

The benefits of green exercise for children

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Introduction

The health benefits of engaging in physical activity during childhood include enhanced fitness, improved bone health and cognitive function, favourable cardiovascular and metabolic disease risk profiles, motor skill development, healthier blood pressure and heart rate, and a reduction in body fat (Janssen and Leblanc, 2010; World Health Organisation, 2010; Janz et al., 2010; Faigenbaum and Myer, 2012; Duncan et al., 2014; Larson et al., 2015). Regular physical activity during youth is also known to enhance psychological health, improving self-esteem and reducing symptoms of anxiety and depression (Calfas and Taylor, 1994; Ekeland et al., 2005). Despite these benefits, approximately 75 per cent of boys and 80 per cent of girls aged 5–10 years in the UK do not perform the recommended daily 60 minutes of moderate to vigorous physical activity (MVPA) (Health and Social Care Information Centre, 2014). This is higher in adolescents aged 11–15 years with 83 per cent of boys and 89 per cent of girls not meeting daily activity requirements (Health and Social Care Information Centre, 2014). Regular participation in physical activity during early and youth years is particularly important as physical activity often tracks into adulthood where adequate levels of physical activity are protective against many chronic diseases.

Evidence suggests that the natural environment can play a role in promoting physical activity in children and young people; encouraging free play, which is essential to their health, wellbeing and development (Bird, 2007; Bowler et al., 2010). In adults, engaging in physical activity whilst exposed to natural environments also provides additive benefits for psychological health compared with physical activity in a non-natural environment or indoors (Pretty et al., 2005; 2007; Barton and Pretty, 2010; Thompson-Coon et al., 2011). This chapter discusses the importance of natural environments for facilitating physical activity and spontaneous play in children and young people. It also compares the health benefits of green exercise in children to those evident in adults and assesses potential reasons for any differences. We address the issue of disconnection from nature and how to reconnect children to the outdoors.

The natural environment and physical activity

The natural environment provides a setting for physical activity (Pretty et al., 2005; Bowler et al., 2010). Time spent outdoors is a positive correlate of physical activity in children and adolescents (Sallis et al., 2000; Gorden-Larsen et al., 2000; Cleland et al., 2008; Lachowycz et al., 2012), whilst adults with easy access to natural settings are three times as likely to be active (Wells et al., 2007; Bowler et al., 2010). Lachowycz et al. (2012) found that time spent in green space contributes over one-third of all outdoor physical activity on weekday evenings, over 40 per cent on Saturdays and 60 per cent on Sundays, indicating both that children are high users of green environments and that green space may be an important contributor to overall physical activity levels. In addition, a review of studies examining the relationship between green space use and physical activity found a positive relationship or evidence of an association in two-thirds of children (Lachowycz and Jones, 2011).

The availability of parks and open spaces is positively associated with physical activity in children and adolescents; and are second behind schools as settings where young people are active (Epstein et al., 2006; Loukaitou-Sideris and Sideris, 2009; Mahdjoubi and Spencer, 2010; Floyd et al., 2011; Larson et al., 2015). It has also been shown that the proportion of total park area in a community is a significant predictor of children's physical activity, with physical activity increasing by 1.4 per cent for every 1 per cent increase in park area (Roemmich et al., 2006; Timperio et al., 2008). Approximately 50 per cent of children and young people engage in MVPA whilst in a park area (Floyd et al., 2008a, b); with each extra hour of park use resulting in an extra 35 minutes of MVPA (Larson et al., 2015). Thus, natural settings and particularly local parks and open spaces, may play a key role in promoting physical activity in children and young people (Timperio et al., 2008).

Research comparing physical activity levels in young people during exposure to different types of environments has supported the notion that the natural environment facilitates physical activity. One such study compared physical activity levels during school playtime on the playground and field: playtime on the field resulted in 40 per cent more moderate-to-vigorous physical activity (MVPA) than play on the playground (Wood et al., 2014a). Similar findings were also demonstrated in a study comparing activity levels during urban and rural orienteering. Children were significantly more active during rural orienteering, spending half of their time in the natural environment in physical activity compared with only one-quarter in the built environment (Wood et al., 2014b). We are able to conclude that natural environments promote inclusion in physical activity by: i) reducing the gap in the differences in male and female physical activity levels and encouraging girls to be more active (Wood et al., 2014a, b); ii) engaging the less fit children in physical activity (Barton et al., 2014); and iii) making physical activity seem easier and more enjoyable to children who are less physically active (Reed et al., 2013). This combined benefit of physical activity

and exposure to green space is likely to be of particular importance in light of the growing concerns over physical inactivity, poor physical and mental health and childhood obesity.

A number of studies have also assessed the impact of living environment on habitual physical activity. Whilst some studies have indicated that children living in rural settings are more active and fitter than those living in urban settings (Dyment and Bell, 2008; Joens-Matre et al., 2008; Liu et al., 2008, 2012; Adamo et al., 2012), others have suggested that there are no differences between the two (Plotnikoff et al., 2004; Loucaides et al., 2004; Sandercock et al., 2010). In some locations, children from urban areas are more active than their rural counterparts (Goran et al., 1998; Bathrellou et al., 2007; Sheu-Jen et al., 2010; Al-Nuaim et al., 2012). The inconsistency between these findings can be attributed to the fact that the studies have focused on the presence of green space in the living environment and not the actual location where the physical activity is performed (Lachowycz et al., 2012; Wood, 2012). Children living in urban areas may have access to local green space which they use for physical activity, whilst children from rural areas are often close to green space but cannot always access it (Sheu-Jen et al., 2010). Equally, some urban spaces are perceived as unsafe for children and young people, and thus act as a barrier to participation in physical activity (Molnar et al., 2003; Mahdjoubi and Spencer, 2015).

The importance of play in natural spaces

Play has been defined as the spontaneous activity in which children engage to amuse and occupy themselves (Burdette and Whittaker, 2005). However, spontaneous and unregulated play is becoming less common in affluent countries due to parental fears of strangers, the loss of natural spaces for free play, and contrasting perceptions about what is best for children and young people (Louv, 2005; Bird, 2007). The loss of spontaneous free play in natural spaces is particularly concerning, as play in nature is important for the health, wellbeing and development of children. Natural environments are varied and changeable and thus provide good opportunities for free explorative play which gives greater opportunities for decision-making whilst also enabling children to develop the capacity for creativity and symbolic play, both essential for personal and cognitive development (RSPB, 2010; Department for Education, 2013). Furthermore, play in nature can improve concentration, and for children suffering from attention deficit hyperactivity disorder (ADHD) can enable increased functioning and a reduction in the severity of attention deficit symptoms (Taylor et al., 2001; Kuo and Taylor, 2004; Munoz, 2009).

In addition, play in nature has been shown to promote risk-taking, independence and autonomy, and results in positive attitudes towards the environment (Ward-Thompson et al., 2006; Lester and Maudsley, 2007; Bird, 2007). Play in nature also promotes physical, social, emotional and cognitive development; improves motor fitness, motor skills, balance and coordination;

and produces healthy growth and a good level of mental health (Fjørtoft, 2004; Munoz, 2009). Through play in nature, children have greater levels of social interactions which promote an aptitude for learning (Bragg et al., 2013; Pretty et al., 2009). They are also provided with an opportunity to develop problem-solving skills, improve their communication, co-operation, interpersonal and decision-making skills, whilst promoting responsibility and imagination (RSPB, 2010). There is also some evidence to suggest that play in nature can reduce bullying and aggressive behaviour (Malone and Tranter, 2003; Mahdjoubi and Spencer, 2015). Thus the opportunity to play in natural environments may play a key role in promoting individual health and wellbeing in children and young people, as well as stronger communities.

Comparison of green exercise outcomes in youth and adults

Earlier chapters have shown that green exercise in adults provides additive benefits for self-esteem and mood above those received from exercise alone (Pretty et al., 2005; Barton and Pretty, 2010). Despite the well-documented benefits of engaging in green exercise via activities such as outdoor adventure programmes and forest schools (Paxton and McAvoy, 2000; Pryor et al., 2005; O'Brien and Murray, 2007) and the extensive benefits derived from play in natural environments (Fjørtoft, 2004; Lester and Maudsley, 2007; Bird, 2007; Munoz, 2009), it is not clear whether physical activity in a natural setting provides additive benefits for psychological wellbeing in children and young people.

Wood et al. (2012) compared the effects of cycling whilst viewing either rural or urban scenes on self-esteem and mood in adolescents: physical activity alone improved self-esteem and mood via reductions in tension, but there were no differences in the change in self-esteem and mood as a result of viewing different environmental scenes. These findings are also supported by Duncan et al. (2014), who found that cycling whilst viewing a forest video provided no additive benefits for the mood of primary school children compared with cycling alone.

Several studies have also examined the effect of being directly exposed to differing environmental types. Reed et al. (2013) compared the effects of running in natural and urban environments and found that whilst the physical activity improved self-esteem, there were no differences in the improvements in self-esteem. These findings are supported by Wood et al., (2014) who found no differences in the change in self-esteem between play on the playground and field; and Barton et al., (2014) who identified that a nature-based intervention was no more effective at increasing self-esteem than a playground-based intervention. Furthermore, Wood et al., (2014) found that there were no differences in the change in self-esteem when orienteering in both a natural and built environment, even though the orienteering itself led to improvements in self-esteem.

This apparent lack of additional benefit could be attributed to the types of activities included in studies with children. Adult studies have primarily

included walking activities which are of light intensity and enable participants to interact with the environment and with each other. Exercise in the studies with children primarily included running and cycling and might have been too intense for them to notice their surrounding environment (Wood et al., 2014). This is evidenced by the work of Taylor and Kuo (2009) who examined the effect of walking in three different environments on the concentration of children with ADHD. The study found that walking in a park resulted in significantly better concentration than walking in a residential or downtown setting. The effect of walking in the park was as large as the deficit due to ADHD and the peak effect of medication. Thus, the natural environment may only provide additive benefits for psychological wellbeing at low exercise intensities. It might also have a clear role for children suffering from attention deficit disorders and perhaps those with mental ill-health. Furthermore, in order to benefit from green exercise, children and young people might need direct interaction with nature (Wood et al., 2014), such as is received from forest school and outdoor adventure programmes.

Children's disconnections with nature

This lack of green exercise effect could also be attributed to children and young people's low levels of everyday interaction with nature. As a society we spend less time outdoors, both in working and leisure contexts. As a result, we are becoming increasingly disconnected from nature.

Connection to nature is described as the degree to which an individual includes nature as part of their identity (Schultz, 2002) and it includes an understanding of nature and everything it comprises, both good and bad (Nisbet et al., 2009). Connectedness to nature is also an important predictor of subjective wellbeing and ecological behaviour (Mayer and Frantz, 2004; Hine et al., 2008). For example feelings of connectedness to nature reported after wilderness experiences range from the aesthetic appreciation of beautiful scenery and landscapes to a deep sense of belonging to the natural world. In this context nature connection has also been taken to include feelings of peacefulness and harmony, a sense of timelessness, creation of a sense of vulnerability which is humbling, learning a respect for nature and developing a sense of place (Russell 1999, 2001; Caulkins et al., 2006; Hine et al., 2009). However, not all children and young people have opportunities to interact with local urban nature, let alone experience more intense wilderness settings. The issues of contact and connection may also be interlinked, with increasing contact leading to increasing connection. It appears, however, that both connection to and interaction with nature are on the decline in affluent countries. Particular concerns have arisen about children's disconnection from nature and these have been brought to the fore by Richard Louv (2005): 'at the very moment that the bond is breaking between the young and the natural world, a growing body of research links our mental, physical, and spiritual health directly to our association with nature'.

The current generation of children and young people spends less time interacting with nature than previous generations and are thus increasingly confined to indoor and urban settings (Bird, 2007). The proportion of children playing out in natural spaces has dropped by some 75 per cent over the last 30 to 40 years, with only 10 per cent of young people having regular contact with nature compared with the 40 per cent of adults who did so 30–40 years ago (Natural England, 2009). A similar pattern has emerged in Australia suggesting this is an international problem. The average British child watches almost 2.5 hours of television per day (up 12 per cent since 2007) (OFCOM, 2011; Moss, 2012) and spends more than 20 hours a week online (IPPR, 2008). All of this is despite the proven positive effects that contact with nature has on physical and mental health, personal and social development, and even academic achievements and life pathways (RSPB, 2012).

The term *Nature Deficit Disorder* describes the human costs of disconnection and alienation from nature such as diminished use of the senses, attention difficulties and higher rates of emotional and physical illnesses (Louv, 2005). The term was originally adopted for children but more recently has also been used to refer also to adult disconnections. In order to benefit from having contact with nature, a connection and understanding of the natural world is likely to be required (Bratman et al., 2012). Thus, children and young people might not benefit from green exercise in the same way as adults as a result of their prior or existing lack of connection to the natural world (Reed et al., 2013; Barton et al., 2014; Wood et al., 2014a, b). The continuing loss of connection to nature could then result in policy makers and environmentalists of the future having a lack of understanding of nature and its value (Pyle, 1978; Bird, 2007; Bragg et al., 2012). Evidence suggests people who do not value and respect nature when they are young are less likely to see the importance of protecting the natural environment when older (Pyle, 1978; Bird, 2007; Bragg et al., 2012). The increasing disconnection from nature in children and young people could have important consequences for future generations and the natural environment itself.

Reconnecting children to nature

Given the concerns about children and young people's disconnections from nature and the body of evidence describing the beneficial effects of both contact with and play in natural environments, it is not surprising that a drive to reconnect children with the outdoors has been initiated (Natural England, 2009; RSPB, 2010; Moss, 2012). The importance of children's connection to and respect for nature has been recognised in the UN Convention on the Rights of the Child (UNCRC) which has been in force in the UK since 1992. Article 31 of the Convention states that 'education of the child shall be directed to ... the development of respect for the natural environment' (UNCRC 29.1e) and that children should 'engage in play' (UNCRC 31). Furthermore, the results of recent research suggests that environmental educators should provide time during their

specific 'Environmental Education' programmes for children to experience nature, enabling them to bond with the natural world by just being in nature (Natural England, 2009; RSPB, 2010; Moss, 2012). Additional research also suggested that the focus on learning in the core-subject areas may have drawn attention away from opportunities to form emotional connections to nature through free play (Natural England, 2009; RSPB, 2010; Moss, 2012).

In 2009, Natural England examined the changing relationship between childhood and nature across generations, the extent of children's disengagement from nature and then highlighted the need for remedial action. This was supported by the RSPB's Every Child Outdoors report (RSPB, 2010) which brought together research about the wide benefits to children of being connected to nature; and the National Trust's national Outdoor Nation debate (later published as Natural Childhood: Moss, 2012); and creation of 'Project Wild thing', all of which explored children's contemporary relationship with nature. In addition, the UK government's Natural Environment White Paper 2011 *The natural choice: securing the value of nature*, saw acknowledgement of the importance of enabling children to connect with natural environments and to learn about nature. It called for an assurance that every child would have opportunities to visit natural environments (Defra, 2011). In 2012 the RSPB acknowledged the need to establish a baseline of connection to nature levels in the UK to allow longitudinal comparisons to be made and to enable assessment of the effectiveness of nature re-connection programmes. Subsequently the RSPB has developed appropriate methodologies for connection to nature surveys in children, adults and teenagers (Bragg and Wood, 2015) and is currently conducting baseline surveys across the UK. Natural England, Defra and the Forestry Commission have also acknowledged the importance of measuring connection to nature in children by piloting it in their Monitor of Engagement with the Natural Environment (MENE) survey, comprising 45,000 interviews annually, and providing trend data for how people use the natural environment in England (Natural England, 2015).

Conclusions

Play in natural environments provides a number of important health and wellbeing benefits to children and young people including increased levels of physical activity and improved psychological health outcomes. However, young people are increasingly confined to indoor and urban environments and as a result are becoming disconnected from nature. In order to reconnect children and young people with nature they should be encouraged to engage with the natural environment from a young age and to participate in more outdoor exercise and play. This will encourage more frequent countryside visits throughout adulthood and access to the health and social capital benefits associated with regular contact with nature (Peacock et al, 2007; Pretty et al., 2015).