

The importance of Forest School and the pathways to nature connection

Abstract

Over the past 25 years Forest School in the UK has been growing in popularity as part of a wider resurgence of interest in outdoor learning. A key driver behind this recurrence of interest has been a growing concern over the lack of child exposure to outdoor experiences and with the natural world and their ensuing nature-deficit disorder. This article considers Forest School as linked with the concept of nature connection that is the sensation of belonging to a wider natural community. This sense of belonging developed by being in nature can also be a key factor in promoting attachment and sense of place which in turn is associated with the promotion of health, wellbeing and pro-environmental behaviours. As such the origins towards achieving nature connection are a formal part of the Forest School Association's (FSA 2016) Forest School principals, with growing research linking Forest School and nature connection as concomitant. Recent work has suggested that contact, emotion, meaning, compassion, and beauty are key pathways for the formation of nature connection and there is a strong need to better understand children's nature connection in this context. Further, from the premise that what goes on in spaces and places is fundamentally linked to both social and spatial processes, this article also attempts to understand the spatialities of Forest School in order to frame the development of nature connection within a socio-spatial analytic.

Introduction

Over the past two decades in the UK and internationally, there has been growing concern over the steady increase in children's lack of connection to nature (Cummings and Nash 2015; Knight 2013; Louv 2005; National Trust, 2012). Estimates suggest 75% of children within the UK perceive themselves to be separate or disconnected from nature (RSPB 2013), in part due to the loss of meaningful experiences with nature from increasing urbanisation (Pyle 2003). This disconnection has been expedited by a general decline in exposure of outdoor play experiences due to a more screen-based lifestyle (Clements 2004) and parental anxieties over children's safety outside the home (Johansson 2006; Valentine and McKendrick 1997). It is suggested that a disconnection with nature not only erodes children's spatial connection with the natural environment but also makes them less complete human beings as a result (Veloso and Loureiro 2017). While a lack of nature connection is on the rise, a reconnection with a lost part of the self in nature is still possible (Lumber et al. 2017). Yet, until relatively recently there has been a general decrease in outdoor play (Maynard 2007) and the concomitant erosion of the importance of play as a learning tool, particularly in school settings (Moyles 2015). Due to these concerns over children's nature deficit disorder (Louv 2005) the emphasis on schools to provide outdoor learning experiences has gained momentum over the past two decades (Maynard 2007), particularly amongst Early Years and Primary school settings (Waite 2017). As a result, schools have increasingly been encouraged to integrate elements of outdoor learning in their curriculum (DCSF 2007; DfES 2006; Ofsted 2008; Tickell 2011).

Forest School is just one way many schools are able to re-address their provision of outdoor learning opportunities for children and young people. By immersing children holistically in the outdoors and the natural environment Forest School has the potential to promote all aspects of child development and growth including their physical, social, cognitive, linguistic, emotional, social and spiritual development (Davies 2013), but with an emphasis on emotional intelligence (Knight 2016). As such, holistic development, a key component of Forest School recognises the social context and the importance placed on interaction with others, including both peers and practitioners, as a further key feature of learning (Patel 2003). What is unique about Forest School as an outdoor learning approach is that it is based in woodland. The emphasis placed on encouraging children to use all their senses and move around relatively freely, where '...learning-orientated approaches take the place of task-orientated approaches, and as such learning is less dominated by the national curriculum...[and] personal, social and emotional development is more significant' (Harris 2017, p.229). Hence Forest School's popularity

with Early Years settings and Primary School in particular is notable (Knight 2016; Leather 2018; Massey 2005a; Maynard 2007; O'Brien and Murray 2007).

We argue in this paper that this emphasis on both physical and social development that Forest School affords participants, plays a further key role in place attachment and therefore the development of a sense of place (Beames and Ross 2010; Davies et. al. 2006). Namely, via such sociability participants begin to see themselves in relation to all the other creatures (including other humans and non-human animals) they engage with in that setting (Palmberg and Kuru 2000). The more children engage with this natural environment the more it affords meaning to them, which in turn promotes a sense of belonging (Tuan 1977); especially important for children in urban cities who report greater loneliness than those living in smaller towns and rural areas (ONS 2018). Therefore, there is a need to connect with nature (Charles 2009) and each other, and ultimately care for it (Bögeholz 2006).

By providing children opportunities to explore and learn about the outdoor environment where there is relative freedom, the aim of this article is to frame the students' experiences of Forest School within the context of a spatial analytic. Thus, the paper contributes to the growing area of research into the geographies of education (Holloway and Jöns 2012; Mills and Kraftl 2016) and of particular note in relation to Forest School is Frances Harris's paper 'Outdoor learning spaces: The case forest school' (2017). By understanding the spatialities of Forest School and the specific pathways to nature connection (see Table 1 below) the article attempts to highlight how Forest School can provide an alternative space for more intrinsic social and emotional development in order to positively re-connect children with nature as well as themselves and others. We argue that by connecting with nature and the natural world, children are able to develop their sense of belonging and responsibility towards the wider environment, which can ultimately support development of pro-environmental attitudes.

Table 1:

Pathway	Definition	Forest School Activities
Contact	Meeting with nature through the senses	Being outside in all seasons; climbing trees; playing games like hide and seek; running around; rope swings and rope walks; building dens; lighting fires and cooking in the open air; bug hunts; tree ids; site management activities; bare foot walking; appreciating sights and smells
Emotion	An affective state or sensation occurring from engaging with nature	Respecting habitats; developing awareness of habitats, flora and fauna; watching insects; using natural materials to make artefacts; making nettle soup; bug hunts; planting seeds; feeling joy through play; feeling calm through reflecting in woodland
Meaning	The use of natural symbolism to communicate thoughts	Reflections round the log circle; making dog logs; pretend games involving becoming different animals; story telling; discussions; observing seasonal change
Compassion	Including nature within one's self-concept, leading to concern for nature and empathy; motivating helping/co-operation	Constructing bird boxes and bug hotels; bug hunts; discussions around materials that decompose; sustainability etc.; low maintenance management of environment including helping to clear brambles and other evasive plants, pruning and coppicing
Beauty	Perceiving the aesthetic qualities of nature that include colour, shape, and form that please the senses and create awe	Art activities using natural materials – making picture frames, mobiles, stick creatures, tree art using mud; being in woodland in all seasons and observing seasonal change; engaging with trees and observing leaves

The importance of nature connection

Nature connection is of interest due to the benefits a reconnected relationship with nature provides (Tam [2013](#)), thought to stem in part from our evolutionary history with the natural world (Capaldi et al. [2014](#)). Humanity's evolution as part of nature have shaped our cognitions and emotions (Gullone [2000](#)), with an affiliation for life aiding our ancestors' survival through paying attention to the visual cues within the environment (Capaldi et al. [2014](#)). Our desire to affiliate or connect with nature persists to this day, despite the prevailing human exceptionalism that dominates the western cultural viewpoint; whereby humanity is separate from wider nature due to our possession of culture (Catton and Dunlap [1978](#)). Nature connection is the sensation of belonging to a wider community of nature (Mayer et al. [2009](#)) with nature connection comprised of emotion (Hinds and Sparks [2008](#); Mayer and Frantz [2004](#)), self-concept (Schultz [2001](#)), social identity (Clayton [2003](#)), experiences, and learning (Nisbet et al. [2009](#)).

Research interest in this area is especially important given the possible detriment to our mental health from a disconnection with nature (Maller et al. [2009](#)). While the term disconnection is problematic as it implies some form of separation, it is a necessary concept. Disconnection implies that humanity is of the natural world rather than in it (McPhie and Clarke [2015](#)) that may be better conceptualised through Integral Ecology (Zylstra et al. [2018](#)). Given the established and frequent use of Nature Connection within the literature, the term will still be utilised in this paper. Often within the literature, exposure to nature and nature connection are interchangeably used despite being different concepts. With the pathways to nature connection emphasising the need for the spatial engagement, involving discovery using all senses with nature beyond simple contact, we can examine the benefits of nature connection discussed here.

Wellbeing

Nature has long been associated with positive outcomes for humanity; historically, anecdotally and in more recent empirical work on wellbeing (Russell et al. [2013](#)). Broadly, the wellbeing benefits of nature connection are as important as income or education (Capaldi et al. [2014](#)), being linked to psychological and social wellbeing (Howell et al. [2011](#)), vitality (Nisbet et al. [2011](#)), life satisfaction (Mayer and Frantz [2004](#)), and happiness (Richardson et al. [2016a, b](#); Zelenski and Nisbet [2012](#)). Further benefits to wellbeing include a reduction in trait and state anxiety (Martyn and Brymer [2016](#)) as well as personal growth (Nisbet et al. [2011](#)), calm and contentment (McCormick et al. [2015](#)), and perspective taking (Russell et al. [2013](#)). Generally, both hedonic and eudaimonic wellbeing outcomes of nature connection have been treated as a single concept. Recent work suggests that nature (and nature connection) will produce different wellbeing outcomes depending on self-regulation via the sympathetic (calm) and parasympathetic (joy) nervous system (Richardson et al. [2016a, b](#)), with meta-analyses indicating nature is related to both hedonic and eudaimonic wellbeing outcomes equally (Pritchard et al. [2019](#)). Further, the wellbeing benefits for children from nature connection are more likely to occur when a child is highly connected via direct interaction when measured using a psychometric scale of nature connectedness (Lumber et al. [unpublished](#)).

Health

Nature connection is a predictor of contact with nature (Lin et al. [2014](#); Nisbet and Zelenski [2013](#)); potentially providing health benefits through green exercise to increase physical activity levels (Alvarez-Bueno et al. [2017](#); Richardson et al. [2016a, b](#)) which may prevent inactivity and the health issues associated with it (Velo and Loureiro [2017](#)). Further, the cultural perception that nature has a positive effect on health may also have an influence on any physical health benefits experienced (Nilsson et al. [2011](#)). Nature connection can provide coping resources in conjunction with positive personality traits to deal with stress that in turn, may improve immune system functioning through resilience to disease (Cervinka et al. [2012](#)). The benefit to health from nature connection will be a dual process in conjunction with wellbeing outcomes that benefit the immune system, which itself is thought to be the central pathway of health outcomes derived from nature (Kuo [2015](#)).

As with wellbeing, the threshold at which health benefits occur are more likely when a child is scoring highly on a nature connection measure (Lumber et al. [unpublished](#)).

Pro-environmentalism

While a direct causal link between nature connection and pro-environmental behaviour has not yet been evidenced, a growing body of evidence suggest nature connection plays a central role (in conjunction with other factors) for pro-environmental (Bruni et al. [2015](#); Otto and Pensini [2017](#)) and pro-conservation behaviours (Richardson et al. [2020](#)). Most compellingly, meta-analyses have evidenced clear links between nature connectedness and increased pro-environmental behaviours (Mackay and Schmitt [2019](#); Whitburn et al. [2019](#)). Pro-environmental attitudes have been linked to nature connection (Kuo et al. [2019](#); Mayer and Frantz [2004](#)) which may have a bearing on any behaviour enacted. Further, empathy, an outcome of nature connection (Zelenski and Nisbet [2012](#)) can facilitate concern for the environment (Berenguer [2007](#)) while emotional attachments to nature can lead to a desire to protect natural spaces from harm (Scannell and Gifford [2010b](#)). Cognitions held by the individual could also play a role, with biospheric concern stemming from nature being included in the self-concept (Bruni and Schultz [2010](#); Schultz et al. [2004](#)) and focusing on one's similarity with nature (Tam et al. [2013](#)). Therefore, nature connection through emotional attachment, biospheric concern, similarity, empathy, and pro-environmental attitudes could lead to positive behaviours towards the environment, evidenced through the success of large-scale interventions to facilitate nature and the resulting self-reported pro-environmental behaviour (Richardson et al. [2016a, b](#)). Further, recent quantitative work indicates pro-environmental and pro-nature behaviours are more likely to occur when children are highly connected to nature (Hughes et al. [2018](#)), with nature as self, a subscale measurement of Nature Connection a predictor of environmentally responsible attitudes (Bahar and Sahin [2017](#)). Analysis suggests that nature connection explains 69% of the variance of ecological behaviour in children, with environmental knowledge contributing an additional 2% (Otto and Pensini [2017](#)). Interestingly, children's pro-environmental attitudes predict self-reported pro-environmental behaviours with parental and best friend's pro-environmental behaviour also a significant predictor, suggesting social agency is an important factor (Collado et al. [2017](#)).

Children and nature connection

Given the potential benefits to children and the environment from nature connection, identifying ways in which a positive, connected relationship to nature can be fostered is important. Childhood freedom to explore their surroundings and their overall experiences in particular are thought to be important for nature connection (Hinds and Sparks [2008](#); Knight [2016](#); Maynard [2007](#); Muller et al. [2009](#)), particularly when they take risks, make choices, take more responsibilities and make connections with their own learning and what is around them (Gill [2007](#)). Such spatial experiences are shaped by engaging with nature through general outdoor play (Berto and Dias [2017](#)), playing in woodland (Wells and Lekies [2006](#)) and creative expression (Bruni et al. [2015](#)). Further, activities centred on walking (Mayer et al. [2009](#)), camping and hiking (Martin [2004](#)), using allotments (Hawkes and Acott [2013](#)), have also been suggested to lead to nature connection. Such affective activities afford children with the freedom to use all their senses to explore the natural environment. In this context, it is via bodily movements, material mess, and an understanding of spatial scale (Kraftl [2015](#)) that provides learners the ability to engage differently than they would from other more structured ways of connecting with nature. Of particular note are environmental education programs, that focus on gaining knowledge of nature that involves the identification of flora and fauna based on a more scientific knowledge-based curriculum (Lumber et al. [2017](#)). However, although important, such structured learning activities have failed to show a sustained increase in nature connection (Lieflander et al. [2012](#)). Instead, research now suggests that activities involving contact, emotion, meaning, compassion and beauty are the pathways to nature connection (Lumber et al. [2017](#)), (See [Table 1](#) below for definitions of each pathways). Forest School, with its focus on a more experiential experience, allows for the realisation of such pathways, where the emphasis of Forest School remains focused on holistic development where reflection and emotion become an integral part of that experience (Knight [2011](#)). Forest School becomes a more enjoyable outdoor learning experience that is

arguably more authentic and organic and as such encourages sociality and promotes place attachment and a sense of belonging (Cummings and Nash [2015](#)), which is discussed further below.

Qualitative reports indicate that the pathways are important for individual connection, with a sense of discovery significant and offer a framework when structuring activities aimed at fostering nature connection (Lumber, et al., Submitted). The manner in which Forest Schools may be able to facilitate nature connection through the pathways are noted in Table [1](#).

The pathways of Forest School

In the UK Forest School sessions usually run over a period of between 6–12 weeks, although some programmes run once a week over a year (Knight [2013](#)). It very much depends whether or not schools have their own woodland area and resources on site. There may be activities loosely structured during such Forest School experiences as noted in Table [1](#), but children ultimately choose what they want to do, and practitioners scaffold learning accordingly and as necessary (Massey [2005a](#)). In relation to the pathways in Table [1](#) is that Forest School as opposed to many other outdoor learning experiences is less structured due to being play-based and learner led (Waite [2017](#)). Practitioners simply facilitate an experience in which children are often free to explore, and encouraged to play, connect, reflect and socialise in a natural environment (Knight [2016](#); Campbell and Thompson [2013](#)). As such, we want to argue that the pathways to nature connection are realised more intuitively and organically, although with discussion and reflection being a key element.

By engaging with others in an outdoor setting and familiarising themselves with that environment via all their senses, children through Forest School activities develop a secure attachment to the setting and with others in that setting (Beames and Ross [2010](#); Davis et al. [2006](#)). By allowing learners to be explorative contact with the environment offers an enjoyable experience that enriches positive connections and an intrinsic motivation to learn (Cummings and Nash [2015](#); Hobbs [2015](#)). The emphasis is on social and emotional development with a focus on interaction, cooperation and reflection (Knight [2011](#)). Not only are participants able to socialise with their peers and adults in this natural setting, but also with other creatures and the outdoor environment itself which hitherto was very much part of childhood and growing up (Louv [2005](#)). Here, the ability to explore and play safely within a natural environment may offer opportunities to promote a sense of place and connection with nature through the pathway of *contact* where the sense of discovery, awe and engagement of the senses can be utilised (Lumber et al., submitted). The use of free play also provides meaning-making opportunities for children as the woodland becomes a special place of *beauty* for them, which may secure a sense of belonging (Davenport and Anderson [2005](#)) and place attachment; the bonding via social ties and activities, of individuals and the environment that affords meaning for them (Scannell and Gifford [2010a](#)).

Furthermore, symbolic connotations in the social group or through expressive characteristics of the place (Scannell and Gifford [2010b](#)) provide further meaning and form a link to the ecosystem that can change as both personal identity and the ecosystem alter (Russell et al. [2013](#)). Thus, the opportunity to socialise not only with peers but with other creatures and the woodland itself may offer opportunities to emotionally connect with nature, perhaps producing a sense of compassion (Lumber et al. [2017](#)) as a sense of similarity is formed that may in turn promote helping behaviour and self-compassion too (Gilbert [2014](#)). Here appreciating the *beauty* to be found in nature via learner-led activities is important. The formation of attachment to place and the connection with it suggests Forest Schools may also have an important role to play in benefitting wellbeing through nature connection (Capaldi et al. [2014](#); Russell et al. [2013](#)). It may also in turn benefit pro-environmental behaviours through a sense of connection (Bahar and Sahin [2017](#); Cudworth [2018](#); Otto and Pensini [2017](#)), place attachment (Scannell and Gifford [2010a](#); Wattchow and Brown [2011](#)), and a sense of belonging (Cummings and Nash [2015](#)).

Different learning spaces

These experiences thus also provide children with a spatially different experience from that of mainstream schooling and daily school life (Harris [2017](#)), with outdoor learning spaces shown to benefit attention and memory (Berman et al. [2008](#); Berto [2005](#)); an enjoyment for learning (Kuo et al. [2019](#)) and academic development (McCree et al. [2018](#)). For us this is the key to our thinking, as any learning environments, or social spaces for that matter, acquire meaning via human (and we would argue non-human) agency (Massey [2005a](#); Thrift [2006](#)). As such a space does not become a place until we interact and socialise within it. The more we engage intrinsically with a space and experience it through our senses the stronger we will identify with that place with the possibility that we will feel part of it (Cudworth [2018](#)). If we feel part of it, we are more likely to gain a deeper meaningful understanding of it and develop a sense of belonging and an affinity to certain places.

The mainstream-learning environments of many schools construct a particularly disciplinarian environment and thus specific power relations are set up to legitimate certain spatial practices embedded in schools (Cudworth [2018](#)). These power relations are outcomes led and shaped by the performativity culture of neo-liberal policy architecture, where schools are ranked according to exam results (Ball [2017](#)). Consequently, within this context we can begin to understand how movement and noise are kept to a minimum and learning, based on a state-sanctioned curriculum, is emphasised, managed and decided by the teacher. Thus, learning is heavily scrutinised and focused on specific bodies of knowledge and regular attendance at school becomes paramount amidst the pressures to keep children on track to do well in tests (Kelly [2009](#); Waite [2010](#)). Consequently, everything that goes on in schools is focused around specific, spatial practices that become standardized in many school settings. Such practices go on to reproduce certain types of accepted behaviours and identities that then become normalised by social relations (Cudworth [2018](#)). As a result, mainstream schooling on the whole has become normalised around the learning of certain subjects and bodies of knowledge, whereby school becomes simply a place to achieve well in tests (Cudworth [2018](#)). In this system a good learner is someone who attends school regularly, remains on track and passes numerous tests, and a good teacher is someone who can track children's progress against set criteria. Those children and young people that fail to do well in such tests and/or engage 'inappropriately' with the 'regimes' of schooling, will very likely fail to build a sense of attachment or belonging to their school or surrounding environment.

With Forest School engagement taking place over a number of weeks and using all their senses to engage and connect with the natural world, learners are more likely to build a sense of belonging to this 'different' learning space which begins to afford more relevance to them and their identities with nature (Casey [2001](#)). It becomes a meaningful place (Cummings and Nash [2015](#)). This is key to the development of place attachment, and nature connection whereby participants associate the place with particular social bonds and behaviours (Cummings and Nash [2015](#)), which in turn promotes the development of a caring attitude to a place (Wattchow and Brown [2011](#)).

Place attachment and a sense of belonging developed by a more instinctive spatial engagement with the natural environment, as opposed to the more formal 'spatial regimes' of the school environment based on performance and targets, is something we argue is a key cognitive process for the promotion of nature connection via the 'Pathways.' We see this very much in line with Gray's ([2012](#)) work on Dewey's ideas around the importance of experiential learning that is being increasingly eroded by mainstream classroom-based learning with its focus on a curriculum, national testing and outcomes (Waite [2010](#)).

Moving learning outdoors

The alternative learning space that Forest School provides is a space where different rules and spatial practices apply and where "There are no formal targets, learning outcomes or prescribed attainment levels relating to children's time at forest school" (Harris [2017](#), p. 229). Alongside other outdoor experiences, Forest School is a different 'cultural' space where children and young people, as well as practitioners, have relative autonomy and

freedom in what they do away from the confines of the more ‘structured’ formal school setting (Harris [2017](#)). Moving away from the inside to the outdoor space, can often feel like a cultural shift for both children and practitioners; a cultural border is crossed where learning becomes redefined (Peacock and Pratt [2011](#)). This includes developing more informal practitioner and child relationships based on more physicality whereby healthier attachments are developed and grounded on trust (Archard [2015](#)). Learning is also led by the learner where children are relatively free to choose what they want to do and therefore more likely to be motivated to achieve, which in turn develops their enjoyment of learning (Kuo et al. [2019](#)) and self-esteem (O’Brien and Murray [2007](#)).

By continuing to move around the natural area as they want to and at their own pace, learners further develop their skills holistically whilst interacting intrinsically with the outdoors and all others in it (Knight [2016](#)). Further, with limited focus on a curriculum and no formal targets or pressures on achievement, Forest School becomes a social space with different relational truths perpetuated by everyone in that place that for some have often been associated with the de-schooling of learning spaces (Kraftl [2015](#)). Thus, Forest School becomes a metaphorical space ‘where different behaviours are permitted, and spaces in the curriculum’ (Harris [2017](#), p. 222). Neo-liberal power relations could potentially be challenged by such places.

However, it is important to acknowledge that nature connection in a woodland context is unproblematic. Such spaces are not without their own unique set of power relations that often work against nature itself by hiding the ‘truths’ connected with the historical, geographical and political formation of woodlands and forests at the expense of ecological sustainability (Pacini-Ketchabaw [2013](#)). As such if we are to really re-connect children with nature, via our discussions, reflections and stories we need to think carefully about how we are sensitive to ‘how Indigenous peoples and their ontologies and epistemologies are erased from child care forest pedagogies, from local ecologies, and from discussions of children in nature’ (Pacini-Ketchabaw [2013](#), p. 356).

Conclusion

The Forest School approach goes beyond simply learning outside the classroom. Through its emphasis on free play and exploration, it creates a unique space to foster relational and meaning-making opportunities within the natural environment. These opportunities tie directly into the pathways to nature connectedness that not only supports a re-connection with a lost part of self but also potential health, wellbeing and pro-environmental outcomes too. This paper has outlined the links between Forest Schooling and nature connection through the five pathways on a theoretical basis with the authors acknowledging the need for further research evidence to demonstrate the ability of Forest School settings to improve nature connection through the pathways directly. Further, qualitative, quantitative and mixed methods approaches are all needed to help identify the way the pathways lead to nature connection through the lens of Forest School not only for children but also potentially for their families, Forest School leaders, and the wider school community. Research that evaluates the use of the pathways to nature connection within Forest School activities, explores the fostering of nature connection in Forest School leaders, and whether Forest Schooling leads to health, wellbeing and pro-environmental outcomes is needed; to affirm the cognitive, social, wellbeing, health and pro-environmental outcomes nature connection through Forest Schooling can bring. This line of enquiry will be important in facilitating a move away from the neo-liberal performative culture in favour of learning environments that foster a holistic development of the child, one where their personal growth, cognitive, social and emotional development can be nurtured through a connection with their wider environment and other people and other animals.

Although Forest School is a growing phenomenon in the UK, it will be up to school leaders and authorities to embed such ideas in their curriculums in order to develop an alternative way of supporting formal education and what goes on inside the classroom. With more time allocated to outdoor learning and Forest School and this reconnection with the wider environment, we argue children will be able to develop a sense of place and re-engage with learning and be more intrinsically motivated to learn more widely. This in turn will increase their

enjoyment of school life that they then find as a more inclusive space and will want to come to school. We believe it is time to once again take learning outside the classroom, where teachers are encouraged and supported to do so. Whilst at the same time being mindful of the geographical, historical and political complexities of how we have shaped woodlands and forests as well as how they have shaped us. On a final note, we see that the development of pro-environmental behaviours amongst children and young people is equally important to the development of formal academic knowledge.

References

- Álvarez-Bueno, C., Pesce, C., Cavero-Redondo, I., Sánchez-López, M., Garrido-Miguel, M., & Martínez-Vizcaíno, V. (2017). Academic achievement and physical activity: A meta-analysis. *Pediatrics*, 140(6), e20171498. <https://doi.org/10.1542/peds.2017-1498>.
- Archard, J. (2015). The impact of Regular Forest School Sessions on Young Teenagers Wellbeing, Summary Report from Good from the Woods Partner. Available at https://www.plymouth.ac.uk/uploads/production/document/path/8/8008/final_summary_report_jenny_a_otterhead_.pdf. Accessed 30 Jan 2019.
- Ball, S. (2017). *The education debate* (3rd ed.). Bristol: Polity Press.
- Bahar, F., & Sahin, E. (2017). An associational research on Turkish children's environmentally responsible behaviours, nature relatedness and motive concerns. *Science Education International*, 28(2), 111–118.
- Beames, S., & Ross, H. (2010). Journeys outside the classroom. *Journal of Adventure Education and Outdoor Learning*, 10(2), 95–109. <https://doi.org/10.1080/14729679.2010.505708>.
- Berenguer, J. (2007). The effect of empathy in pro-environmental attitudes and behaviours. *Environment and Behaviour*, 39(2), 269–283. <https://doi.org/10.1177/0013916506292937>.
- Berman, M. G., Jonides, J., & Kaplan, S. (2008). The cognitive benefits of interacting with nature. *Psychological Science*, 19(12), 1207–1212.
- Berto, R. (2005). Exposure to restorative environments helps restore attentional capacity. *Journal of Environmental Psychology*, 25, 249–259.
- Berto, G., & Dias, G. (2017). The importance of outdoor play for children's healthy development. *Porto Biomedical Research*, advance online publication retrieved from: <http://www.sciencedirect.com/science/article/pii/S2444866416301234>. Accessed 4 Dec 2018.
- Bögeholz, S. (2006). Nature experience and its importance for environmental knowledge, values and action: Recent German empirical contributions. *Environmental Education Research*, 12, 65–84.
- Bruni, C. M., & Schultz, P. W. (2010). Implicit beliefs about self and nature: Evidence from an IAT game. *Journal of Environmental Psychology*, 30, 95–102.
- Bruni, C. M., Winter, P. L., Schultz, P. W., Omoto, A., Tabanico, J., & J. (2015). Getting to know nature: Evaluating the effects of the Get to Know Program on children's connectedness with nature. *Environmental Education Research*, 23(1), 43–62. <https://doi.org/10.1080/13504622.2015.1074659>.
- Campbell, D., & Thompson, S. (2013). Naturally speaking: Parents, children, teachers in dialogue with nature. In D. Meir & S. Sisk-Hilton (Eds.), *Nature education with young people* (pp. 102–122). New York: Routledge.
- Capaldi, C. A., Dopko, R. L., & Zelenski, J. M. (2014). The relationship between nature connectedness and happiness: a meta-analysis. *Frontiers in Psychology*, 5(976), 1–15. <https://doi.org/10.3389/fpsyg.2014.00976>.

- Cassey, E. (2001). Between geography and philosophy: What does it mean to be in the place-world? *Annals of the Association of American Geographers*, 91(4), 683–693.
- Catton, W. R., & Dunlap, R. E. (1978). Environmental sociology: A new paradigm. *American Sociologist*, 13(1), 41–49.
- Cervinka, R., Roderer, K., & Hefler, E. (2012). Are nature lovers happy? On various indicators of well-being and connectedness with nature. *Journal of Health Psychology*, 17(3), 379–388.
- Chalres, C. (2009). The ecology of hope: Natural guides to building a children and nature movement. *Journal of Science Education and Technology*, 18, 647–475.
- Clayton, S. (2003). Environmental identity: A conceptual and operational definition. In S. Clayton & S. Opatow (Eds.), *Identity and the natural environment: The psychological significance of nature* (pp. 45–66). Boston: MIT Press.
- Clements, R. (2004). An investigation of the status of outdoor play. *Contemporary Issues in Early Childhood*, 5(1), 68–80.
- Collado, S., Evans, G. W., & Sorrel, M. A. (2017). The role of parents and best friends in children's pro-environmentalism: differences according to age and gender. *Journal of Environmental Psychology*, 54, 27–37.
- Cudworth, D. (2018). Space, place and social relations. In D. Cudworth (Ed.), *Schooling and travelling communities: Exploring the spaces of educational exclusion* (pp. 93–129). London: Palgrave Macmillan.
- Cummings, F., & Nash, M. (2015). An Australian perspective of a forest school: Shaping a sense of place to support learning. *Journal of Adventure Education and Outdoor Learning*, 15(4), 296–309.
- Davenport, M. A., & Anderson, D. H. (2005). Getting from sense of place to place-based management: An interpretive investigation of place meanings and perceptions of landscape change. *Society & Natural Resources*, 18(7), 625–641.
- Davies, G. (2013). Full principles and criteria for good practice. <http://www.forestschoolassociation.org/full-principles-and-criteria-for-good-practice>. Accessed 1 Feb 2019.
- Davis, B., Rea, T., & Waite, S. (2006). The special nature of the outdoors: Its contribution to the education of children aged 3–11. *Australian Journal of Outdoor Education*, 10(2), 3–12.
- DCSF (Department for Schools, Children and Families). (2007). *The children's plan: Building brighter futures*. London: DCSF.
- DfES, (Department for Education and Skills). (2006). *Learning outside the classroom manifesto*. Nottingham: DfES Publications.
- FSA. (2016). 'What is Forest School?' Forest School Association. <https://www.forestschoolassociation.org/what-is-forest-school/>. Accessed 2 Feb 2020.
- Gilbert, P. (2014). The origins and nature of compassion focused therapy. *British Journal of Clinical Psychology*, 53, 6–41.
- Gill, T. (2007). *No fear: Growing up in a risk averse society*. London: Calouste Gulbenkian Foundation.
- Gray, D. S. (2012). Walking in the mindfield. *International Journal of Holistic Education*, 1(1), 1–8.
- Gullone, E. (2000). The Biophilia hypothesis life in the 21st century: Increasing mental health or increasing pathology? *Journal of Happiness Studies*, 1, 293–321.
- Harris, F. (2017). Outdoor learning spaces: The case of forest school. *Area*, 50, 222–231.

- Hawkes, F. M., & Acott, T. G. (2013). People, environment and place: The function and significance of human hybrid relationships at an allotment in south east England. *Local Environment: The International Journal of Justice and Sustainability*, 18(10), 1117–1133.
- Hinds, J., & Sparks, P. (2008). Engaging with the natural environment: The role of affective connection and identity. *Journal of Environmental Psychology*, 28(2), 109–120.
- Hobbs, I. K. (2015). Play-based science learning activities: Engaging adults and children with informal science learning for pre-schoolers. *Sci. Commun*, 37, 405–414.
- Holloway, S., & L., & Jöns, H. (2012). Geographies of education and learning. *Transactions of the Institute of British Geographers*, 37, 482–488.
- Howell, A. J., Dopko, R. L., Passmore, H. A., & Buro, K. (2011). Nature connectedness: Associations with well-being and mindfulness. *Personality and Individual Differences*, 51(2), 166–171.
- Hughes, J., Richardson, M., & Lumber, R. (2018). Evaluating connection to nature and the relationship with conservation behaviour in children. *Journal of Nature Conservation*, 45, 11–19.
- Johansson, M. (2006). Environment and parental factors as determinants of mode for children's leisure travel. *Journal of Environmental Psychology*, 26(2), 156–169.
- Kelly, A. V. (2009). *The curriculum: Theory and practice* (6th ed.). London: SAGE.
- Knight, S. (2011). *Forest school for all*. London: SAGE.
- Knight, S. (2013). *Forest school and outdoor learning in the early years* (2nd ed.). London: SAGE.
- Knight, S. (2016). *Forest school in practice for all ages*. London: SAGE.
- Kraftl, P. (2015). *Geographies of alternative education: Diverse learning spaces for children and young people*. Bristol: Polity Press.
- Kuo, M. (2015). How might contact with nature promote human health? Promising mechanisms and a possible central pathway. *Frontiers in Psychology*, 6, 1093.
- Kuo, M., Barnes, M., & Jordan, C. (2019). Do experiences with nature promote learning? Converging evidence of a cause-and-effect relationship. *Frontiers in Psychology*, 10, 305.
- Leather, M. (2018). A critique of Forest School: Something lost in translation. *Journal of Outdoor and Environmental Education*, 21, 5–18.
- Liefländer, A. K., Frohlich, G., Bogner, F. X., & Schultz, P. W. (2012). Promoting connectedness through environmental education. *Environmental Education Research*, 19, 370–384.
- Lin, B. B., Fuller, R. A., Bush, R., Gaston, K. J., & Shanahan, D. F. (2014). Opportunity or orientation? Who uses urban parks and why. *PLOSOne*, 9(1), 1–7.
- Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. London: Atlantic Books.
- Lumber, R., Richardson, M., & Sheffield, D. (2017). Beyond knowing nature: Contact, emotion, compassion, meaning, and beauty are pathways to nature connection. *PLoS ONE*, 12(5), e0177186. <https://doi.org/10.1371/journal.pone.0177186>.
- Lumber, R., Richardson, M., McEwan, K., Hughes, J., Harvey, C., & Sheffield, D. (unpublished). A threshold indicator for children's health and life satisfaction: Is the connection to nature index a useful predictor?
- Mackay, C. M. L., & Schmitt, M. T. (2019). Do people who feel connected to nature do more to protect it? A meta-analysis. *Journal of Environmental Psychology*, <https://doi.org/10.1016/j.jenvp.2019.10323>.

- Maller, C., Townsend, M., Leger, L. S., Henderson-Wilson, C., Pryor, A., Prosser, L., & Moore, M. (2009). Healthy parks, healthy people: The health benefits of contact with nature in a park context. *The George Wright Forum*, 26, 51–83.
- Martin, P. (2004). Outdoor adventure in promoting relationships with nature. *Australian Journal of Outdoor Education*, 8(1), 20–28.
- Martyn, P., & Brymer, E. (2016). The relationship between nature relatedness and anxiety. *Journal of Health Psychology*, 21(7), 1436–2144. <https://doi.org/10.1177/1359105314555169>.
- Massey, D. (2005). *For space*. Thousand Oaks: SAGE.
- Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24(4), 503–515.
- Mayer, F. S., Frantz, C. M., Bruehlman-Senecal, E., & Dolliver, K. (2009). Why is nature beneficial? The role of connectedness to nature. *Environment and Behaviour*, 41, 607–643.
- Maynard, T. (2007). Forest schools in Great Britain: An initial exploration. *Contemporary Issues in Early Childhood*, 8(4), 320–331. <https://doi.org/10.2304/ciec.2007.8.4.320>.
- McCree, M., Cutting, R., & Sherwin, D. (2018). The hare and the tortoise go to Forest School: Taking the scenic route to academic attainment via emotional wellbeing outdoors. *Early Child Development and Care*, 188(7), 980–996.
- McCormick, M. P., Cappella, E., O'Conner, E. E., & McClowry, S. G. (2015). Social-emotional learning and academic achievement: Using causal methods to explore classroom-level mechanisms. *AERA Open*, 1, 1–26.
- McPhie, J., & Clarke, D. A. G. (2015). A walk in the park: Considering practice for outdoor environmental education through an immanent take on the material turn. *Journal of Environmental Education*, 46(4), 230–250.
- Mills, S., & Kraftl, P. (2016). Cultural geographies of education. *Cultural Geographies*, 23(1), 19–27.
- Moyles, J. (2015). *The excellence of play*. Milton Keynes: Open University Press.
- Muller, M. M., Kals, E., & Pansa, R. (2009). Adolescents' emotional affinity to nature: A cross-societal study. *The Journal of Developmental Processes*, 4(1), 59–69.
- National Trust. (2012). *Natural Childhood Report*. London: The National Trust Park Lane Trust.
- Nilsson, K., Sangster, M., Gallis, C., Hartig, T., de Vries, S., Seeland, K., & Schipperijn, J. (Eds.). (2011). *Forests, trees and human health*. Dordrecht: Springer.
- Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2009). The nature relatedness scale: Linking individual's connection with nature to environmental concern and behaviour. *Environment and Behaviour*, 41(5), 715–740.
- Nisbet, E. K., & Zelenski, J. M. (2013). The NR-6: a new brief measure of nature relatedness. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2013.00813>.
- Nisbet, E. K., Zelenski, J. M., & Murphy, S. A. (2011). Happiness is in our nature: Exploring nature relatedness as a contributor to subjective well-being. *Journal of Happiness Studies*, 12, 303–322.
- O'Brien, L., & Murray, R. (2007). Forest School and its impacts on young children: Case Studies in Britain. *Urban Forestry & Urban Greening*, 6, 249–265.
- Ofsted. (2008). *Learning outside the classroom: How far should you go?* London: Ofsted.
- ONS (Office of National Statistics). (2018). *Children's and Young People's Experience of Loneliness*. Retrieved

from: <https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/childrensandyoungpeoplesexperiencesofloneliness/2018>. Accessed 30 Dec 2018.

Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connectedness to nature, together, are related to ecological behaviour. *Global Environmental Change*, 47, 88–94.

Pacini-Ketchabaw, V. (2013). Frictions in forest pedagogies: Common worlds in settler colonial spaces. *Global Studies of Childhood*, 3(4), 355–365.

Palmberg, I. E., & Kuru, J. (2000). Outdoor activities as a basis for environmental education. *The Journal of Environmental Education*, 31, 32–36.

Patel, N. V. (2003). A holistic approach to learning and teaching interaction: Factors in the development of critical learners. *The International Journal of Educational Management*, 17(6/7), 272–284.

Peacock, A., & Pratt, N. (2011). How young people respond to learning spaces outside school: A sociocultural perspective. *Learning Environments Research*, 14(1), 11–24.

Pritchard, A., Richardson, M., Sheffield, D., & McEwen, K. (2019). The relationship between nature connectedness and eudaimonic wellbeing: a meta-analysis. *Journal of Happiness Studies*. <https://doi.org/10.1007/s10902-019-00118-6>.

Pyle, R. M. (2003). Nature matrix: Reconnecting people with nature. *Oryx*, 37, 206–214.

Richardson, M., Cormack, A., McRobert, L., & Underhill, R. (2016). 30 days wild: Development and evaluation of a large-scale nature engagement campaign to improve well-being. *PLoS ONE*. <https://doi.org/10.1371/journal.pone.0149777>.

Richardson, M., McEwan, K., Maratos, F., & Sheffield, D. (2016). Joy and calm: How an evolutionary functional model of affect regulation informs positive emotions in nature. *Evolutionary Psychological Science*, 2, 308–320.

Richardson, M., Passmore, H.-A., Barbett, L., Lumber, R., Thomas, R., & Hunt, A. (2020). The green care code: How nature connectedness and simple activities help explain pro-nature conservation behaviours. *People and Nature*, 2(3), 821–839. <https://doi.org/10.1002/pan3.10117>.

RSPB. (2013). Connecting with Nature. RSPB. Available online at: http://www.rspb.org.uk/Images/connecting-with-nature_tcm9-354603.pdf. Accessed 14 Jan 2016.

Russell, R., Guerry, A. D., Balvanera, P., Gould, R. K., Basurto, X., Chan, K. M. A., et al. (2013). Humans and nature: How knowing and experiencing nature affect well-being. *Annual Review of Environment and Resources*, 38(6), 6.1-6.30.

Scannell, L., & Gifford, R. (2010a). Defining place attachment: A tripartite organising framework. *Journal of Environmental Psychology*, 30(1), 1–10.

Scannell, L., & Gifford, R. (2010b). The relations between natural and civic place attachment and pro-environmental behaviour. *Journal of Environmental Psychology*, 30(3), 289–297.

Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology*, 21, 327–339.

Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology*, 24(1), 31–42.

Tam, K.-P. (2013). Concepts and measures related to connection to nature: Similarities and differences. *Journal of Environmental Psychology*, 34, 64–78.

Tam, K.-P., Lee, S.-L., & Chao, M. M. (2013). Saving Mr. Nature: Anthropomorphism enhances connectedness to and protectiveness toward nature. *Journal of Experimental Social Psychology*, 49(3), 514–521.

- Tickell, D. C. (2011). *The early years: Foundations for life, health and learning: An independent report on the early years foundation stage to her majesty's government*. Norwich: HMSO.
- Thrift, N. (2006). Space. *Theory, Culture & Society*, 23(2–3), 139–146.
- Tuan, Y. (1977). *Space and place: The perspective of experience*. London: Edward Arnold.
- Valentine, G., & McKendrick, J. (1997). Children's outdoor play: Exploring parental concerns about children's safety and the changing nature of childhood. *Geoforum*, 28(2), 219–235.
- Veloso, A., & Loureiro, S. (2017). Green exercise, health and wellbeing. In G. Fleury-Bahi, E. Pol, & O. Navarro (Eds.), *Handbook of Environmental Psychology and Quality of Life Research* (pp. 149–169). Cham: Springer International Publishing.
- Waite, S. (2017) (Ed). *Children learning outside the classroom: From birth to eleven* (2nd ed.). London: SAGE.
- Waite, S. (2010). Losing our way? The downward path for outdoor learning for children aged 2–11 years. *Journal of Adventure Education and Outdoor Learning*, 10(2), 111–126.
- Wattchow, B., & Brown, M. (2011). *A pedagogy of place*. Melbourne: Monash University Publishing.
- Wells, N. M., & Lekies, K. S. (2006). Nature and the life course: Pathways from childhood nature experiences. *Children, Youth and Environments*, 16(1), 1–25.
- Whitburn, J., Linklater, W., & Abrahamse, W. (2019). Meta-analysis of human connection to nature and proenvironmental behavior. *Conservation Biology*. <https://doi.org/10.1111/cobi.13381>.
- Zelenski, J. M., & Nisbet, E. K. (2012). Happiness and feeling connected: The distinct role of nature relatedness. *Environment and Behaviour*, 46(1), 3–23. <https://doi.org/10.1177/0013916512451901>.
- Zylstra, M. J., Esler, K., Knight, A. T., & Le Grange, L. (2018). Integrating multiple perspectives on the human-nature relationship: A reply to Fletcher 2017. *The Journal of Environmental Education*, 50(1), 1–10.
-