumstances (Marmot, et al., 2010; OECD, 2015). While some children may not know whether their parents or guardians went to university, it is less feasible to ask young children complex and detailed questions about their family

income and/or their parents' occupations. The children also reported the dates when they completed the questionnaires, before and after undertaking the Wildlife Trust events, which were used to calculate the event duration.

The initial questionnaire before undertaking the Wildlife Trust events also measured the children's engagement with nature-related aspects of life, such as 'I spend time outdoors in nature' and 'I read books about nature and wildlife', on the 1 to 5 engagement frequency scale from 'Never or almost never' to 'Every day or almost every day'. Additionally, 'I live near nature, such as a park, some woods, or the countryside' was measured through the 1 to 5 agreement scale from 'Strongly disagree' to 'Strongly agree'.

In summary, the children's characteristics and contexts were measured across multiple discrete items:

- Gender (girls / boys),
- Parents/guardians went to university (yes / no / unknown),
- Age (years),
- Event duration (days, as calculated from when the two questionnaires were completed),
- 'I walk or cycle around my local area' (1-5 frequency),
- 'I play sports or exercise outdoors' (1-5 frequency),
- 'I spend time outdoors in nature' (1-5 frequency),
- 'I watch nature and wildlife programmes or videos' (1-5 frequency),
- 'I read books about nature and wildlife' (1-5 frequency),
- 'My parents encourage me to spend time outdoors in nature' (1-5 frequency),
- 'I live near nature, such as a park, some woods, or the countryside' (1-5 strong disagreement to strong agreement).

2.3.1.2. Personal well-being and subjective health

The children's **personal well-being and health** was measured across multiple items (on the 1 to 5 agreement scale from 'Strongly disagree' to 'Strongly agree'):

- 'My health is good',
- 'I generally feel happy',
- 'My life is going well',
- 'I can do most things if I try'.

These covered contemporary items used to measure well-being (Huebner, 1991, 2004; Natural England, 2018; Richardson, Cormack, McRobert, & Underhill, 2016) and also encompassed the resilience aspect of self-esteem (Lereya, et al., 2016). The questionnaire items were averaged to provide a single scale of personal well-

being and health with acceptable reliability (Cronbach's alpha reliability coefficients were .631 from before and .659 from after undertaking the Wildlife Trust events).

2.3.1.3. Personal affinities and orientations towards nature (nature connection)

Someone's personal affinity and orientation towards nature is often referred to as their 'nature connection' (Clayton, 2012; Restall & Conrad, 2015; Tam, 2013; Zylstra, Knight, Esler, & Le Grange, 2014). The children's **nature connection** was measured through the 'Connection to Nature Index' (Cheng & Monroe, 2012), which was designed for use with children and has been previously applied across England and the United Kingdom (Bragg, Wood, Barton, & Pretty, 2013; Kerr, 2015; Richardson, Sheffield, Harvey, & Petronzi, 2015; RSPB, 2013). In full, the items were (on the 1 to 5 agreement scale from 'Strongly disagree' to 'Strongly agree'):

- 'I like to hear different sounds in nature',
- 'I like to see wild flowers in nature',
- 'When I feel sad, I like to go outside and enjoy nature',
- 'Being outdoors in nature makes me feel peaceful',
- 'I like to grow plants',
- 'Collecting rocks and shells is fun',
- 'Being outdoors makes me happy',
- 'I feel sad when wild animals are hurt',
- 'I like to see wild animals living in a clean environment',
- 'I enjoy touching animals and plants',
- 'Taking care of animals is important to me',
- 'Humans are part of the natural world',
- 'People cannot live without plants and animals',
- 'My actions will make the natural world different',
- 'Picking up litter on the ground can help the environment',
- 'People should not change the natural environment'.

These questionnaire items were averaged to provide indicators with acceptable reliability (for the overall nature connection measure, Cronbach's alpha reliability coefficients were .878 from before and .892 from after undertaking the Wildlife Trust events).

This conceptualisation of nature connection encompasses multiple dimensions: enjoying nature (measured through agreement with items such as 'Being outdoors makes me happy' and 'Being in the natural environment makes me feel peaceful'); feeling empathy and affinities towards animals and wildlife (such as 'I feel sad when wild animals are hurt' and 'I enjoy touching animals and plants'); feeling a sense of oneness between people and nature including recognising links between people and nature (such as 'Humans are part of the natural world' and 'People cannot live

without plants and animals’); and feeling a sense of responsibility towards nature (such as ‘My actions will make the natural world different’ and ‘Picking up litter on the ground can help the environment’) (Cheng & Monroe, 2012). Other conceptualisations of nature connection, designed for adults, include specific self-reflective measures of feeling connected to nature and recognising that nature is an aspect of their personal identity, through items such as ‘I often feel a sense of oneness with the natural world around me’ (Mayer & Frantz, 2004), ‘I think of myself as a part of nature, not separate from it’ (Clayton, 2003), and ‘My relationship to nature is an important part of who I am’ (Nisbet & Zelenski, 2013; Nisbet, Zelenski, & Murphy, 2009). These and other measures of nature connection, including the ‘Connection to Nature Index’, have been found to closely associate and to have similar associations with outcomes such as reported well-being (Brügger, Kaiser, & Roczen, 2011; Tam, 2013).

2.3.1.4. Pro-environmental values

The children’s **pro-environmental values** (essentially that people should care for nature and undertake pro-environmental behaviours) were also measured across multiple items (on the 1 to 5 agreement scale from ‘Strongly disagree’ to ‘Strongly agree’):

- ‘People should protect plants and animals’,
- ‘People should care for the environment’,
- ‘People should recycle’,
- ‘People should save energy and water’.

These questionnaire items were averaged to provide indicators with acceptable reliability (Cronbach’s alpha reliability coefficients were .638 from before and .760 from after undertaking the Wildlife Trust events).

Pro-environmental actions and/or conservation behaviours are often considered to cover actions such as recycling, walking or cycling rather than using personal vehicles, feeding wildlife, and undertaking voluntary conservation work. However, particular actions or behaviours may not necessarily be under the control of young children (and could be facilitated or limited by family advantage or disadvantage such as affluence or having a garden), so the questionnaire was orientated towards expressed values rather than reported actions.

2.3.1.5. Reflections on the Wildlife Trust events

On the second questionnaire completed after undertaking the events, children were also asked about their experiences of the Wildlife Trust events (such as ‘I enjoyed it’ and ‘I felt close to nature’) and whether they had recognised any benefits, following a similar approach to wider research into children’s experiences of learning within nature (Kendall & Rodger, 2015) and adults’ experiences of engaging with nature (Natural England, 2018). These items were measured on the 1 to 5 agreement scale from ‘Strongly disagree’ to ‘Strongly agree’. In full, the items were:

- 'I enjoyed it',
- 'It made me feel calm and relaxed',
- 'It made me feel refreshed and revitalised',
- 'I took time to appreciate my surroundings',
- 'I learned something new about the natural world',
- 'I felt close to nature',
- 'I enjoy being outdoors more',
- 'I learned something new that might help my school work',
- 'I think I will be better at my school work',
- 'I think I will enjoy my school work more',
- 'It showed me that I can do new things if I try',
- 'I now feel more confident in myself',
- 'I get on better with other people in my class',
- 'I get on better with my teachers',
- 'It helped me feel part of my school',
- 'It showed me that people should protect plants and animals',
- 'It showed me that people should care for the environment',
- 'I would like to spend more time in nature in the future'.

2.3.2. Quantitative analytical approaches

The children's questionnaire responses from before and after taking part in the Wildlife Trust events were compared through repeated-measures analysis of variance via mixed modelling, in order to reveal and isolate the independent effect of time (which can be inferred to reflect changes due to the Wildlife Trust events) from the effects of children having different personal characteristics, undertaking different events with different durations, and/or having different prior levels of engagement with nature-related aspects of life. The modelling concurrently considered 'interactions with time', to consider whether changes over times were similar or different depending on children's personal characteristics, prior levels of engagement with nature-related aspects of life, and initial health and well-being, initial nature connection, and/or initial pro-environmental values. Following prior research (Hughes, Richardson, & Lumber, 2018; RSPB, 2013), initial health and well-being, nature connection, and pro-environmental values were categorised using a threshold of 4.05 in order to identify children with lower initial levels (less than 4.05) or higher initial levels (equal or greater than 4.05).

Repeated-measures analysis of variance has been used in prior evaluations (Rogerson, Barton, Bragg, & Pretty, 2017). The analysis applied here extended the approaches used within earlier evaluations, and accounted for the children's different characteristics (such as age) and prior engagement with nature-related aspects of

life (such as undertaking exercise outdoors and reading books and/or watching media about nature) as covariates. Additionally, the mixed modelling approach accounted for potential within-person and within-event similarities over time, essentially where children may be more similar and/or change in similar ways to other children undertaking the same event (Snijders & Bosker, 2012).

In summary, the repeated-measures analysis of variance modelled the effect of:

- Time (reflecting changes due to attending the Wildlife Trust events).

While controlling for any effect(s) of:

- Event duration (days),
- Gender (girls / boys),
- Parents/guardians went to university (yes / no / unknown),
- Age (years),
- [Baseline] Well-being and health (low / high),
- [Baseline] Overall nature connection (low / high),
- [Baseline] Pro-environmental values (low / high),
- [Baseline] 'I walk or cycle around my local area',
- [Baseline] 'I play sports or exercise outdoors',
- [Baseline] 'I spend time outdoors in nature',
- [Baseline] 'I watch nature and wildlife programmes or videos',
- [Baseline] 'I read books about nature and wildlife',
- [Baseline] 'My parents encourage me to spend time outdoors in nature',
- [Baseline] 'I live near nature, such as a park, some woods, or the countryside'.

While considering different changes for different children via the interactions of:

- Time × Event duration (days),
- Time × Gender,
- Time × Parents/guardians went to university,
- Time × Age,
- Time × [Baseline] Well-being and health (low / high),
- Time × [Baseline] Overall nature connection (low / high),
- Time × [Baseline] Pro-environmental values (low / high),
- Time × [Baseline] 'I walk or cycle around my local area',
- Time × [Baseline] 'I play sports or exercise outdoors',
- Time × [Baseline] 'I spend time outdoors in nature',
- Time × [Baseline] 'I watch nature and wildlife programmes or videos',
- Time × [Baseline] 'I read books about nature and wildlife',

- Time × [Baseline] ‘My parents encourage me to spend time outdoors in nature’,
- Time × [Baseline] ‘I live near nature, such as a park, some woods, or the countryside’.

And while accounting for:

- Within-child and within-event similarity/variability.

Repeated-measures analysis of variance provides ‘estimated marginal means’ in order to give insight into what changes may occur. ‘Estimated marginal means’ are predicted values (such as for children’s nature connection) that account for the various aspects considered within the model (so that the ‘estimated marginal means’ for nature connection then account for any differences across children with different characteristics and/or backgrounds in order to clearly reveal any underlying differences over time). ‘Estimated marginal means’ were calculated at sample-average levels of the covariates (i.e. reflecting a predicted effect ‘for the average child’) and account for the other modelled factors (such as differences linked with personal characteristics such as gender). The magnitudes of any differences in ‘estimated marginal means’ were shown through Cohen’s D values. Cohen’s D values are commonly interpreted with values above 0.20 reflecting a small difference, above 0.50 reflecting a moderate/medium difference, and above 0.80 reflecting a large difference (Cohen, 1988).

2.4. Observations, interviews, and qualitative analytical approaches

Interviews with and observations of children, teachers, and practitioners were undertaken while the activities occurred. Detailed field notes were written during and immediately after each activity, in order to record children’s various learning behaviours, interests, interactions, and other arising occurrences. Outcomes were observed for small groups of children and for individuals within the context of the larger groups’ endeavours. Additionally, for potential verification and confirmation (or disconfirmation) across the different research methods, notes were made of any evidence of impacts and outcomes that aligned with the questionnaire items (specifically the questionnaire items that considered the children’s reflections on the Wildlife Trust events/activities).

In order to maintain as natural as possible environment during the events, the qualitative researcher acted as a non-participant observer. An open, unstructured interview approach was applied, where the interviews were conducted as exploratory conversations. Questions typically asked children to describe or explain what they were doing, thinking about, trying out, feeling, and so on. Children were then free to show and tell the researcher whatever they wanted to. Teachers and teaching assistants were asked for anonymous information about the children, their educational backgrounds, and the work they were doing before and after the activities when they returned to their school. Teachers revealed their own hopes and goals for children’s learning and development. The Wildlife Trust practitioners also

offered examples of intended goals and outcomes for activities. Detailed field notes were taken during and added to immediately after all conversations in order to create accurate records.

All field notes were analysed, including observations and interviews, using a thematic approach, initially drawing on categories from the questionnaire content: subjective well-being; time spent outdoors, living close to nature; nature connection; pro-environmental behaviours; learning and school work; and the children's self-reflective experiences about the activities. Other outcomes were isolated and summarised, such as of visible, audible and physical manifestation of enjoyment of and engagement with activities.

3. Results

3.1. Quantitative analysis

3.1.1. Children's changing views

The children's responses from before and after undertaking the Wildlife Trust events were compared through repeated-measures analyses of variance via mixed modelling in order to isolate the independent effect of time from the effects of other factors (**Table 1** and **Table 2**). The analysis accounted for children having different characteristics (such as gender and age), undertaking different Wildlife Trust events, having different initial levels of engagement with nature-related aspects of life (such as spending time outdoors in nature or reading books about nature), and having different initial levels of well-being, nature connection, and pro-environmental values.

Increases over time were revealed for children's subjective well-being and health (a significant main effect of time: $F(1, 355.212) = 10.608, p < .001$): estimated marginal means for well-being and health increased from 4.12 to 4.26 (Cohen's $D = .153$; $p = .001$) on the 1 to 5 agreement scale from 'Strongly disagree' to 'Strongly agree'. Increases over time were revealed for overall nature connection (a significant main effect of time ($F(1, 357.000) = 17.518, p < .001$); estimated marginal means for overall nature connection increased from 4.01 to 4.16 (Cohen's $D = .207$; $p < .001$) on the 1 to 5 agreement scale. Increases over time were revealed for pro-environmental values (a significant main effect of time ($F(1, 352.467) = 36.333, p < .001$); estimated marginal means for pro-environmental values increased from 4.32 to 4.54 (Cohen's $D = .373$; $p < .001$) on the 1 to 5 agreement scale.

Relatively few significant interactions, reflecting different changes for different children, were revealed; otherwise, children with different characteristics (such as gender and age) and initial engagement (such as prior time spent outdoors) were revealed to have similar changes. The following interactions were revealed.

For children's subjective well-being and health, there was a significant interaction effect between baseline well-being/health and time ($F(1, 355.564) = 25.767, p < .001$): children with low initial well-being/health showed increases (estimated marginal means increased from 3.61 to 3.90; Cohen's $D = .448, p < .001$); children with high initial well-being/health showed no significant change (estimated marginal means remained similar from 4.63 to 4.61; Cohen's $D = .021, p = .700$).

For children's nature connection, there was a significant interaction effect between baseline nature connection and time ($F(1, 357.000) = 28.463, p < .001$): children with low initial nature connection showed increases (estimated marginal means increased from 3.63 to 3.95; Cohen's $D = .565, p < .001$); children with high initial nature connection showed no significant change (estimated marginal means remained similar from 4.39 to 4.38; Cohen's $D = .016, p = .785$). For children's nature connection, there was also a significant interaction effect between baseline pro-environmental values and time ($F(1, 357.000) = 6.471, p = .011$): children with low initial pro-environmental values showed increases in nature connection (estimated marginal means increased from 3.91 to 4.15; Cohen's $D = .511, p < .001$); children with high initial pro-environmental values showed no significant change in nature

connection (estimated marginal means remained similar from 4.12 to 4.18; Cohen's $D = .094$, $p = .060$). For children's nature connection, there was also a significant interaction effect between event duration and time ($F(1, 357.000) = 14.357$, $p < .001$): increases in overall nature connection were higher with shorter event durations.

For children's pro-environmental values, there was a significant interaction effect between baseline values and time ($F(1, 352.820) = 78.291$, $p < .001$): children with low initial pro-environmental values showed increases (estimated marginal means increased from 3.83 to 4.38; Cohen's $D = 1.329$, $p < .001$); children with high initial pro-environmental values showed decreases (from 4.80 to 4.69; Cohen's $D = .238$, $p < .001$). For children's pro-environmental values, there was also a significant interaction effects for parental education and time ($F(2, 352.910) = 4.328$, $p = .014$): increases in pro-environmental values were revealed for children who reported that their parents attended university (from 4.33 to 4.49; Cohen's $D = .357$, $p < .001$) and for children who reported that their parents did not attend university (from 4.33 to 4.47; Cohen's $D = .337$, $p = .005$) while increases were higher for children where parental education was unknown (from 4.30 to 4.64; Cohen's $D = .783$, $p < .001$). For children's pro-environmental values, there was also a significant interaction effect between 'I live near nature, such as a park, some woods, or the countryside' and time ($F(1, 353.870) = 5.870$, $p = .016$): increases in pro-environmental values were revealed for children who agreed that they lived closer to nature but no changes were revealed for those who disagreed.

In summary, for personal **well-being and health**:

- Accounting for children having different characteristics, undertaking different Wildlife Trust events, having different initial levels of engagement with nature-related aspects of life, and initial levels of well-being, nature connection, and pro-environmental values, revealed an overall increase in personal well-being and health over time. Estimated marginal means for well-being and health increased from 4.12 to 4.26 (Cohen's $D = .153$; $p = .001$) on the 1 to 5 scale from 'Strongly disagree' to 'Strongly agree'.
- Children with low or high initial well-being and health were revealed to have different changes: children with low initial well-being/health showed increases (estimated marginal means increased from 3.61 to 3.90; Cohen's $D = .448$, $p < .001$); children with high initial well-being/health showed no significant change.

In summary, for the overall measure of **nature connection**:

- Accounting for children having different characteristics, undertaking different Wildlife Trust events, having different initial levels of engagement with nature-related aspects of life, and initial levels of well-being, nature connection, and pro-environmental values, revealed an overall increase in overall nature connection over time. Estimated marginal means for overall nature connection increased from 4.01 to 4.16 (Cohen's $D = .207$; $p < .001$) on the 1 to 5 scale from 'Strongly disagree' to 'Strongly agree'.
- Children with low or high initial nature connection were revealed to have different changes: children with low initial nature connection showed increases (estimated marginal means increased from 3.63 to 3.95; Cohen's $D = .565$, $p < .001$); children with high initial nature connection showed no significant change.

In summary, for **pro-environmental values**:

- Accounting for children having different characteristics, undertaking different Wildlife Trust events, having different initial levels of engagement with nature-related aspects of life, and initial levels of well-being, nature connection, and pro-environmental values, revealed an overall increase in pro-environmental values. Estimated marginal means for pro-environmental values increased from 4.32 to 4.54 (Cohen's $D = .373$; $p < .001$) on the 1 to 5 scale from 'Strongly disagree' to 'Strongly agree'.
- Children with low or high initial pro-environmental values were revealed to have different changes: children with low initial pro-environmental values showed increases (estimated marginal means increased from 3.83 to 4.38; Cohen's $D = 1.329$, $p < .001$); children with high initial pro-environmental values showed decreases (from 4.80 to 4.69; Cohen's $D = .238$, $p < .001$).

Table 1: Quantitative analysis: summary of model effects

<i>Modelled element</i>	Personal well-being and health <i>Sig.</i>	Nature connection (overall) <i>Sig.</i>	Nature connection sub-dimension: enjoyment <i>Sig.</i>	Nature connection sub-dimension: animals <i>Sig.</i>	Nature connection sub-dimension: oneness <i>Sig.</i>	Nature connection sub-dimension: responsibility <i>Sig.</i>	Pro-environmental values <i>Sig.</i>
Intercept	<.001	<.001	<.001	<.001	<.001	<.001	<.001
Time	.001	<.001	.008	.208	<.001	<.001	<.001
Event duration (days)	.598	.342	.322	.608	.613	.570	.190
Gender (girls / boys)	.529	.053	.006	.122	.982	.662	.237
Parents/guardians went to university (yes / no / unknown)	.076	.561	.559	.700	.527	.967	.242
Age (years)	.020	.124	.045	.266	.763	.724	.695
[Baseline] Well-being and health (low / high)	<.001	.001	.092	.033	.011	.003	.016
[Baseline] Overall nature connection (low / high)	.389	<.001	<.001	<.001	<.001	<.001	<.001
[Baseline] Pro-environmental values (low / high)	.848	.034	.887	.003	.011	.015	<.001
[Baseline] I walk or cycle around my local area	.016	.168	.122	.252	.284	.457	.703
[Baseline] I play sports or exercise outdoors	.006	.499	.837	.046	.660	.526	.683
[Baseline] I spend time outdoors in nature	.661	.026	<.001	.579	.646	.821	.729
[Baseline] I watch nature and wildlife programmes or videos	.983	.004	.004	.096	.095	.617	.068
[Baseline] I read books about nature and wildlife	.882	<.001	<.001	.022	.291	.055	.166
[Baseline] My parents encourage me to spend time outdoors in nature	.190	.003	.006	.383	.560	.015	.695
[Baseline] I live near nature, such as a park, some woods, or the countryside	.214	.049	.648	.030	.116	.070	.059
Time × Event duration (days)	.069	<.001	<.001	.025	.022	.757	.125
Time × Gender	.681	.801	.747	.274	.169	.254	.793
Time × Parents/guardians went to university	.689	.084	.263	.440	.356	.105	.014
Time × Age	.292	.897	.794	.524	.579	.225	.799
Time × [Baseline] Well-being and health (low / high)	<.001	.252	.070	.271	.131	.416	.491
Time × [Baseline] Overall nature connection (low / high)	.357	<.001	<.001	.005	.028	.169	.187
Time × [Baseline] Pro-environmental values (low / high)	.325	.011	.152	.206	.207	<.001	<.001

<i>Modelled element</i>	Personal well-being and health <i>Sig.</i>	Nature connection (overall) <i>Sig.</i>	Nature connection sub-dimension: enjoyment <i>Sig.</i>	Nature connection sub-dimension: animals <i>Sig.</i>	Nature connection sub-dimension: oneness <i>Sig.</i>	Nature connection sub-dimension: responsibility <i>Sig.</i>	Pro-environmental values <i>Sig.</i>
Time × [Baseline] I walk or cycle around my local area	.358	.448	.549	.745	.518	.801	.440
Time × [Baseline] I play sports or exercise outdoors	.511	.439	.930	.184	.781	.114	.592
Time × [Baseline] I spend time outdoors in nature	.389	.451	.391	.571	.798	.394	.767
Time × [Baseline] I watch nature and wildlife programmes or videos	.923	.701	.522	.714	.419	.174	.595
Time × [Baseline] I read books about nature and wildlife	.509	.087	.522	.033	.077	.648	.508
Time × [Baseline] My parents encourage me to spend time outdoors in nature	.066	.875	.605	.899	.930	.098	.477
Time × [Baseline] I live near nature, such as a park, some woods, or the countryside	.479	.107	.131	.692	.917	.498	.016

Notes: Repeated-measures analyses of variance via mixed modelling encompasses ‘fixed’ and ‘random’ elements, specifically: fixed elements for children’s characteristics and prior engagement with nature-related aspects of life (modelled as covariates except as factors for gender, parent/guardian education, and baseline groups); and random elements for repeated within-child and within-event (unstructured) variances/co-variances. The significance of the fixed elements are summarised; results of immediate relevance involve the significance of time (i.e. highlighting changes over time while accounting for all of the other modelled elements), and any interactions with time (i.e. highlighting potentially different changes over time for different children). Significant elements ($p < .05$) are highlighted in bold. For the separate sub-dimensions of nature connection, the item ‘Being outdoors makes me happy’ was only included within the dimension covering enjoying nature and was not also included within the dimension covering sense of oneness between people and nature (which has sometimes been the case within earlier research), so that the different dimensions did not overlap and given that factor analysis highlighted no clear underlying link between ‘Being outdoors makes me happy’ and sense of oneness between people and nature.

Table 2: Quantitative analysis: summary of estimated marginal means

Factor (1-5 scale)	Before		After		Difference	
	EMM	SE	EMM	SE	Cohen's D	Sig. (p)
Personal well-being and health	4.12	.04	4.26	.05	.153	.001
Nature connection (overall)	4.01	.03	4.16	.04	.207	<.001
Nature connection sub-dimension: enjoyment	3.81	.04	3.95	.06	.145	.005
Nature connection sub-dimension: animals	4.27	.05	4.34	.06	.059	.207
Nature connection sub-dimension: oneness	4.21	.04	4.41	.05	.218	<.001
Nature connection sub-dimension: responsibility	3.97	.05	4.27	.05	.273	<.001
Pro-environmental values	4.32	.02	4.54	.03	.373	<.001

Notes: Estimated marginal means (EMM), standard errors (SE), and pairwise statistical tests are reported. EMMs were calculated at sample-average levels of the covariates and account for the other modelled factors (such as differences in personal characteristics). For the separate sub-dimensions of nature connection, the item 'Being outdoors makes me happy' was only included within the dimension covering enjoying nature and was not also included within the dimension covering sense of oneness between people and nature (which has sometimes been the case within earlier research), so that the different dimensions did not overlap and given that factor analysis highlighted no clear underlying link between 'Being outdoors makes me happy' and sense of oneness between people and nature.

3.1.2. Children's reflections on the Wildlife Trust events

The children expressed positive views about the Wildlife Trust events that they undertook (**Table 3**):

- 'I enjoyed it' (where 94% of children expressed agreement or strong agreement),
- 'It showed me that people should care for the environment' (90%),
- 'I learned something new about the natural world' (90%),
- 'It showed me that people should protect plants and animals' (89%),
- 'It showed me that I can do new things if I try' (84%),
- 'I enjoy being outdoors more' (83%),
- 'I felt close to nature' (82%),
- 'I took time to appreciate my surroundings' (82%),
- 'I get on better with my teachers' (81%),
- 'It made me feel calm and relaxed' (81%),
- 'I learned something new that might help my school work' (79%),
- 'I now feel more confident in myself' (79%),
- 'It made me feel refreshed and revitalised' (79%),
- 'I get on better with other people in my class' (79%),
- 'I would like to spend more time in nature in the future' (78%),
- 'I think I will be better at my school work' (77%),
- 'It helped me feel part of my school' (76%),
- 'I think I will enjoy my school work more' (73%).

Boys and girls reported similarly for these items, except for (on average) boys reporting higher for 'I think I will be better at my school work' and 'I now feel more confident in myself' compared to girls (**Table 4**).

- 'I think I will be better at my school work': 82% of boys expressed agreement or strong agreement compared to 73% of girls.
- 'I now feel more confident in myself': 82% of boys expressed agreement or strong agreement compared to 77% of girls.

Children who reported that either of their parents/guardians went to university (compared to children who reported that neither of their parents/guardians went to university) reported higher for 'It made me feel calm and relaxed', 'It made me feel refreshed and revitalised', and 'I now feel more confident in myself', but otherwise these children expressed similar views (**Table 5**).

- 'It made me feel calm and relaxed': 84% of children who reported that either of their parents/guardians went to university expressed agreement or strong

agreement compared to 75% of children who reported that neither of their parents/guardians went to university.

- 'It made me feel refreshed and revitalised': 81% of children who reported that either of their parents/guardians went to university expressed agreement or strong agreement compared to 70% of children who reported that neither of their parents/guardians went to university.
- 'I now feel more confident in myself': 80% of children who reported that either of their parents/guardians went to university expressed agreement or strong agreement compared to 73% of children who reported that neither of their parents/guardians went to university.

The children's responses to these items did not correlate with their reported age in years or with the event duration measured in days.

Table 3: Children's reflections on the Wildlife Trust events

Item	Strongly disagree (1)		Disagree (2)		Neither agree nor disagree (3)		Agree (4)		Strongly agree (5)		All children (1-5 scale)	
	N	%	N	%	N	%	N	%	N	%	M	SD
I enjoyed it	6	1.4%	5	1.2%	15	3.5%	88	20.7%	312	73.2%	4.63	.74
It made me feel calm and relaxed	16	3.8%	12	2.8%	54	12.8%	116	27.4%	225	53.2%	4.23	1.03
It made me feel refreshed and revitalised	9	2.1%	15	3.6%	66	15.7%	114	27.1%	216	51.4%	4.22	.98
I took time to appreciate my surroundings	10	2.4%	12	2.8%	54	12.8%	129	30.6%	217	51.4%	4.26	.95
I learned something new about the natural world	9	2.1%	5	1.2%	28	6.6%	117	27.7%	263	62.3%	4.47	.84
I felt close to nature	12	2.8%	13	3.1%	49	11.6%	118	28.0%	230	54.5%	4.28	.98
I enjoy being outdoors more	14	3.3%	14	3.3%	43	10.1%	95	22.4%	258	60.8%	4.34	1.01
I learned something new that might help my school work	15	3.6%	15	3.6%	57	13.6%	125	29.8%	207	49.4%	4.18	1.03
I think I will be better at my school work	11	2.6%	25	5.9%	59	14.0%	110	26.1%	216	51.3%	4.18	1.05
I think I will enjoy my school work more	24	5.7%	17	4.1%	73	17.4%	124	29.6%	181	43.2%	4.00	1.13
It showed me that I can do new things if I try	12	2.9%	8	1.9%	46	11.0%	108	25.8%	244	58.4%	4.35	.95
I now feel more confident in myself	19	4.6%	10	2.4%	59	14.1%	114	27.3%	215	51.6%	4.19	1.06
I get on better with other people in my class	12	2.9%	14	3.4%	63	15.2%	109	26.3%	216	52.2%	4.21	1.01
I get on better with my teachers	12	2.9%	6	1.4%	60	14.5%	113	27.2%	224	54.0%	4.28	.96
It helped me feel part of my school	24	5.8%	16	3.8%	58	13.9%	106	25.4%	213	51.1%	4.12	1.14
It showed me that people should protect plants and animals	5	1.2%	1	.2%	42	10.0%	100	23.9%	271	64.7%	4.51	.78
It showed me that people should care for the environment	3	.7%	5	1.2%	33	7.9%	95	22.7%	282	67.5%	4.55	.75
I would like to spend more time in nature in the future	17	4.0%	14	3.3%	61	14.4%	107	25.2%	225	53.1%	4.20	1.06

Notes: Numbers (N) and percentages (%) per response category, and overall means (M) and standard deviations (SD), are reported.

Table 4: Children's reflections on the Wildlife Trust events: differences across children (gender)

<i>Item (1-5 scale)</i>	All children		Gender: girls		Gender: boys		Difference	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>Cohen's D</i>	<i>Sig. (p)</i>
I enjoyed it	4.63	.74	4.63	.77	4.64	.70	.009	.926
It made me feel calm and relaxed	4.23	1.03	4.17	1.06	4.30	.99	.126	.197
It made me feel refreshed and revitalised	4.22	.98	4.21	1.01	4.24	.94	.035	.720
I took time to appreciate my surroundings	4.26	.95	4.25	.99	4.26	.91	.009	.930
I learned something new about the natural world	4.47	.84	4.48	.84	4.45	.85	.033	.738
I felt close to nature	4.28	.98	4.30	.99	4.26	.97	.037	.704
I enjoy being outdoors more	4.34	1.01	4.31	1.07	4.38	.94	.074	.446
I learned something new that might help my school work	4.18	1.03	4.14	1.07	4.23	.98	.084	.389
I think I will be better at my school work	4.18	1.05	4.07	1.10	4.29	.98	.214	.029
I think I will enjoy my school work more	4.00	1.13	4.01	1.14	3.99	1.13	.016	.868
It showed me that I can do new things if I try	4.35	.95	4.30	1.01	4.40	.89	.099	.312
I now feel more confident in myself	4.19	1.06	4.08	1.13	4.32	.97	.228	.021
I get on better with other people in my class	4.21	1.01	4.13	1.06	4.32	.95	.188	.058
I get on better with my teachers	4.28	.96	4.23	.99	4.34	.92	.116	.241
It helped me feel part of my school	4.12	1.14	4.04	1.19	4.21	1.09	.150	.128
It showed me that people should protect plants and animals	4.51	.78	4.49	.80	4.52	.77	.035	.724
It showed me that people should care for the environment	4.55	.75	4.50	.80	4.61	.69	.148	.130
I would like to spend more time in nature in the future	4.20	1.06	4.15	1.11	4.26	1.01	.108	.268

Notes: Means (*M*), standard deviations (*SD*), and statistical tests are reported. Significant differences ($p < .05$) are highlighted in bold.

Table 5: Children's reflections on the Wildlife Trust events: differences across children (parent/guardian education)

<i>Item (1-5 scale)</i>	All children		Parents/guardians went to university: no		Parents/guardians went to university: yes		Difference	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>Cohen's D</i>	<i>Sig. (p)</i>
I enjoyed it	4.63	.74	4.51	.86	4.68	.68	.217	.058
It made me feel calm and relaxed	4.23	1.03	4.09	1.12	4.33	.93	.246	.032
It made me feel refreshed and revitalised	4.22	.98	4.04	1.03	4.31	.96	.265	.022
I took time to appreciate my surroundings	4.26	.95	4.23	.96	4.30	.93	.067	.563
I learned something new about the natural world	4.47	.84	4.49	.77	4.47	.84	.016	.893
I felt close to nature	4.28	.98	4.27	.96	4.32	.99	.051	.656
I enjoy being outdoors more	4.34	1.01	4.28	1.06	4.41	.96	.130	.259
I learned something new that might help my school work	4.18	1.03	4.12	1.14	4.19	1.02	.065	.577
I think I will be better at my school work	4.18	1.05	4.16	1.12	4.15	1.06	.007	.949
I think I will enjoy my school work more	4.00	1.13	3.78	1.25	4.04	1.13	.217	.063
It showed me that I can do new things if I try	4.35	.95	4.23	1.05	4.38	.91	.160	.168
I now feel more confident in myself	4.19	1.06	3.97	1.23	4.26	1.00	.263	.024
I get on better with other people in my class	4.21	1.01	4.09	1.10	4.23	1.03	.128	.275
I get on better with my teachers	4.28	.96	4.19	1.05	4.28	.96	.093	.428
It helped me feel part of my school	4.12	1.14	4.00	1.27	4.18	1.12	.155	.184
It showed me that people should protect plants and animals	4.51	.78	4.39	.81	4.56	.77	.221	.058
It showed me that people should care for the environment	4.55	.75	4.45	.76	4.61	.71	.212	.070
I would like to spend more time in nature in the future	4.20	1.06	4.15	1.14	4.22	1.05	.070	.543

Notes: Means (*M*), standard deviations (*SD*), and statistical tests are reported. Significant differences ($p < .05$) are highlighted in bold.

3.2. Qualitative analysis

Various benefits to children were revealed through the observations and interviews, which can be exemplified and illustrated through particular instances and within case studies of the various activities.

3.2.1. Children's learning

3.2.1.1. Children's learning about aspects of ecology and geology

The Wildlife Trust events often involved children learning about specific aspects of nature, including the ecology of plants and animals, through various approaches such as identifying flowers and trees, considering plants as sources of materials, and considering habitats and needs. For example, in the London region, children (aged 7 to 8 years old) took part in a tally of plants and flowers in an urban wildlife centre, in which they recorded the number of plant types, number of petals in flowers, petal colour(s) and flower shape (**Figure 1**):

Child: We've found a purple bell.

Tutor: What did you find? What did you have most of?

Child: Four petal flowers and lots of daisies.

Tutor: Why do plants have flowers?

Child: Because it's spring?

Tutor: But why?

Child: For bees to get nectar.

Tutor: So why are there lots of daisies? Some types have the most nectar; dandelions have lots of flower heads, so lots of pollen/nectar. Have you done a treasure hunt?

Children: Yes!

Tutor: Where is the treasure? At X marks the spot, so 4 petals – X in the middle marks the spot! And what about the colours that are missing in all the petals here?

Child: No reds or greens ... or oranges.

Tutor: Bees can't see red.

The children had previously learnt how to construct tally charts in school and were able to apply their numeracy skills while learning within nature, actively observing plant features, and learning about reasons for flower structures and the specific functions associated with pollination processes. Groups of children then collaborated and all successfully created model plants, applying what they had just learnt about the various features and structures of plants.



Figure 1: Flower garden

At another nature reserve in the West Midlands region, children undertook mini-beast hunting (**Figure 2**) and pond dipping (**Figure 3**) in order to observe and classify invertebrates. The tutor enthralled the children (aged 8 to 9 years old) with stories about various animals:

Tutor: Off we go to the first habitat – the woodland.

Child: It's damp, wet, darker and creatures are underneath logs.

The children were mostly early English learners.

Teacher: Can you say 'slithering'?

Lots of excited chatter occurred on the way to the woodland. Children found centipedes, slugs, spiders, woodlice, and beetles, and checked what they were with the tutor.

Teacher: How many legs does your creature have?

Some of the children (while screaming a little): This is a scary place! A slug ... yuck!

A child tries to make people jump with the slug.

Tutor: My woodlouse fact will make you go 'eeew, yuck'. They drink through their bottoms!

A child brings a woodlouse to show everyone.



Figure 2: Meadow invertebrate observation

The Wildlife Trust tutors used contexts and stories that allowed children to access activities and ideas at appropriate levels. Teachers also used relaxed and often humorous styles:

Child: My feet are sore.

Teacher: I've brought spare elbows, knees and noses but no feet!
Next time I'll have to bring feet!

The children had the chance to go pond dipping, and the teachers and teaching assistants acknowledged that none of them would typically have this opportunity in or outside school. The children appreciated the experiences:

Child: Woow tadpoles ... so many! Can we see them turn into frogs?



Figure 3: Pond invertebrate observations

Within a learning campus in the South West region, a mixed age group (also including some children aged 9 to 12 years old) made mini-beast hotels as part of their after-school nature club within the school grounds. Most of the children had not made them before and the tutor explored the sort of things that they might need. She asked them where mini-beasts like to live:

Child: In grass, compost, trees, underground.

Tutor: Who lives underground?

Children: Moles, ants.

Tutor: Yes.

Children: Worms, spiders?

Each child had brought in a plastic bottle to hold the 'hotel'. The tutor encouraged the children to be creative, and to explore in a small area of bushes, looking for woodlice, spiders, and other small invertebrates. The teacher encouraged children to look in an old compost heap in the grounds. The children worked in pairs to fill their bottles; some found a slow worm. The tutor then taught them how to make a clove hitch for constructing a handle to hold up the hotel; the children were observed to all be working hard and engaged. The tutor advised them to use thinner sticks to attract smaller insects and encouraged them to take them home to put in their gardens (most of the children had gardens). This activity mainly required children to observe and classify invertebrates, and to learn and use some simple design and technology skills incorporating natural materials (**Figure 4**).



Figure 4: Mini-beast hotels

At another activity within the West Midlands, children (aged 9 to 10 years old) walked through an ancient, rugged landscape, which exposed them to visible evidence of geological processes and timescales (**Figure 5**).



Figure 5: The landmark

Having previously (the day before) walked up another well-known local landscape, the children traversed the area while the tutor asked various questions along the way, to see if they remembered the names of rocks, having previously observed distinctive colours and textures:

Tutor: This pink rock is granophyre, not 'granny-on-fire'! It's the oldest rock (feldspar) in the world and is worn down to make [local] quartzite so that's a newer rock. We saw rocks up the [hill] yesterday but this is a third rock type.

Child: Is it igneous? What exactly is granophyre?

All children were visibly engaged, actively listening attentively, and practising names of rocks. Everyone walked through to the 'beach' where ripples are visible in the rock (**Figure 6**).

Child: It's the fossiled [fossilised] beach!

Everyone subsequently walked through the forest on way back, helping each other and by holding branches and brambles.

Child: Miss this is the fossiled [fossilised] beach.

A girl slipped slightly on small sloped path back and froze. A boy and teacher held her hands to help her across.

During this activity, the children were seen to engage with, to learn, and to recall various geological ideas. The children also demonstrated good learning relationships with teachers and the Wildlife Trust tutor, as well as concern for one another's well-being as they crossed some challenging terrain. The teachers noted that most of the children were not used to walking in the countryside, and did not come to the area even though they lived close by. Accordingly, the activity provided the children with a new opportunity to experience nature.



Figure 6: Fossilised beach

At two different 'Forest School' activities, both in the East of England, children learnt about plant and animal ecology (**Figure 7**). In one case, the teacher took her 8 to 9 year-old (Year 4) classes and worked closely with the Wildlife Trust tutor to include and integrate ideas and skills from school, as well as to take back ideas and learning strategies as inspiration for future work. The observed half day-long sessions were also focused on literacy, numeracy, environmental art and collaborative learning.



Figure 7: Forest School entrance, East of England

In the other case, a group of 9 to 10 year-old children undertook animal tracking, identification and classification through inquiry-based learning. Their event included a nature walk that led them through quiet and peaceful parts of the forest. The tutor included sequences of questions to assess the children's progression with ideas

across the three-day activity. In the opening activity, children examined and identified key features of different animal skulls and skeletal remains in small groups. They were being 'animal detectives' in the challenge to identify as many of the animals as possible:

Tutor (while holding up a skull): Who am I?

Children: A muntjac!

Tutor: Well done!

Children: Yeessss!

Tutor: Am I a herbivore, omnivore, or carnivore and how do you tell?
Hands up, thank you.

Child: Teeth!

Tutor: Yes, here are flat, grinding teeth and these at the front?

Lots of hands were going up all the time.

Child: Tusks, little tusks.

Child: Fangs?

The children were seen to be totally immersed for a considerable time, all actively wanting to share their ideas and knowledge with each other, with teachers and with the tutors. The next activity allowed children to track some of the animals they had been learning about by going on an observational nature walk (**Figure 8**):

Tutor: Now be very quiet as deer can hear us from quite a distance.
Cup your ear with your hand to see what that's like. Like dishes ...
and walk quietly so we don't rustle the leaves.

Child: Ooh mole hills, like in my Nan's garden!

Child: Look at all those droppings, they look like raisins!

Child: Hey it's a nibbled leaf [excited to see] ... and fox prints?

Tutor: It's a dormouse nest, high-ish in the hedge. (**Figure 9**)

Child: Wow!



Figure 8: Animal tracks



Figure 9: A dormouse nest

As the session continued, the tutor provided students with opportunities to learn through inquiry-based and problem-solving approaches by setting challenges about the life cycle and habits of hedgehogs. The children's developing ideas about hedgehogs were also checked through a series of statements in which the children

physically indicated their understanding by moving to areas designated as 'true', 'false', or 'not sure'. This revealed several ideas that children were secure in, but a few that divided their opinions:

Hedgehogs are mammals: All children moved to the area designated as 'True'.

Baby hedgehogs are born with prickles: Most children moved to the area designated as 'True', a few to 'False', and a few to 'Not sure'.

Baby hedgehogs are called 'hoglets': All children moved to the area designated as 'True' (with cheers of hurrah!).

Bread and milk are good for hedgehogs: Most children moved to the area designated as 'False', and a few to 'True'.

Pet dogs can catch hedgehog fleas: Half of the children moved to the area designated as 'True' and half to 'False'. The tutor explained that the answer was 'False'.

One garden is enough space for a hedgehog: Half of the children moved to the area designated as 'True' and half to 'False'. The tutor explained that the answer was 'False'.

Hedgehogs are nocturnal: All children moved to the area designated as 'True'.

Hedgehogs run away if disturbed: Most children moved to the area designated as 'False' and a few to 'True'. The tutor clarified: You are all right! Sometimes!

The inquiry-learning challenge was approached through role play. At first, the children worked in pairs to 'find' hedgehog food (represented through photographs hidden in the autumn leaves in the area). When they found a picture card, they exchanged it for 'survival' tokens:

Tutor: You are hedgehogs in autumn; find food and you will build up food tokens.

The children were then given a model hedgehog, represented by a small plastic container filled with hot water with a sealable cap:

Tutor: If you can keep your hedgehog warmer than mine, you will win brown fat tokens and survive the winter! (**Figure 10** and **Figure 11**)



Figure 10: The hedgehog hibernation challenge



Figure 11: The hedgehog hibernation challenge

This led to a frenzy of activity as the children raced to find a good spot for making a hibernation nest in which to bury their hedgehog. Once all groups were ready (which took a considerable time), the tutor had everyone measure the temperature of their hedgehog and compare against hers. The brown fat tokens they won (as every group was indeed successful) were ultimately exchanged for chocolate buttons! The reward of chocolate was genuinely unexpected and the majority of the children expressed appreciation. During this activity, the children were observed to be fully engaged and motivated in applying their ideas about reducing energy transfer. The tutor's strategies promoted the children's enjoyment of being in nature and allowed them to link aspects of their learning in school with natural processes.

3.2.1.2. Children's wider learning and development

Across the various Wildlife Trust nature events, the natural environment was used as a context for facilitating children's development across wider curriculum areas, including literacy, numeracy, art and design, and technology. There was collaboration between teachers and Wildlife Trusts tutors in devising some of these opportunities, particularly as part of the longer-term events, which allowed teachers and tutors to co-plan more easily. On an event in the East of England, the teacher asked for poetry writing to be weaved into the forest school sessions, using different kinds of descriptive writing and techniques in literature. The children wrote 'what am I?' poems:

I can be big or small
I'm black and white
I have a trunk that looks a bit bobbly brown
What am I?

Answer: a silver birch.

A poem written by a 9 year-old (Year 5) child.

Throughout the process, the children were supported in their writing and its development:

Tutor: We're using personification today. A few of you haven't done it at school yet. What does it mean?

Child: Like a person ... branches, like long sticky arms – human like. Trees stood straight like a soldier. Crooked like a witch's finger.

Tutor: A good one.

Teacher: Or emotions – branches could be stretched out scarily or as a friendly warning! Trees don't have emotions but humans do – so, good.

Child: Look up, it's waving, dancing ... some look lonely ... stretching like a big hand.

The teacher explained that their children also then went on to develop this kind of writing back at school.

Other 'Forest School' activities facilitated children's environmental art pursuits, again interspersed with their learning of ecology. For example, children decorated wooden names badges from slices of tree branch (**Figure 12**), made charcoal pencils to then draw with (**Figure 13**), and constructed animal and plant sculptures (**Figure 14**). Some of these proved to be strong favourites:

Child: My favourite things were cooking our marshmallows on the fire and making our creative art ladybird.



Figure 12: Decorated name badges



Figure 13: Making and drawing with charcoal



Figure 14: Ladybird sculpture

Children also undertook a range of other pursuits. In activities across the East, South West, and West Midlands regions, children made dens and constructed nature path boardwalks, mini-beast hotels, and other structures to use in free play, which involved various imaginative stories and games (such as a ship to sail in to Antarctica and Scotland). In the East region, children also built games in teams of

twos and threes using various natural materials (such as a golf game using sticks and sweet chestnut seed cases). Fire building and lighting was also a popular activity observed in nature events across the East and West Midlands regions. In the West Midlands, for example, children learnt how to use sharp knives to whittle short sticks into fire sticks to start their own mini-campfire, and worked safely and accurately with the tools.

3.2.1.3. Nature-orientated pedagogy in school

Following some of the activities, teachers reported that they applied ideas and learning strategies from the nature events when they returned to school. For example, the groups working with a Wildlife Trust in the East of England wrote 'Forest School' journals and used the activities to inspire work in school in between each session in the forest (see the supplementary material for examples). The teacher explained:

We go back to school and take the activities with us. I'm inspired to go outside with them in school now, and feel confident that they will engage. We are in the middle of our 'livings things' topic and everything we've done fits so well. Last week we were doing classification, so this week in science, I thought let's go outside with the chalk on the playground to do it, not in class on paper, where they worry about it being read. My co-teacher and I now use '50 things to do before 11' to guide 'golden time'. We use our small school field and nature reserve too. The fact the children can also write poems here, and keep their journals about each day about Forest School is so good for literacy work. Using personification with the trees today ... such a great opportunity to show what they can do.

Discussions with the teachers highlighted that all the schools had their own school grounds, although one mainly consisted of artificial constructions. One school had a small nature reserve in the school grounds, and another had its own small area of forest, known as 'Happy Wood', where children of all ages in the school spent time. One of the teaching assistants in the East region recounted that they were undertaking their 'Forest School' training, and emphasised the importance of also taking children to different natural environments:

By Year 6, children get a bit fed up of our bit of wood. It becomes too familiar. We want to take them to different woods, an ancient wood ... but it does mean they are very used to this kind of environment over the years.

3.2.2. Wider benefits of learning within nature

3.2.2.1. Enjoyment and other positive experiences

Across the various activities, the children displayed high levels of engagement, enjoyment and motivation during nature activities. For example, in the London region:

Child: Look, look [taking a leaf to show tutor] my leaf smells lemony!

Tutor: Why lemony do you think?

Child: If animals smell the leaf, they won't like it.

Tutor: You've hit the nail on the head. It puts them off, it's lemon balm and a bit overpowering. [Holding up each leaf.] Look how they are different: hard, the shape ...

Child: I can see the veins!

Tutor: What are veins for?

Child (excitedly explaining to the tutor): When rain falls, water goes down veins.

Similarly, in the West Midlands region:

Tutor: What will we see today?

Children (very excited): Slugs, spiders ... ohhh! Snakes, grass snakes!

Tutor: Not impossible but probably too in the city still. Now what is a habitat? (**Figure 15**)

Child: A place a creature lives.

Tutor: Brilliant, would you like to add to it?

Child: A creature's address!



Figure 15: Stag beetle habitat

Once instructions had been given and clarified, children ran, skipped and rushed to start activities, chattering and exclaiming. Occasionally they became tired, cold, hungry, or slightly concerned or worried by unfamiliar situations or contact with animals, but these instances were few in number. Teachers, teaching assistants and the Wildlife Trust tutors supported any challenges that children faced with encouragement and positivity. For example, in the West Midlands, a teacher clarified that positive experiences were had, despite the weather:

Teacher: Some kids didn't have the right clothing for our second day of building the boardwalks. It was unexpectedly pouring with rain. They were not equipped and waterproofs were only revealed after everyone was soaked! I wasn't sure they would come back today! But they did and today's four activities are great for them.

The children were also supported through any challenges faced when encountering aspects of nature, such as nettles, seen through an example in the East region:

Tutor: We'll play 1, 2, 3, where are you? What do you say?

Children: Yay! 1, 2, 3, we're here!

The children played hide and seek in the forest, within a defined area.

Tutor: Yes and if they find you, come back to the circle.

Girls and boys counted; all sitting on tree stumps.

Tutor: Go! Count to 30 - hide! [Everyone ran off.]

Tutor [counting with them]: Keep calling.

A girl got stung by a nettle, and the tutor reassured her: Use the cold tap. No scratching is the best thing.

Teacher: If I stomp on your foot, you'll forget about your hand! [All laughing.]

When children engaged in observations of nature, they were curious, wanting to discover and learn about animals, plants, and other objects that they encountered. For example, in the South West, children found some eggs on the back of leaves and showed them carefully to the tutor:

Tutor: Let's take a photo to check which they are.

Child: They're beautiful.

Tutor: They look like butterfly to me, go slowly.

Children: We've never seen butterfly eggs before!

Tutor: Let's do some research ...

Child: (very excited): A woodlouse has crawled into my bug hotel! He's moved in!

On nature walks, children became engrossed in what they were seeing and doing. For example, from the East region:

Teacher: Look, [a child] is being like a real detective! She's just licked her finger like in the movies. [As she made a note about a deer track.]

Similarly, in the London region:

Teacher: How many flowers did you find? Explain?

Child: One flower. [A yellow buttercup.]

Teacher: Look at the types of grass.

Tutor: And what about types of flowers?

Children: We have blues ones.

Children exhibited much movement, running a little, and overall enjoyment.

Child: They're actually amazing! Edible flowers – taste amazing!

More generally, teachers reported witnessing changes in confidence, behaviours, motivation and willingness to take risks over the weeks of the 'Forest School' events. For example, from the East region, a teacher explained:

Children are having a go at stuff, having a reference point, something new, lots haven't climbed a tree before. They are taking risks and having common experiences. They're working together. [One of the newer children] came from Yorkshire; this has helped him and I've got

to know them all – the quicker the better, what makes them scared, what they struggle with ... No one is noticing the stinging nettles now. The girls are now so much more confident here.

The teachers attributed some of these impacts to being in the natural environment, including experiencing peacefulness and calm. As illustration, within woodlands in the East of England, children walked silently along a golden path of fallen autumn leaves, trying not to make any sound while they listened for animals (**Figure 16**).



Figure 16: Golden path through the forest

The sun was filtering through the trees as the Wildlife Trust tutor asked everyone to find their own quiet place to sit and be still. Some sat in amongst the roots of trees, others in piles of leaves; branches were swaying in the wind, leaves were falling. The tutor asked the children to reflect on how they had been feeling, and they were eager to share:

I had a beetle on me!

This place is so comfy, my tree was so comfy, it was moving! (**Figure 17**)

The leaves keep falling on me.

I saw a squirrel in another tree ... cool ... ooh, there are more squirrels!

I found a speckled feather.

Oh, I'm so jealous!

I saw a caterpillar going off down the fern.



Figure 17: A quiet spot in the forest

During the longer 'Forest School' events, the children were also seen to build up personal associations with the environment through finding specific features that they looked forward to seeing and encountering again in subsequent sessions. A particular favourite was having a stick or branch at the site. The children would hide the stick somewhere and immediately look for it when returning to the nature reserve. The Wildlife Trust tutors taught the children how to drag larger sticks safely, without waving them around. Behaviours that would be disallowed within a school context (such as playing with sticks) essentially became another way for the children to feel connected with nature over the duration of the event. If another group coming through the site had in some way disturbed their sticks, the children were apparently upset.

3.2.2.2. Enhanced collaboration and communication

All the nature events included opportunities for students to develop collaboration and communication skills. Teachers and teaching assistants stated that were particularly keen that these broader skills should be fostered, as they underpin the wider curriculum. The Wildlife Trust tutors led activities that often involved children working in pairs and small teams, to discuss what they were doing and seeing with their partners, and where children were encouraged to actively ask questions. More generally, the physical space that the natural environments provided facilitated the children in developing social relationships with one another, with their teachers, teaching assistants and with the Wildlife Trust tutors. Teachers described children who did not typically play with each other in school as beginning to do so more readily. This particular benefit was reported by teachers with children taking part in longer events. For example, from different activities within the East England region, teachers and volunteers expressed that:

These weeks at Forest School at the beginning of the school year are so valuable for me. I can step back and really see what the children are like. For example, [a child] was a bit bossy at the beginning in school. She's confident as an individual but wasn't mixing really that well. Now after a few weeks in Forest School, she's visibly relaxed; look at her working quietly, calmly with her partner, not showing off, not trying to take over ... so good to see.

This [blindfolded observation of trees] is the ultimate communication activity, boys leading girls, arms around each other. Boys and girls are collaborating in the outdoors, whereas they usually separate in the school playground by Year 4.

Getting to know the kids over a period is brilliant. A couple of the boys are best mates but sometimes they blow up with each other and now I can take them aside. They mellow and overcome 'being outside'. They grow in confidence. Loads of them had never been [up the hill] before.

3.2.2.3. Impacts for specific individuals and/or groups

Teachers and teaching assistants reported that taking children in Year 3, Year 4, and Year 5 (children aged 7 to 10 years old) out to nature events was particularly beneficial:

We come to the Wildlife Trust site every year with our Year 4's. The opportunity to be out, learning, running, pond dipping ... we will do this as long as we can. Most of our children don't go outside to play, so this is so valuable. [A teacher in the West Midlands]

We wanted to run this for Year 5 as they don't get much, it's always Year 6. It was great last week: 'getting to know you's. The children wore blindfolds and led each other to a tree. Then they had to feel it, then spin round and try and find their tree again by feeling. Then they made their own name tag out of a piece of wood, it was lovely. [A teacher in the East of England]

I reminded Year 5 about this today; I wasn't sure they'd come but there are lots of keen children, I'm really pleased with it. [A teacher in the South West of England]

The teachers, teaching assistants and the volunteer parent/carer also recounted instances of benefits to learning and well-being for individual children who had found learning in a formal school environment to be a challenge:

I work with [a child] at school all the time. He's on the autistic spectrum and finds everything such a challenge. Out here every week he's been in his element. We've got him on the den building each week (**Figure 18**), as he found the walk last time not a great experience. He's designed and built some great structures and gone on to help the others which he never does normally. [A teaching assistant in the West Midlands]



Figure 18: Den-building materials

It's all building resilience for many reasons [A teacher in the East of England]

My daughter is doing well at Forest School. But my son who came a couple of years ago had an even better time. He's dyslexic and just lives really for his horses. School isn't the right place for him. Here he was in his element; the space, the climbing and den building and all the fires ... he loved it. I'm worried about him going to secondary school next year ... the pressures. If he could learn like this he'd be a different child. [A parent/carer in the East of England]

The flexibility and physicality of the activities in nature provided these children with opportunities to show what they could do, and to interact positively with their peers more readily than they could within their usual school environment.

3.2.2.4. Children's expressions, reflections, and memories

The children's own expressions from across the various nature events highlighted that these were highly valued by the children. As indicative examples:

Forest School is brilliant ... why can't we have Forest School every day?

My favourite thing was '1, 2, 3, where are you?' [hide and seek in the forest] and climbing the trees which I thought I couldn't do.

We all liked our sticks and stick tag at lunchtime.

I loved the hedgehog house building.

The exploring and finding the mini-beasts.

I enjoyed looking at skulls.

Making fire, getting the bark brown bits off, den building.

I'm good at looking for things and rock climbing. I'm good at carving.

We want to make a fire again on our last day!

It has to be the marshmallows in the fire – they taste so good!

I learnt it's only safe to climb a tree to the height of your shoulder. I really enjoyed climbing and jumping off.

4. Discussion

4.1. Engaging and connecting with nature

The various results from this research highlight that children's well-being and aspects of their nature connection can be fostered through events from The Wildlife Trusts, which involve children spending time engaging with nature.

After undertaking the Wildlife Trust events, the quantitative analysis revealed increases in the children's personal well-being and health, nature connection, and pro-environmental values. The analysis compared the children's responses from before and after undertaking the events, and accounted for the children undertaking different events and having different characteristics, such as their age and gender, and for the children having different levels of prior engagement with nature-related aspects of life, such as undertaking exercise outdoors and reading books and/or watching media about nature. From a wider perspective, these are reassuring findings, in the context of increasing needs for sustainable living and for the conservation and protection of nature (Department for Environment, Food and Rural Affairs, 2018; State of Nature, 2016).

These findings were affirmed through the children's reflections on their experiences, expressed through the questionnaire that they completed after undertaking the events. This highlighted that the majority of children had positive experiences and believed that they gained benefits. These included: 'I enjoyed it' (where 94% of children expressed agreement or strong agreement); 'It showed me that people should care for the environment' (90%); 'It showed me that people should protect plants and animals' (89%); 'I enjoy being outdoors more' (83%); 'It made me feel calm and relaxed' (81%); 'It made me feel refreshed and revitalised' (79%); and 'I would like to spend more time in nature in the future' (78%).

These findings were also supported through the qualitative observations and interviews: children's enjoyment levels were seen to be high; children's motivation and engagement were high; and children exhibited curiosity, active observations, and engagement with nature. Additionally, teachers reported that their children developed self-confidence, positive behaviours, motivations to learn, independence, and a willingness to take risks; these were variously attributed to opportunities for free play and roaming, and the peacefulness of being in nature was also considered to be beneficial. The children's various expressions highlighted that the events were highly valued and broadly entailed positive experiences.

4.2. Learning within nature and learning about nature

The Wildlife Trust events involved the children learning about nature while learning within nature. The interviews and observations of children, teachers, and Wildlife Trust practitioners during the events/activities highlighted that the children learnt about many aspects of ecology and geology. The children were also seen to apply wider ideas and skills from across the curriculum; specifically, nature was productively used as a context and avenue to support development in areas such as

literacy, numeracy, art, design, and technology, together with development in physical dexterity through construction and play. Children were seen to learn collaboratively and actively, and were provided with space to express ideas confidently and creatively. The teachers and teaching assistants also expressed that they valued longer term programmes, and believed that, over time, the children relaxed, opened up more, engaged with learning, took ideas and skills back to school, and looked forward to returning to the Wildlife Trust events. On a wider level, some teachers and teaching assistants explained that they then applied nature-inspired pedagogical strategies within their teaching back at school.

These findings were affirmed through the children's reflections on their experiences, expressed through the questionnaire that they completed after undertaking the events. The majority of the children believed that they gained various educational benefits. These included: 'I learned something new about the natural world' (where 90% of children expressed agreement or strong agreement); 'I learned something new that might help my school work' (79%); 'I think I will be better at my school work' (77%); and 'I think I will enjoy my school work more' (73%). The majority of the children also believed that they gained wider personal benefits, including: '[the event/activity] showed me that I can do new things if I try' (84%); 'I now feel more confident in myself' (79%); 'I get on better with my teachers' (81%); 'I get on better with other people in my class' (79%); and '[the event/activity] helped me feel part of my school' (76%). The qualitative approaches affirmed that the children engaged in varied collaborative pursuits, and that teachers believed that their children developed social and personal skills such as self-confidence and links with peers.

These results from across the interviews and observations of children, and from the children's reflections on their experiences expressed through the survey, cohere with findings from earlier research and evaluations in England that also applied similar methods (Kendall & Rodger, 2015; Murray & O'Brien, 2005). For example, practitioners of 'Forest School' programmes for primary school children in England have observed developments in children's confidence, social skills, language and communication skills, motivation and concentration, physical skills, and knowledge and understanding of the natural environment (Murray & O'Brien, 2005). Wider research has also highlighted that learning within nature has been enjoyable for children and has linked with various benefits such as children's personal and social skills including confidence, and with children's positive attitudes and motivations around learning (Bølling, Otte, Elsborg, Nielsen, & Bentse, 2018; Dillon, et al., 2005; Kendall & Rodger, 2015; Murray & O'Brien, 2005; Plymouth University, 2016; Waite, Passy, Hunt, & Blackwell, 2016). Additionally, experiences of outdoor learning have helped foster children's interests and motivations towards specific areas of their studies, such as natural history (Stern, Powell, & Ardoin, 2008) and science (Dettweiler, Lauterbach, Becker, & Simon, 2017). More generally, outdoor learning may help provide important experiences and memories (Dierking & Falk, 1997; Knapp & Benton, 2006; Liddicoat & Krasny, 2014), which have (for example) helped foster children's interest in engaging with nature and increased their environmental awareness and pro-environmental behaviours (Liddicoat & Krasny, 2014).

4.3. Limitations

Future research would ideally need to consider children who undertake events and also consider children who do not (and who might, for example, learn about aspects of nature as part of their classroom learning), which would be necessary in order to conclusively establish any effects as following from the events.

The quantitative analysis was undertaken across a potentially diverse range of events/activities. More comprehensive sampling and exploration of different types of events/activities may allow greater insight to be gained. For example, identifying different types of activities and their (potentially varying) learning aims, approaches, and other aspects of their context and delivery would allow detailed exploration of whether changes are seen against those intended aims (and/or against any other emergent areas) and/or whether any particular aspects are linked with particular outcomes and/or changes. Similarly, more comprehensive sampling of children of different ages and/or across various schools would allow detailed exploration of any differences and/or their impacts.

The quantitative analysis focused on revealing overall changes while statistically accounting for children having different ages, undertaking different event durations, and for their other characteristics and levels of prior engagement with nature. However, quantitative analysis can also only consider and/or reveal changes for areas that have been measured within a questionnaire. Many other aspects of children's lives are likely to be relevant to their health and well-being, and to their nature connection, so that any research can only provide a partial perspective. Considered more generally, it may be informative to determine and then consider more aspects and dimensions of children's nature connection, which would ideally also involve directly asking children what aspects of nature they value and how they subjectively experience nature.

Any findings from the considered children may not necessarily be generalizable to different contexts and/or to different children across England. The sample was unavoidably limited by the available events and by participation. From a wider perspective, the presented findings, and their wider implications, show plausible tendencies and key areas to be confirmed, developed, and/or otherwise explored through further and more extensive research.

Some of the children's views such as their pro-environmental values (that people should care for nature and undertake pro-environmental behaviours) were initially very high. Realistically, such views are close to the maximum levels of the measurement scale, so that increases may become less feasible and any smaller change (such as selecting 'Agree' rather than 'Strongly agree' through happenstance or due to transitory influences) might lead to the appearance of decreases. There are indications from prior research that measuring aspects related to nature connection in young children may be inherently harder to observe and/or otherwise complicated through (potentially) generally optimistic and positive responses (Bragg, Wood, Barton, & Pretty, 2013; Ernst & Theimer, 2011). While there appeared to be no obvious outliers and/or other circumstances (such as small numbers of potentially disillusioned or frustrated children who may have expressed their irritation via the questionnaire), it is possible that children's high initial responses (relatively close to the scale maximum) entailed greater opportunity for some decreases to occur in some cases, especially when considering changes for sub-groups of children.

4.4. Wider implications

Nature has been considered to be beneficial to health and well-being throughout history and across many different societies and cultures (Ward Thompson, 2011). In accordance with these intuitions, higher amounts of local nature around homes and/or within local areas across England has associated with adults expressing higher personal health and well-being (Mitchell & Popham, 2007; Wheeler, et al., 2015; Wheeler, White, Stahl-Timmins, & Depledge, 2012; White, Alcock, Wheeler, & Depledge, 2013; White, Pahl, Wheeler, Depledge, & Fleming, 2017). More specifically, and again across England, higher frequencies of visiting nature, and/or visiting specific natural areas such as woodlands, uplands, and coastlands (compared to various other areas), have associated with higher well-being (MacKerron & Mourato, 2013; White, Pahl, Ashbullby, Herbert, & Depledge, 2013; White, Pahl, Wheeler, Depledge, & Fleming, 2017).

Benefits to health or well-being from nature may arise in various ways. Theoretical perspectives have proposed and explained that nature may help to facilitate recovery from stress (Ulrich, 1981, 1983) and/or facilitate recovery from fatigue (Kaplan, 1983, 1995), following from aspects of natural environments, people's reactions to them, and any compatibility with people's inclinations and actions. Concurrently, well-being has been considered to follow from achieving underlying needs, such as for autonomy, competence, and also relating, connecting, and belonging with others (Deci & Ryan, 1985; Ryan & Deci, 2000, 2001). Well-being may be fostered through being able to autonomously undertake various activities, which follows from being intrinsically motivated to do so, via someone being inherently interested in and enjoying those activities (La Guardia, 2009). People can also undertake activities in order to help realise their self-identity, and/or to help express their identity to others, in order to become who they want to be in life (Eccles, 2009). Someone's well-being may link with their nature connection, given that nature connection encompasses an intrinsic motivation towards enjoying and engaging with nature (through expressions such as 'Being outdoors makes me happy', 'Being outdoors in nature makes me feel peaceful', and 'When I feel sad, I like to go outside and enjoy nature'), together with a perceived responsibility and sympathy towards nature. Personal connections to nature can also encompass the recognition of nature being personally meaningful to someone's identity, through expressions such as 'My relationship to nature is an important part of who I am' (Nisbet, Zelenski, & Murphy, 2009; Nisbet & Zelenski, 2013).

Accordingly, supporting children's well-being, and benefits to well-being arising from nature, may need to involve the following.

- **Further opportunities to engage with nature.** Across England, around 70% of school-aged children (aged 6-15) visit nature at least once a week, although only around 8% visit nature with their schools (Hunt, Stewart, Burt, & Dillon, 2016). Children's accessibility to nature may be limited by their location and by various other barriers. For some children, visiting nature through their school may provide opportunities that they would not otherwise be able to gain. For children at school, learning about nature while learning within nature can help cover aspects of the national curriculum while providing enjoyable and beneficial experiences.

- **Fostering children's motivations.** Children will likely want to engage with nature if they think that they may enjoy it and/or are interested in doing so. Positive early experiences and support may be important. Explaining that nature can be beneficial to health and/or well-being offers an initial extrinsic motivation for someone to engage with nature, which can develop into intrinsic motivation when engaging with nature is found to be enjoyable and has increasing internalised personal meaning.
- **Fostering links between children's personal identities and nature.** Supporting children's varied interests, and also recognising and supporting the diverse ways in which someone can be a 'nature person', remain important. Some children may prefer outdoor activities and adventure, for example, while others may prefer learning about plants and animals.
- **Fostering accessibility.** Wider socio-cultural norms, stereotypes, and/or expectations may facilitate or constrain people's motivations and/or developing personal identities (Clayton, 2012; Eccles, 2009). Recognising the diverse ways in which people can engage with nature, and the diverse people who do so, may help ensure that more children can see that nature is accessible for 'people like me'. It may be helpful to avoid inadvertently conveying that nature is 'best' experienced (or 'should' be experienced) in particular ways and/or by particular people, aside from avoiding activities that damage nature and/or are unsustainable.

Accordingly, support for children may need to consider and involve multiple avenues and aspects of life, which may need involvement and support from stakeholders across environmental, educational, and other fields.

5. Glossary and terminology

Forest Schools

'Forest Schools' refer to a type of and/or orientation towards learning activities within nature (and are not necessarily formal schools), and may not necessarily (but usually do) involve learning within forests or woodlands. 'Forest School' activities often involve: the use of a woodland setting (something natural and wild but within established and safe boundaries); learning that can be linked to national curriculum and foundation stage objectives, and which can involve various approaches to facilitating learning; the freedom to explore and engage with nature in varied ways; regular engagement with children over time; and small groups with relatively high numbers of supporting adults (Murray & O'Brien, 2005; O'Brien, 2009; O'Brien & Murray, 2006). The concept of 'Forest Schools' broadly links with and/or has been inspired by Scandinavian initiatives to mix indoor and outdoor learning (Bentsen, Mygind, & Randrup, 2009; Waite, Bølling, & Bentsen, 2016), and also with Scandinavian socio-cultural norms and values, which have historically integrated the outdoors within recreation, general living, and wider ideals of citizenship (Beery, 2013; Gurholt, 2008, 2014; Humberstone & Pedersen, 2001).

Health and well-being

Someone's health can be measured through the presence or absence of particular medical conditions, such as diagnosed diseases or long-term conditions. Additionally or alternately, people can express their own subjective perception of their health (Craig, Fuller, & Mindell, 2015; Marmot, et al., 2010). Someone's subjective mental well-being is often considered as a combination of their emotions and feelings, such as their happiness and their satisfaction with life (Children's Society, 2015; OECD, 2015; Public Health England, 2015). Wider aspects of life are also conceptualised as being relevant to well-being, such as having autonomy, a purpose in life, having positive relations with others, and achieving personal growth (Ryan & Deci, 2000, 2001). Positive well-being, emotions, and/or other feelings such as enjoyment and happiness are sometimes referred to as 'positive affect' (such as in the context of affective reactions to circumstances or events), in contrast to feelings such as anxiety being referred to as 'negative affect'.

Nature

Nature encompasses plants and animals, whether considered as specific habitats or species and/or as wider landscapes and ecosystems (State of Nature, 2016). Sometimes, nature is defined as anything and everything that is not artificially created by people, which then excludes artefacts, buildings, and wider infrastructures (Hartig, Mitchell, de Vries, & Frumkin, 2014). Nevertheless, constructed gardens and parks are usually considered part of nature. Many contemporary landscapes in England, such as agricultural fields surrounded by hedgerows or stone walls, have also been formed over centuries of artificial development (State of Nature, 2016). Historically, nature has sometimes been conceptualised and/or potentially idealised

as something outside of society, something remote, and something untouched by people (Cronon, 1996).

Nature connection

Someone's personal affinity towards nature is often referred to as their 'nature connection', which has been conceptualised as encompassing someone inherently valuing experiences of nature and enjoying being in nature (Cheng & Monroe, 2012), feeling in harmony and connected with nature (Mayer & Frantz, 2004), feeling a perceived responsibility and sympathy towards nature (Cheng & Monroe, 2012; Mayer & Frantz, 2004; Nisbet & Zelenski, 2013), and recognising the importance or value of nature as an aspect of their personal identity (Nisbet, Zelenski, & Murphy, 2009; Nisbet & Zelenski, 2013). Different conceptualisations have placed different emphasis on these, and also on other, aspects of people's interrelating experiences, their attitudes and emotions, and their self-identities involving nature (Clayton, 2012; Restall & Conrad, 2015; Tam, 2013; Zylstra, Knight, Esler, & Le Grange, 2014).

Pro-environmental behaviours

Beneficial behaviours towards nature are often referred to as 'pro-environmental behaviours' (or conservation behaviours, environmentally friendly behaviours, or environmentally sustainable or responsible behaviours); these generally encompass actions in daily life such as recycling, minimising unnecessary use of resources and energy, using efficient forms of transport, and considering the environment when making general purchases (Bamberg & Möser, 2007; Hines, Hungerford, & Tomera, 1987). For children, pro-environmental behaviours have often been considered through saving water and energy at home, recycling, and other actions and practices that are potentially under their control (Leeming, Dwyer, & Bracken, 1995; Musser & Diamond, 1999; Musser & Malkus, 1994). Pro-environmental behaviours can be positively promoted through interventions and other encouragement, but have been found to also follow from childhood experiences, from knowledge about environmental problems and how to act in response, and from various attitudes, beliefs, and further factors, broadly encompassing personal, contextual, and wider socio-cultural aspects of life (Bamberg & Möser, 2007; Gifford & Nilsson, 2014; Hines, Hungerford, & Tomera, 1987; Osbaldiston & Schott, 2012; Steg, Bolderdijk, Keizer, & Perlaviciute, 2014; Zelezny, 1999). Pro-environmental behaviours, sustainable development, and protecting nature are increasing concerns for England and the wider United Kingdom (Department for Environment, Food and Rural Affairs, 2018; State of Nature, 2016), as well as the wider international community (Cardinale, et al., 2012; Folke, et al., 2011; United Nations, 2000, 2015).

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7. Supplementary material

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Appendix 1: Qualitative sample

Region and venue	Event duration	School group	Activity focus: plant ecology	Activity focus: animal ecology	Other curriculum areas, broader goals, other pursuits
London; inner city venue, reclaimed land, wildlife centre	Short (one half day)	29 Year 3 (7-8 year-olds); 1 teacher; 2 teaching assistants; 3 Wildlife Trust staff	Plant (flower) identification; parts of a flower; plants as sources of materials	Invertebrate (mini-beast) hunt	Collaborative partner and team building
West Midlands; suburban city venue, reclaimed land, ecological centre	Short (one half day)	59 Year 4 (8-9 year-olds); 2 teachers; 4 teaching assistants; 1 Wildlife Trust staff	Forest walk tree identification	Invertebrate (mini-beast) hunt; the life of bees; pond dipping and animal identification	Collaborative partner work
East; rural forest site, woodlands	Short/medium (3 days over 3 weeks)	27 Year 5 (9-10 year-olds); 2 teachers; 4 Wildlife Trust staff/ volunteers	Tree scientists (meet a tree and tree study; leaf flags and crowns; seeds and plant life cycles; plant adaptations; uses of plants	Needs in a habitat; identifying animals from bones; food chains; animal tracks; focus on hedgehogs; invertebrates; moths (and bats) game; invertebrate hunt and identification; making invertebrate homes	Den building; wild art; role play; building invertebrate homes (arts and crafts); collaborative partner work; free play in nature
South West; city suburban site, school playing fields	Longer (2 hours after school club over 6 weeks)	16 Year 5-7 (9-12 year-olds); 1 teacher; 2 Wildlife Trust staff	Plant identification; plants as sources of materials	Invertebrate (mini-beast) hunt	Making mini-beast hotels; collaborative partner work; fire building and cooking outdoors
West Midlands; rural site, public nature reserve	Longer (6 whole days over 4 weeks)	52 Year 5 (9-10 year-olds); 2 teachers; 3 teaching assistants; 4 Wildlife Trust staff and volunteers	Plants as sources of tools and materials	Not applicable	Collaborative partner and team building; den building; rock and fossil identification; fire building and cooking outdoors; myth and story telling
East; rural forest site, woodlands	Longer (6 half days 'Forest School' over 6 weeks)	16 Year 4 (8-9 year-olds); 1 teacher; 1 parent; 3 Wildlife Trust staff and volunteers	Tree identification through forest exploration; plants as sources of tools and materials	Invertebrate (mini-beast) hunt; bird identification	Collaborative trust development; independence, risk awareness, self-confidence; tool use

safety; den
building; fire
building,
charcoal
making and
cooking
outdoors; tree
climbing (risk
taking in
safety);
creative and
environmental
art; poetry
writing

Forest School Diary

Day 5

What we did... we made charcoal and we had marshmallows with rich tea and we made a spider out of logs and stones.



Who I worked with...

I only worked with Ashleigh



What I learnt... how to make charcoal



What I enjoyed... I definitely enjoyed the marshmallow with rich tea



Figure 19: Children's journals and poems (from an event/activity in the East of England)

Forest School Diary

Day 1

<p>What we did...</p> <p>in forest school we got belly and we went on hire bus Lots of songs like 19 and we a kite on the bus and had a day play about you grow bling heads and honey and strong and under a messy stage.</p> 	<p>Who I worked with...</p> <p>any we run and we see a spider like forest school and my work with me half day we any side you and you go back in to the camp site a round. we can have a camp game.</p> 
<p>What I learnt...</p> <p>a about a tree is good and stay and learn a about wild life.</p> 	<p>What I enjoyed...</p> <p>hay and shorts and learning a about wild life best.</p> 

Figure 20: Children's journals and poems (from an event/activity in the East of England)

Forest School Diary

Day 1

What we did... we started first
we played 1,2,3 where are
you and I won twice.
Next we learnt more about
the woods it was really
good.



Who I worked with... I worked
with a team with daniel
ronnie leana leona and
libby

What I learnt...

I learnt more games and
learnt more about the woods
like animals habitat
and we made a bug hotel



What I enjoyed...

I enjoyed everything
but mostly 1,2,3 where
are you

Figure 21: Children's journals and poems (from an event/activity in the East of England)

<p>What we did...</p> <p>obstacle courses and one was three were you.</p> 	<p>Who I worked with...</p> <p>per put in my class, and a teacher</p> 
<p>What I learnt...</p> <p>how to make an obstacle course.</p> 	<p>What I enjoyed...</p> <p>making the obstacle courses fun! it was amh</p> 

Figure 22: Children's journals and poems (from an event/activity in the East of England)

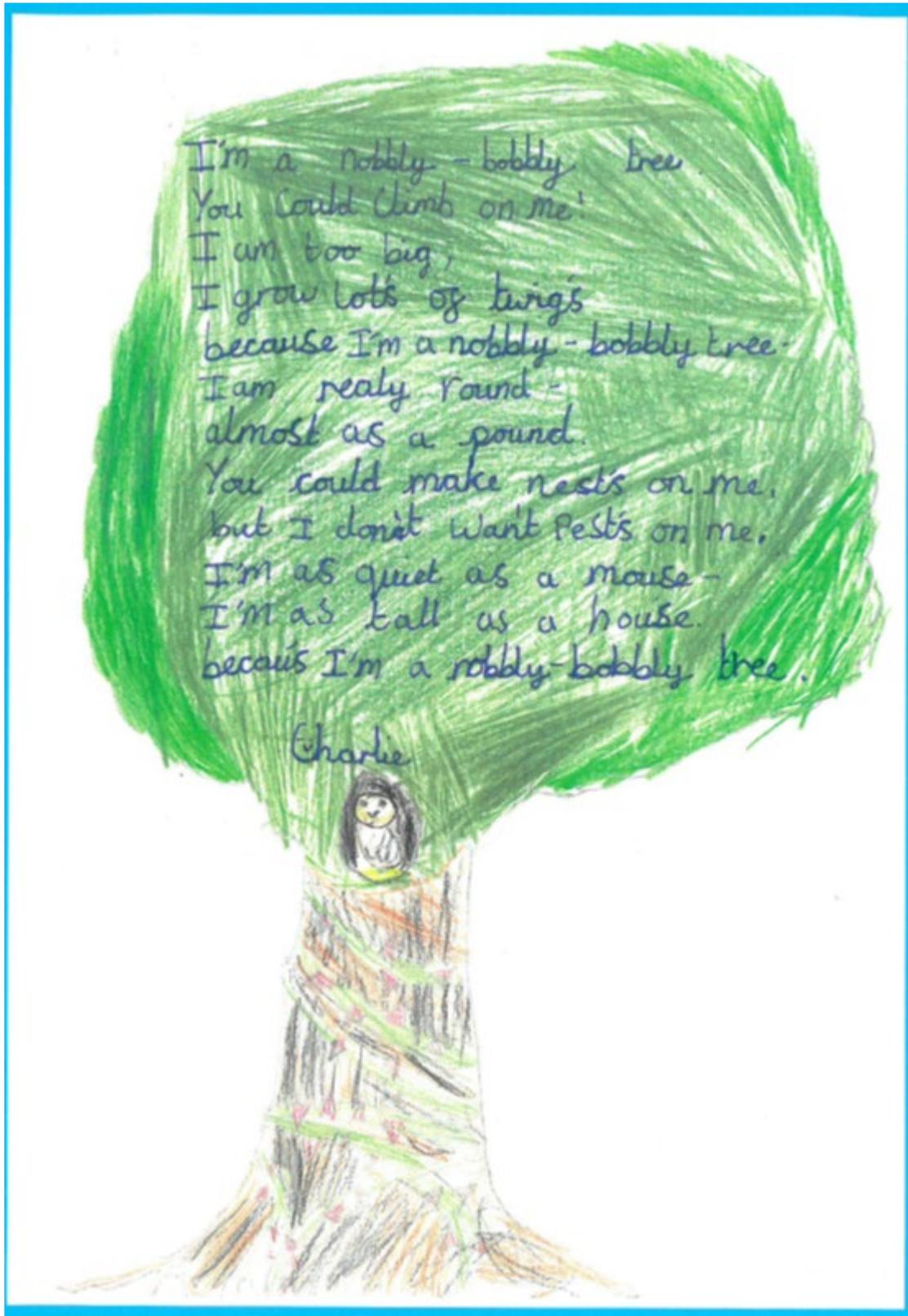


Figure 23: Children's journals and poems (from an event/activity in the East of England)

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Published: November 2019

Images: Front cover © Helena Dolby for Sheffield & Rotherham Wildlife Trust, pond dipping © Penny Dixie



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