Children in the Outdoors

A literature review

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Acknowledgements

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1. Introduction

"Denying children of a chance to encounter nature, no matter how small, 'robs them of the very essence of life' (Engwicht, 1992: 6)", Matthews and Limb (1999), p. 78

Childhood has long been associated in our collective imagination with images of the 'rural' and the 'countryside' because adult conceptualisations of the child as 'innocent' are connected with nature (Jones, 2007a). Our contemporary social construction of childhood often relates to past images of the rural idyll – associated with an agricultural landscape in which children engage in long days of free play in the outdoors (Matthews, et. al., 2000). Many children's books, programmes and films incorporate these notions – involving 'natural' spaces, animal characters or visions of rural childhood (Jones, 2007b). However, this conceptualisation of childhood is largely a Westernised construct – assuming that childhood involves the opportunity to play and neglecting to incorporate notions of toil, work or responsibility. It is also largely a White, able-bodied construct.

Yet this adult construction of childhood rarely tallies with the lived everyday experience of children (Jones, 2007a). It also sits in contrast to contemporary constructions of the 'wild' or 'dangerous' child/ youth and concern over their use of public space (particularly urban) (Valentine, 1996). Children within contemporary society have been cast as simultaneously a group to be protected and feared (Matthews and Limb, 1999). Societal fears have also impacted on this vision of childhood – with concern over crime and children's safety in public space linked with a decreasing amount of time spent by children in the outdoors (Sutton, 2008). Valentine (2004) highlights this most strikingly when she discusses the influence of the Soham murders on conceptualisations of responsible parenting and the spaces in which children are deemed to be 'safe'.

Recent research has started to examine the links between use of the outdoors, access to greenspace and human health. As we face contemporary health challenges, such as a growth in levels of obesity and stress, medical researchers, physiologists and social scientists have turned to examine the outdoors and natural spaces' potential for alleviating such health problems. Policy-makers too, have started to look at promoting the use of the outdoors as a means of increasing public health, for example, we now see general practitioners recommending green gym types of exercise (Bird, 2007). In general, there is perceived to be a link between the outdoors and improved health but this assessment is often based on self-reported health. It seems that more research is needed to investigate the health benefits of outdoor use in measured terms as well as look more closely at which types of outdoor spaces have, in particular, a causal relationship with positive human health benefits.

This literature review examines existing research on health and the outdoors – highlighting the key ways in which researchers have, thus far, examined the links and reported causality and effects. Children have been identified as one of the key social groups that could gain health benefits from use of the outdoors – but also one that requires evidence-based policy directed towards their needs (Nilsson, 2007). Therefore, the review takes an in-depth look at the current themes within health, outdoors and children's research and highlights how these relate to understanding the links between children's use of outdoors spaces and health outcomes. It also highlights where there are research gaps and how these might be addressed.

2. The link between Outdoor Use and Health

"The knowledge base shows that exposure to natural spaces – everything from parks and open countryside to gardens and other greenspace – is good for health."
Sustainable Development Commission (2008), p. 3

There is an emerging research and policy interest in the health and wellbeing outcomes associated with use of outdoor spaces (Sustainable Development Commission, 2008). There has been interest in a conceptualisation of health that links to not only physical abilities/ impairments but also mental health and wider notions of wellbeing including "behavioural and social health problems" (Maller et. al., 2005). The concept of the 'outdoors' includes public and private outside spaces, most often incorporating some degree of the 'natural' in which people can engage with nature in man-made (urban greenspace such as domestic and communal gardens and urban parks) or less managed spaces such as open countryside, forest, and coastal and mountain areas (Pretty, 2007).

Research has shown that access to greenspace has a positive impact on health (de Vries et. al., 2003; Mitchell and Popham, 2007). Biological and medical researchers have examined the health benefits of activity outdoors (Florez, et. al., 2007) and suggested links to positive impacts on, for example, blood pressure and cholesterol levels (Maller et. al., 2005; Hartig, et. al. 2003). It has been suggested that those with access to natural outdoor areas, that they can use easily and feel comfortable in, have higher levels of physical activity (Bird, 2007) and that physical activity is associated with general levels of good health (Martin et. al., 2006). Therefore, existing studies (e.g. Gass, 1993) suggest that natural environments are salutogenic and that promoting and facilitating their use could be an important component in the fight for enhanced public health and reduced health inequalities. It has been suggested that this may be particularly important for young people from deprived backgrounds (Ward Thompson et. al., 2006); home-makers and the elderly (de Vries et. al., 2003) and that initiatives need to be tailored to meet the needs of differing groups (e.g. Humphreys and Ruseski, 2007).

Literature on the "therapeutic landscape" (e.g. Gesler, 1992) has highlighted the potential role of contact with the outdoors in generating psychological, physiological and health behavioural benefits and psychologists have explored the psychological benefits of contact with nature (e.g. Hartig, 2007), such as restoring negative mood and helping recovery from attentional fatigue (Bell et. al., 2003). Those with access to a garden, for example, have been shown to generally have fewer mental health problems (Pretty, et. al., 2007).

Exercising outdoors, therefore, has been linked not only to positive health benefits from the physical activity but also associated with greater overall levels of well-being derived from conducting the exercise in spaces that facilitate contact with nature (e.g. Pretty et., al., 2007). Use of woodlands, for example, has been shown to generate feelings of well-being with users thinking of them as "relaxing" spaces (Tabbush and O'Brien, 2003).

Research has found use of, and access to, outdoor spaces can also increase social interaction and that this too can have a positive effect on health and wellbeing. Cohen and Finch (2008), for example, find a link between residential proximity to parks and "neighbourhood social capital" that in turn, they suggest, is a "foundation for underlying health and well-being". Ward Thompson et. al., (2004) also point to the "social inclusion" aspects associated with use of forest spaces.

The use of outside spaces is, therefore, generally associated within existing research with higher levels of physical activity but also with wider wellbeing because it reduces stress, aids recovery and increases socialisation. These effects are well summarised in Nielson and Hansen (2007) who link access to, and use of, greenspace to both a lower instance of obesity and lower stress levels.

3. Outdoors Use and Health – policy and intervention

"At national level [we] require a strategy for integrating green space policies and programmes with other policy areas, primarily health and community safety, regeneration and renewal, social inclusion, education and culture, and across the responsibilities of Government departments and agencies responsible…" DTLR (2002), p. 72

The connections between access to, and use of, high quality outdoor spaces and good health mean that issues of environmental justice are increasingly being incorporated into various policy areas – from land use planning to outdoor access and health. Therefore this section of the literature review highlights the policy and practice of those involved in providing and facilitating access to the outdoors. As well as public bodies, there are also many charities and non-governmental organisations (NGOs) involved in the delivery of interventions designed to increase participation in outdoor activities – often with a focus to some degree on the health benefits associated with such activity. Thus, this section considers the growing policy and grey literature surrounding both the connection between health and the use of the outdoors in general and the link for children in particular.

In the UK, there is policy and practice aimed at creating useable greenspace, often based on the concept that improvement will stimulate use, and that (active) use is linked to better health. The Urban Green Spaces Task Force (2002), for example, in *Green Spaces, Better Places* recommends that everyone within a city should have access to good quality parks and greenspaces. The Commission for Architecture and Built Environment (CABE) have endorsed several campaigns focused around access to good quality parks and greenspaces, such as *Start with the Park* (2005).

There is also policy and practice designed to open-up and encourage access to the countryside and other 'natural' spaces. The Forestry Commission has engaged with this agenda evidenced, for example, through its policy to expand natural playgrounds and the Active Woods Programme (Houston et. al., 2006) and has acknowledged the link between facilitating access to woodland spaces and the promotion of health and wellbeing (Weldon et. al., 2007). The Forestry Commission's Active Woods campaign forms part of a wider Health Concordat with the Countryside Agency, English Nature, Sport England and the Association of National Park Authorities that commits to promotion of the outdoors as a space that can improve both health and well-being (O'Brien, 2005a).

The Countryside Recreation Network has looked particularly at *Young People in the Countryside* and Natural England (Ward Thompson et. al., 2006), and its predecessor English Nature (Travelou, 2006), has show an interest in facilitating young people's use of outdoor spaces, particularly in opening up "wild" spaces and the potential "adventure" opportunities that this presents. There is a strong agenda linked to providing spaces for, and encouraging outdoor play, and in 2002, the Children's Play Council produced *More than Swings and*

Roundabouts: planning for outdoor play. This was closely followed by a non-statutory good practice guide from the UK Office of the Deputy Prime Minister: *Developing Accessible Play Space: a good practice guide*. Forestry Commission Scotland has also done work to incorporate natural features into children's play areas (see e.g. Groves and Mcnish, 2008) with the aim of delivering benefits for child development. Most recently, the National Trust has launched a campaign to encourage children's play in outdoor spaces (Gray, 2008).

Within the rest of Europe, the links between physical activity and health for children are well recognised (e.g. the Spanish Ministry of Health). Within the Netherlands, it is noted that there have been concerted efforts to provide neighbourhood and streetscapes that are "child friendly" and, therefore, encourage children to play outside (Joseph, 1995). There has been some focus on environmental impacts on children's health but this is often from the view point of exposure to dangers, rather than health benefits, e.g Victorin (2005). The protection of children from "environmental hazards" such as "air pollution" and "biological hazards" are also the focus of the WHO-led *Children's Environment and Health Action Plan for Europe* (HPA, 2007)*.

The utility of forest spaces for recreational use has been recognised (e.g. Jensen and Koch, 2004; Bianco, 1998; ONF 2004; Creegan and Murphy, 2006; Gentin and Jensen, 2007) but not necessarily with a focus on how such 'natural' spaces can be made more accessible to children, particularly from the child's point of view. Although in the Norwegian context Fjortoft and Reiten (2003) have examined "Children and young people's relationships with nature and outdoor activities".

There is interest, particularly within the Scandinavian countries, in links between nature and learning, with research examining the potential for engaging with nature within an educational setting (e.g. Sigsgaard, 2005; Hyllested, 2006) as well as particular examples of environmental education (e.g. Hyllested, 2003). The Danish *Udeskole*, for example, provides a repository of knowledge and ideas related to engaging children with nature through the educational context and promotes "natural classes" through mediums such as Forest Schools (Hyllested, 2006). Forest Schools in Sweden have been reviewed by Robertson (2008) and Miklitz (2001); and Kollner and Leinert (1998) discuss the Forest Kindergarten. Fjorft (2001) relates how there has been a drive towards nursery (kindergarten) aged children spending more time outdoors within this setting.

The importance of the links between nature and children's educational development has also been recognised in Spain (Rodriguez Jimenez, 2002) but there is some evidence that the Scandinavian model in particular is being transferred to other countries (Doyle, 2005). This is accompanied by a focus on environmental education for pre-primary school age children (Medek and Robertson, 2005).

Within North America, the design of children's outdoor play spaces has been a focus of discussion, policy and practice (e.g. Seitinger). Frost (2006) relates the history of the outdoor playground within the United States from "outdoor gymnasia" to the sanitised and "standardized" spaces of the 1990s. There has also been a drive towards (re)connecting children with 'wilderness' spaces (Hart, 1982) through both education and recreation (e.g. the *No Child Left Inside* campaign)[1].

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[1] www.nochildleftinside.org

4. Children and the Outdoors – key research themes

> *"…we may find that there are diverse disciplinary approaches that draw on, amongst others, biological, sociological and psychological perspectives. Interest in this theme relates to architects, planners, geographers, ecologists, politicians and so on. As Kahn (1999:1) explains, the topic involves understanding 'our biological roots…environmental behaviour, history, policy and science'."* Lester and Maudsley (2006), p. 9

Research has shown that people derive a sense of well-being from using public space for different reasons (Cattell, et. al., 2008). This suggests that there is a need to look at the differentiated ways in which people experience the natural outdoors and derive well-being and health benefits from its use. Children have been identified as one of the key social groups to examine within this context (Nilsson, 2007). Although this literature review examines research relating to children – as defined as those under the age of 16 – it does not exclude research relating to teenagers as the particular needs of this group straddle the child/ adult divide. Where research findings relate specifically to the teenage group, this is stated.

There is discussion within social science research concerning the definition of 'child' and 'children' (Matthews, 1995) and concern over placing children into a "meta-narrative" (Philo, 1992) that ignores differences of ethnicity (Woolley and Amin, 1995), gender, age and disability etc. (Aitken and Herman, 1997). Although research on children's use of outdoor spaces has recognised the gendered issues relating to use of such areas (e.g. Roemmich et. al., 2007), the experience of childhood by ethnicity and disability remains relatively under-explored (Dunn and Moore, 2005).

The key links between health and outdoor use have been described in the proceeding section and the literature review now moves on to discuss these issues in relation to children's use of the outdoors. This is achieved by highlighting the main themes within current research on children's use of outdoor spaces.

4.1 Children's use of outdoor spaces – general links with health

> *"…it is obvious that outdoor play experiences contribute to children's physical development, in particular to motor development. Less obvious is the learning that happens as children test their strength, externally and internally: how high can I climb? Why does my heart pound when I run? Am I brave enough to jump from this platform?"* Hewes and McEwan (2005), p. 4

Although children share many of the same types of health benefits from outdoor use as adults, there are some aspects that are particular to, or more important to, children. Specifically, these include the effects of contact with nature and time spent outside on attention deficit hyperactivity disorder (ADHD), the health benefits of outdoor play, and the affect of contact with nature on the alleviation of teenage anxiety and depression.

Within existing research relating to children's use of outdoors spaces, there is recognition of a general relationship between time spent outdoors and level of physical activity (Veitch, 2005). Greater amounts of physical activity are considered to be beneficial to children's

health in various ways, for example, in tackling obesity (Ebberling et. al., 2002). Therefore, use of the outdoors and its associated levels of physical activity, have the potential to play an important role in tackling the levels of childhood obesity within Europe (e.g there are said to be in the region of one million obese children within the UK (Boseley, 2005)).

Obesity in children is said to be linked with factors such as a changing diet but also a lack of physical activity (BMA, 2007). As time spent outdoors is associated with physical activity, there is the potential to harness children's use of the outdoors to increase their levels of physical activity and fight such negative health outcomes. Mackett and Paskins (2005), for example, show that children with permission to engage in activities outside the home are involved in more active play, have higher levels of physical activity and that this "contribute(s) significantly to children's health".

Spending time outdoors is also thought to be related to child development, for example, in relation to motor development – with the types of physical activity associated with outdoor play being beneficial to children's development of strength, balance and coordination (Fjortoft, 2004). It is often the natural elements within outdoor spaces that are conducive to creating these benefits as Fjortoft (2001), for example, demonstrates through the advantages gained from features such as "slopes and rocks", "vegetation" and "trees" in terms of facilitating opportunities for particularly active play.

In terms of wider wellbeing, time spent outdoors has been suggested to have restorative benefits and a positive force on stress reduction and prevention of depression (Douglas, 2005). This is well recorded in literature surrounding "restorative environments" (Berto, 2005). Korpela et. al., (2001), for example, found that for university students, 'natural' places were "over-represented among favourite places" and linked to "being relaxed" and "forgetting worries". Time spent in outdoor settings has also been highlighted as "therapeutic" for sleep- and gastro- related childhood problems (Frost, 2006).

In relation to children's wellbeing there has been a particular focus on the link between contact with nature and the alleviation of ADHD symptoms. Taylor and Kuo (2001, 2008) found that outdoor activity as simple as a "walk in the park" has benefits for children with attention deficit hyperactivity disorder by increasing their concentration levels and generally easing ADHD symptoms. Taylor et. al. (2001) also found that ADHD symptoms were less severe for those children that had the opportunity to play within outdoor settings that incorporate aspects of nature. Korpela and Hartig (1996) link a sense of wellbeing with attachment to place and the provision of a space for young people to spend time quietly and release tension built up in other areas of their life.

There is also research that looks at the dangers of exposure in outdoor spaces, for example, in relation to contact with toxins in play equipment (Bell et. al., 2008). There is also some work that examines children's risk of injury in outdoor environments (e.g. Kendrick et. al., 2005) and in relation to specific adult-designed play spaces (e.g. La Forest et. al., 2000). Children's exposure to air pollution in outdoor spaces has also been examined (Thomas and Thompson, 2004).

4.2 Children's play in outdoor spaces

> "Natural environments represent dynamic and rough playscapes…The topography, like slopes and rocks, afford natural obstacles that children have to cope with. The

vegetation provides shelters and trees for climbing. The meadows are for running and tumbling." Fjortoft (2001), p. 111

Article 31 of the United Nations Convention on the Rights of the Child recognises a children's right to play and play related issues emerge as a key theme within research on children's use of space. Research has looked at how children play, their differing play needs and the role of the outdoors in their play experiences (e.g. Cole-Hamilton, 2002; Fjortoft, 2001). Engaging in 'play' activities constitutes a large proportion of children's time and is a key aspect of their physical activity levels (Dietz, 2001). Research has shown that encouraging children to play may be a key way of increasing their levels of physical activity (Burdette, et. al., 2005).

Therefore, if one of the keys to tackling contemporary health problems, such as obesity, is to create environments that encourage greater levels of physical activity (Department of Health, 2004), for children this will mean an engagement with the production of environments that facilitate active play.

4.2.1 Health benefits of outdoor play

Physical activity
Research has highlighted the links between children's time spent outdoors and their levels of physical activity and outdoor play is generally considered to be more physically demanding of children (Fjortoft, 2004). The general links between physical activity and good health have been discussed above (WHO, 2008). A lack of physical activity within childhood has also been linked to specific health problems such as osteoporosis (Andersen et. al., 2004; Stratton and Mullan, 2005).

Although much research has used observational techniques (Clements, 2004) or self-reported health benefits (Tucker et. al., 2008) to make such links, some studies do engage with a more quantitative measurement of the links between physical activity and outdoor play. Groves and McNish (2008) and Lovell (2009) both, for example, show the potential of using pedometers as a way of measuring children's activity levels during outdoor play. These pieces of research stress the benefits of using such monitoring devices in terms of the accuracy of recording activity, but also the difficulties of getting children to use the devices. Fjort (2001) demonstrates use of the EUROFIT (European Test of Physical Fitness) and Motor Fitness Test to measure the effect of outdoor play on children's motor development. Frost (2006) also links activity within outdoor playgrounds to the development of "strength, flexibility and coordination" due to the types of activities facilitated by play equipment, such as "climbing", "balancing" and "swinging".

Ebberling et. al., (2002) call for careful preservation of the types of open and natural spaces that children use for play – quoting the protection of "open spaces" as part of a "common sense approach to prevention and treatment of childhood obesity" that also involves constructing more "pavements…bike paths, parks, playground and pedestrian zones". This highlights the role of active travel within the physical activity that children undertake outdoors (Wurtele and Ritchie, 2005). As Mackett and Paskins (2004) point out, there is a double benefit from participating in play outside the home – the physical activity itself and the opportunity to walk/ cycle to get to the place of the activity. Active travel as a means of getting to school has also been discussed as bringing the health benefits associated with physical activity, yet studies have shown restrictions on the proportions of children that use active travel methods to get to school (Worpole's, 2003).

Well-being

Research shows the opportunities for increase physical activity are not the only benefits to be gained from children's use of the outdoors and that the act of being in contact with nature in itself brings health benefits (Hewes and MacEwan, 2005). It has been suggested, for example, that "greenness", or the degree of contact with nature, in a child's everyday environment is linked to levels of cognitive functioning (Wells, 2000). Research also suggests that the presence of natural features within the spaces in which children play aids children in developing creative play activities, e.g. trees (USDA Forest Service, 2001).

There is also a suggestion that time spent outdoors is linked to immunity development. It has been reported, for example, that children who attend nurseries that incorporate a large amount of time spent outdoors have fewer instances of non-attendance due to illness (Fjorft, 2001). Outdoor play has also been linked to the development of children's understandings of risk (Frost, 2006).

4.2.2 Adult-designed play spaces

> *"Many playgrounds featured mammoth concrete and rock structures representing animals, fantasy figures, pyramids, geometric shapes, and other forms where children parked their coats while they slid down natural hillsides on cardboard boxes…"* Frost (2006), p. 2

A considerable amount of research has focused on providing an evidence base for improving children's play areas. Qualitative methods in the ethnographic tradition (Gharahbeiglu, 2007) and in-depth interviewing (Percy-Smith, 2002) have been used extensively to examine user needs (from children's, parents' and teachers' perspectives, e.g. Herrington, 2008) with the aim of providing understandings that can be used to develop play spaces that are both enjoyed by children and deemed satisfactory to their adult guardians.

However, Stratton and Mullan (2005) employ quantitative measurement techniques (based around heart rate telemetry) to show that design features such as "multicolour playground markings" can increase children's level of physical activity within the playground setting. This study highlights that quantifiable measurement of health benefits and outcomes has the potential to be combined with qualitative understandings of user needs and perceptions to produce knowledge that can be used to create spaces for children's play that are both engaging and effective at increasing physical activity.

Much play related research suggests that existing adult designed spaces tend not to include features that maximise the potential for children to engage in the most active types of play – both physically and mentally (e.g. Cunningham et. al., 1996; Matthews et. al., 1998). Johnson (2004), for example, suggests that the opportunity to engage in adventurous play, involving imagination and even an element of risk, is missing in many contemporary adult-designed play spaces.

Research also suggests that nature is missing from adult-designed play spaces even though it has been shown that children take pleasure from being in natural spaces and that particular natural features can increase their physical and creative play (White, 2004). Frost (2006), for example, highlights that natural features are missing from the majority of playgrounds within the United States of America. Yet Burke (2005) shows that primary school age

children consider the outdoors to be an important play space. O'Brien (2005b) also found that children aged 6 – 8, within her study of the Peabody Hill Wood in London, preferred outdoor play and linked it with "fresh air", "things to do" and opportunities to "run around". Groves and McNish (2008) show that when speaking to children about their play spaces, natural features such as "mud", "grass", "trees" and "leaves" feature heavily in the children's discourse.

Some argue that adventure playgrounds are a way of re-engaging children with nature and more active outdoor pursuits (e.g. Wilson, 2001; Malone and Tranter, 2003; Staempfli, 2009). Studies have shown that the use of natural features within outdoor play has a positive impact on children's levels of physical activity and motor development. Fjort (2001), for example, describes how a group of children that engage in outdoor play in natural spaces (particularly those utilising forest spaces in opposition to traditional playgrounds) "became strikingly better at mastering a rugged ground and unstructured landscape". As a result, some research also argues for the engagement of children with more 'wild' and less 'designed' spaces, whereas other papers call for children to play a larger role within the design of play spaces in an attempt to create spaces that truly meet their play needs (e.g. Rasmussen, 2004; Burke, 2005).

There is much research that has asked adults to comment on the suitability of children's play spaces – particularly on why, or why not, they would chose to let their children to play within them (Herrington, 2008) as parental influence has been shown to be a major determinant of children's patterns of outdoor behaviour (Valentine, 2004). However, a greater involvement of children in the design process would allow more engagement with the actual users of these spaces, those who push the boundaries set by adults, and experience the play activities themselves (Philo, 1992).

Researchers have argued in favour of projects that involve young people as key actors within the research process. Keenan's (2007) work, for example, provides evidence of the utility of participatory approaches. Burke (2005) explores children as an "expert community" in relation to the design of play spaces. Yanagisawa's (2007) work discusses the role of children in the design and planning of the spaces that they will use for play. Nairn et. al., (2003) advocate the importance of understanding the views and experiences of young people. This work links to wider debates over children's agency, which must be a key consideration to those (adults) that design the outdoor play spaces that children use (Elsley, 2004; Burke, 2005).

Research has also examined how the use of 'playground' spaces varies over the course of each 24 hours (Matthews and Limb, 1999) – being a space for younger children who are often supervised, even peripherally, by adults during the day (Blackford, 2004) and then, when vacated by these users in the evening, becoming areas in which teenagers congregate (Matthews et. al., 1998). The appropriation by teenagers of such spaces, which are viewed as for younger children, is often considered to be undesirable (Worpole and Greenhalgh, 1995). However, this highlights that outdoor spaces are used in diverse ways by different age groups of children, at different times of the day, and that research and policy needs to be sensitive to this.

4.2.3 Children's play in 'wild' spaces

"Any effort to improve children's play opportunities must recognise as a fact of life, that most play does not take place on sites formally designated as play spaces."
DCMS (2004), p. 10

In addition to urban greenspace and playgrounds, children's use of the outdoors also relates to their use of the 'natural world' such as forests, the countryside and wild space. In fact, some research has suggested that, for children, these less 'managed' spaces are more appealing (Berg and Medrich, 1980) and that adult designed playgrounds are increasingly unsuccessful in meeting children's needs or expectations in relation to outdoor play (Hart, 2004). Elsley's (2004) study reports that children (aged 10 – 14) favour "wild areas" for play such as "cornfields", wooded areas and ruins. In order to understand more fully why these spaces appeal to children and how some of their features could be incorporated into designated play spaces, it is important to engage with understanding children's perceptions of 'nature' and the 'natural' (Wals, 1994).

Hansen (quoted in Fjortoft, 2001) found, through interviewing children, that they had a desire to engage in physical outdoor play but felt that they did not have access to appropriate spaces in which to do so. Freeman (1995) argues that adult-designed play areas often neglect to include less formal spaces for play – particularly those focused around natural features. There is an opportunity to respond to the desires of children to engage in such types of outdoor play by facilitating access to natural spaces, as well as addressing the declining quality of playgrounds (Worpole, 2003). Thomas and Thompson (2004) point out that there has traditionally been greater levels of access to such wild spaces for those children resident in rural areas and from families with higher socio-economic status.

Thomas and Thompson (2004) also point to the importance of children being able to 'claim' spaces within wildspace areas, appropriate them as "special" or "secret" and imbue them with "their own distinct meaning". De Coninck-Smith and Gutman (2004) illustrate the importance of attachment to place for children and young people and how this is connected with identity construction. Often these 'special' places are related in some way to natural features. Rasmussen's (2004) concept of "children's places" (spaces that are considered important by children themselves, but not necessarily designated by adults as 'for children') highlights the importance of spaces that children imbue with meaning – the corner of a field, for example, becomes a 'city' and a particular tree becomes important within game playing. Factor's (2004) work suggests that such meanings are passed on from child to child, possibly down generations. The appropriation of such spaces can extend to areas within the peripheries of housing estates or derelict land (Moore, 1986). There is an importance to, therefore, study the use of wildspaces in relation to the "microspaces" of children's lives and outdoor experience (Matthews and Limb, 1999).

Activities based around the family – whether with parent(s), grandparents, adult siblings or other relatives – have also been shown to be one of the key ways in which children encounter wildspace, as well as providing opportunity for active, and less stringently adult-monitored, play (Tandy, 1999).

4.3 Children and education in the outdoors

"…the outdoor environment can be more than a place to burn off steam, with more educators and architects and designers embracing the ideas that outdoor play space

provides chances for the highest level of development and learning. When used best, it can be a place for investigation, exploration and social interaction." (CCRU, 2008)

Within existing research, there is also a strong theme related to the connection between children's education and their use of the outdoors (Senda and Kuwabara, 2007). Evidence has been presented of a reduction in the amount of time children spend outside the classroom (NFER, 2004). This has been coupled with concern over reductions in children's level of physical activity within the school context (Armstrong and McManus, 1994).

Nevertheless, there have been (perhaps in response to this) several concerted efforts to re-engage education with nature in a 'natural' setting and increase the amount of time that children spend outdoors within an educational context. There has been a growth in the number of Forest Schools and Outdoor Nurseries, for example, in which children engage in outdoor based activities for prolonged periods of time – from woodland crafts to cooking outdoors and free play (Riley, 2007). Research has shown the educational benefits to be gained from learning in such an environment (O'Brien, 2006; O'Brien and Murray, 2007) and has also highlighted the added value of increased physical activity and well-being derived from the outdoor experience (O'Brien and Murray, 2007).

It has been suggested that a greater engagement with the outdoors throughout the curriculum (not just in play or organised sports activities) for primary and secondary school aged children, can bring benefits associated with a greater connection with nature. Tunnicliffe (2008) gives one example by investigating the merits of the pond as a site of "biology and science education".

However, research has shown that school conducted outside also increases levels of children's physical activity (Groves and McNish, 2008). Mygind (2005) suggests that Forest Schools increase levels of physical activity and Lovell's work (2009) shows that on Forest School days children are more active – as measured through use of pedometers, sedentary time reduces from around three quarters to a third of the school day. Groves and McNish (2008) suggest the impact is particularly great for girls' levels of physical activity. Research on Forest Schools (Lovell, 2009) has suggested that girls' level of physical activity increases in the outdoor setting to become much more comparable with that of boys. Therefore, some of the more traditional associations between gender, education and play appear to be broken down within the outdoors setting of the Forest School.

Contact with nature has also been seen to be associated with increased creativity and language development (O'Brien and Murray, 2005). Tabbush and O'Brien (2002) point out that education in the outdoors need not only be about learning about the environment. This is also demonstrated in Moore and Wong's (1997) action research which highlights the wide range of benefits afforded to children and teachers through the transformation of a tarmac school playground into a space filled with natural elements and subsequently named the "environmental yard".

The Forest School ethos is centred in child-led learning and links, therefore, to the call to give children more opportunities to use the outdoors in ways that they find stimulating (Johnson, 2007). This demonstrates that use of the outdoors and natural features for children's health and development can be achieved not just within the play environment (Burdette and Whitaker, 2005) but also in the educational context (Mannion et. al., 2006). A similar connection has been suggested in relation to out-of-school clubs, although access can be prohibited by cost (Smith and Barker, 2001).

In a wider context, this links to understanding the link between use of the outdoors and environmental attitudes and also links between childhood experience and adult behaviour (Chawla, 2007; Wells and Lekies, 2006). There is scope for research to examine to a greater extent how the environmental attitudes of children link to their frequency of use of outdoor spaces and what types of activities they do in these outdoor spaces (e.g. see Palmer, 1998; Evans, et. al., 2007). Work is also starting to examine the link between childhood use of the outdoors and environmental attitudes, as well as types and frequency of outdoor use, in adulthood (Chawla, 2007; Wells and Lekies, 2006). There is a general agreement that those who use the outdoors more frequently as a child will carry this trend into adulthood (Ward Thompson et. al., 2008).

4.4 Constraints and enablers of children's use of the outdoors

"Like all social actors children can be seen as shaped and constrained by the circumstances of their lives, they also shape them and are enabled by them. They are limited by the conditions of their social lives, but also find ways of creatively managing, negotiating and extending the possibilities." (Prout, 2000), p. 7

Research has recognised that there is a need to understand the behavioural decisions associated with children's activities and use of outdoor spaces. This relates to both the choices that children and their parents/ guardians make about outdoor use and play as well as more structural constraints on children's outdoor use that can be related to societal norms and expectations, as well as the role of the state in facilitating outdoor use.

4.4.1 Children as social actors

"Awareness of children as human beings rather than human becomings, children of the here and now rather than as future citizens, is as applicable to the discourse of the geographies of children as it is to other disciplines…It is therefore important that children's and young people's experiences and views…are explored within the context of their agency." Elsley (2004), p. 155

Much research has discussed the role of parents as controllers of children's actions and the setters of geographical and social boundaries for children's outdoor behaviour. However, studies show that there is also a need to examine and understand the role of children as decision-makers and the ways in which they negotiate and push the boundaries set by adults. Harden (2000), for example, talks about the "subversion strategies" adopted by children in order to negotiate public and open spaces in ways that appeal to them. Some interesting work compares adult and children's perspectives on 'appropriate' use of outdoor spaces by children (Valentine, 2004). It has been shown that children do not always negotiate space in the ways that adults want, and expect, them to. As Elsley (2004) highlights, this can tell us about the gaps between parental perception and children's experiences of outdoor play.

However, research has shown that it is not only parents, but also children, that hold fears related to children's use of the outdoors. Children have reported fears of public spaces and natural spaces and have been shown to equate home with 'safety' (Harden, 2000). Tandy's (1999) study of Australian children indicated that they preferred to play inside the home. Thomas and Thompson (2004) discuss an increasing reluctance amongst children to play in

public spaces, as well as the impact of "personal experience" of traffic accidents on children's fear of such spaces. In research on perceptions of woodland O'Brien (2005) also found that 8 – 10 year old children have some fears of such spaces, that are often linked to potential encounters with dangerous strangers – this could be associated with serious criminal activity, e.g. "rapists", "paedophiles" and "murders" but also with the deviant behaviour of teenagers. In interviews with 10 – 11 year olds Thomas and Thompson (2004) highlight that the children associate "vandalism" and "anti social behaviour" in outdoor spaces with teenage perpetrators but also that they hold fears of adult strangers. This fear of dangerous strangers can limit their desire to use outdoor spaces, particularly unsupervised and are related to, for example, being "kidnapped", "killed" or subject to "sexual predation" (Thomas and Thompson, 2004). Yet, Groves and McNish (2008) show that children do have the capacity to asses risk when playing outdoors and there is an element of self-regulation of potentially 'risky' activities.

Research also highlights a certain gender divide related to the ways in which girls and boys want to use outdoor and public spaces. Differences have been shown in relation to the types of spaces they like and will use, and the types of facilities they want to see improved (Roemmich et. al., 2007). Studies also show that boys enjoy playing further away from their home than girls (Valentine, 1997), although a general trend for children to conceptualise greenspace that is close to home as less "risky" (Harden, 2000) has been noted. Tucker and Matthews (2001) also show that for 10 – 14 year olds, outdoor spaces can become 'gendered' with "playing fields and recreation grounds" labelled by the children as "boy spaces", although equivalent "girl spaces" were not identified.

When asked why they like to spend time outside, children of various ages have linked this to "meeting friends" (O'Brien, 2005). Mikkelsen and Christensen (2009) also stress the "companionship" aspect of being outside for children and how it interacts with their use of, and movement through, outdoor spaces. Thomas and Thompson's (2004) qualitative study of 10 – 11 year olds also highlights the role of the outdoors in facilitating "coming together" with their peers.

4.4.2 Parents, guardians and teachers as boundary setters

"The neighbourhood was a safe place really in those days. You could play on the street if you wanted to, or go down the park by yourself. And you felt safe. Sometimes my children use our park but not too often. They are not allowed to go by themselves...They ride their bikes very rarely in our street unless there's a group. You don't see many children out and about at all these days which is sad really…" Tandy (1999), p. 8

Parents have been named as the "gatekeepers" to children's levels of physical activity outdoors (Beets, et. al., 2007). Parental perceptions and fears relating to outdoor spaces play a major role in determining children's ability to use outdoor spaces (e.g. Weir et. al., 2006; Beets and Foley, 2008; Carver et. al., 2008). A link has been noted, for example, between access to what is considered a 'safe' park and levels of physical activity amongst teenage girls (Babey et. al., 2005).

Research has pointed to a link between increasing levels of parental fear of outdoor and public spaces and a reduction in time spent outside by children (Gaster, 1991; Mackett and Paskins, 2004) and increasingly severe restrictions on children's independent mobility in

outdoor environments (Smith and Barker, 2001; Veitch, et. al., 2005). Giddings and Yarwood (2005) also comment on parental anxieties associated with children's unsupervised use of public spaces. English Nature (1995) reported that parents are hesitant to let 7 – 8 year old children play unsupervised more than 280 metres from home. Recent research suggests that this limit may have become even more restricted in recent times (Rasmussen, 2004). Visscher and Bouverne-de Bie (2008) call this the advent of children leading "spatially segregated lives" in which their time spent in "public" outdoor spaces is severely restricted.

Research has also reported parental fears concerning the types of activities that children undertake in outside spaces. It has been outlined above that play outside is often associated with interaction with natural materials such as mud, grass and other flora and fauna. Groves and McNish (2008) show that this translates for some parents into anxiety over the "dirt" and the "danger" of outdoor play. For some, this is most clearly manifested through parental concern over potential child injury.

Research points to parental perceptions as being a major, if not the major, constraining factor on children's use of the outdoors (Carver et. al., 2008). Therefore, the facilitation of children's use of outdoor spaces needs to engage with this issue in addition to providing access to spaces that children want to use. Beets and Foley (2008) for example, link children's levels of physical activity not to general indicators of neighbourhood safety, but to parental perceptions of the degree of safety. Sheriff (2001) goes so far as to say that lack of a perceived 'safe' place for outdoor play leads to many children being denied parental permission to play outside at all. These types of fears have been seen by some to culminate in the advent of a culture of "paranoid parenting" (Furedi, 2008).

Parental fears have been shown to vary across space with, for example, those living in more central, urban areas experiencing greater levels of fear that those living in more peripheral or suburban areas (Weir et. al., 2006). This suggests that the facilitation of children's outdoor use needs to be sensitive to different socio-spatial contexts and take into consideration the effect of "self-selection" noted in Mokhtarian and Cao et. al., (2008), and, as Handy et. al., (2008) point out:

> "…parents who want their children to play outdoors may choose to live in neighbourhoods conducive to children's outdoor play (and encourage them to do so), in which case the preference rather than the neighbourhood design is the causal factor." p. 163

However, this assumes that preferences associated with children's play are a large factor in residential choice, whereas research has shown that other types of constraint are particularly important, such as household income and household size (Baum et. al., 2006). Thomas and Thompson (2004) remind us that socio-economic status can be closely related to amount of access to outdoor spaces, such as the private garden, and Karsten and van Vliet (2006b) point out that many families "cannot afford to leave the city" even if they would like to live in a location that affords greater access to high quality outdoor environments.

4.4.3 The role of society/ the state

> "In structure, and through prescriptions of use, settings made for children materialize adult interests and concerns, morally, financially and through connections to

discourses about 'good' childhood and 'good' parenting." De Coninck-Smith and Gutman (2004) p. 134

It is not just parental perceptions that influence children's use of space but societal perceptions of children and youth that are overtly or covertly manifested through, for example, urban and greenspace design and policing (Matthews, 1995), educational curriculum, the spaces and activities deemed 'appropriate' for unaccompanied children and the policies put in place to support young people, their learning and outdoor use. Those adults with perceptions of teenagers as "dangerous and out of control" (Valentine, 1996), for example, may produce particular types of spaces and rules for young people's use of the outdoors. Smith and Barker (2001) also highlight increasing restrictions on children's use of the countryside and particular rural spaces that relate to issues of land privatisation and an increasing use of "fencing and signs" by private owners to deter public use.

Research has shown that 'designing' outside areas for use by children is not only about creating formal play areas – such as the classic playground with equipment such as swings and slides. Although studies have shown a link between access to parks and formal recreational areas and children's general level of physical activity (Davison and Lawson, 2006); designing for children's outdoor use also relates to the very design of our towns, neighbourhoods and even streets (Varney and van Vliet, 2005; Handy et. al., 2008). Karsten and van Vliet (2006b) highlight this point in their discussion of the "reclamation" of street spaces from vehicles and "greening" processes that range from the integration of cycle paths and walkways to covering entire streets with grass.

Researchers have emphasised that, in particular, traffic levels in the immediate vicinity of a child's place of residence impact on their likelihood to play outside (Huttenmoser, 2003). Issues of accessibility play a role here too, with research finding that the necessity to cross roads unaided by pedestrian crossings in order to reach an open space in which to play impacts negatively on children's degree of physical activity (Davison and Lawson, 2006). This is again associated with parental perceptions of risk (Carver et, al., 2008). Research on "home zones" (e.g. Gill, 2006) relates to this topic and discusses how residential streets can be designed in such as way to designate street space as 'available' for children's play. Research has shown, therefore, that there is a link between neighbourhood design, children's outdoor activity and children's overall level of physical activity (Churchman, 2003).

As mentioned above, however, Thomas and Thompson (2004) point out an increasing hesitance among children to play in public spaces which, it can be theorised, is linked to societal expectations of the types of people and behaviour 'permitted' within such spaces. Research relates that children's perceived fears of 'public space' (Harden, 2000) are mediated through parental influence, the media and interactions with peers.

Smoyer-Tomic et. al., (2004) consider access to playgrounds an issue of socio-spatial equity partly related to class. Loukaitou-Siders and Stieglitz (2002) take a similar stance when investigating access to "neighbourhood parks" within the Los Angeles area. The Children's Play Council (2002) highlighted that in the UK there can be a difference in Local Authorities' spending on children's outdoor playgrounds of up to 10%, meaning the quality of facilities can vary greatly over space.

Thomas and Thompson (2004) postulate a link between poverty and access to useable outdoor spaces for children. Sutton (2008) also suggests that children from lower socio-economic backgrounds spend more time engaged in "street play" within their use of

outdoor spaces than children from other backgrounds, partly because the opportunities for them to play in parks, other greenspace or recreational facilities is particularly limited.

However, Ellaway et. al. (2007) show that the relationship between access to outdoor play areas (measured as mean number of play areas per 100 child) is higher in the more deprived areas of one city (Glasgow) and highlight that 'quality' of spaces and social constraints relating to outdoor use also need to be taken into account. Cohen et. al., (2006) also highlight the importance of proximity to park spaces for levels of urban children's physical activity – using "metabolic equivalent-weighted moderate/vigorous physical activity" as a measure – but also show that the characteristics of the green space affects levels of physical activity.

4.4.4 A new type of childhood

> *"…children are disappearing from the outdoors at a rate that would make the top of any conservationist's list of endangered species if they were any other member of the animal kingdom…"* Gill (2005)

Research has started to discuss a "new type of childhood" (Karsten, 2005) in which children spend less time than ever before outdoors (Fjortoft, 2001). Kahn and Kellert (2002), for example, believe that subsequent generations of children have increasingly lower expectations of the amount of contact with nature that they will have in their lives. Herbert (2009) has called this a "generational amnesia about the natural world".

There is discussion within research relating to children and their use of outdoor spaces of an increasing reduction in time spent outside by children (particularly time spent in unsupervised play). Gaster's (1991) study, for example, suggests a reduction in children's level of outdoor play over three generations. Karsten and van Vliet (2006a) show that there is an associated reduction in the 'range' of children from the home in terms of their unsupervised use of the outdoors. This has been noted within rural (Aitken, 2001) and urban contexts (O'Brien et. al., 2000).

Children are seen to be functioning within a "field of constrained action" (Kytta, 2004). Research has linked this to an increase in supervised (commercialised) play/ activity centres (McKendrick et. al., 2000). Therefore, contemporary children's geographies are seen to be changing – moving away from time spent in unsupervised outdoor play and towards an adult-controlled use of the outdoors (e.g. Karsten and van Vliet, 2006b).The negative impacts of this reduction in outdoor use has recently attracted fairly wide media attention with the publication of Louv's (2005) book *Last Child in the Woods,* which uses the phrase "nature deficit disorder" to describe the effect of a lack of outdoor use and contact with nature on contemporary youth. However, Sutton (2008) suggests that this 'new childhood' may largely be a representation of contemporary middle-class childhood – one in which children are "chaperoned" and their time "structured" to a greater degree than that of children from lower socio-economic backgrounds.

Researchers have noted gender differences in these trends related to differing parental restrictions on boys' and girls' outdoor use. McMillan et. al., (2006), for example, show gender differences in children's experiences of walking to school. Valentine (1997) suggests that boys are permitted to have a wider range from the home when playing outdoors.

Research has also shown the use of the outdoors to be linked with the very social construction of gender itself (Karsten, 2003).

5. Children in the Outdoors Research – methodological considerations

"[There is] a great deal of difference between the adult who is able to recall rich and memorable experiences of childhood and the young child encountering a place or an environmental experience for the first time. How can we ever step back…? Are adults inevitably to be cast as outsiders able to gain only the most meagre glimpses of childhood?" (Matthews, 1992, p.1)

The review of literature relating to children's use of outdoor spaces laid out in the proceeding sections has shown that there is a widespread use of qualitative methods within this type of research (Handy et. al., 2008). Qualitative methods are suited to delivering an in-depth understanding of the decision-making processes involved in outdoor use, as well as revealing much about how children experience the outdoors (Greene and Hill, 2005). They are appropriate to revealing the myriad of ways in which children in different geographical, socio- and cultural- contexts experience their everyday lives and make sense of outdoor spaces (O'Brien et. al., 2002).However, there is a greater potential to engage with quantitative methods – particularly in relation to measuring the health benefits of outdoor use.

Although the review has pointed to recent studies that have engaged with the quantitative measurement of children's activity levels (e.g Fjortoft 2001; Groves and McNish, 2008; Lovell, 2009), in other studies, the measurement of health outcomes has remained largely fuzzy and ill-defined. A connection between lack of outdoor use and negative health outcomes is stressed, although sometimes taken for granted and not quantified. The connection is also much evidenced through self-reported health using interview techniques, such in Neuwelt and Kearns' (2006) study of the link between walking to school and health. Although interview techniques are effective at understanding behaviour and behaviour change they do not provide quantifiable evidence of health benefits and there is the potential to complement this work with different types of health measurement.

In relation to changes in children's use of outdoor space and the health benefits associated with their use, there is also a lack of longitudinal work. However, this type of study would be particularly beneficial in the examination of trends, preferences and behavioural decision-making over time. Handy et. al. (2008) provide an insight into the usefulness of such techniques with their quasi-longitudinal study examining the link between neighbourhood characteristics and children's levels of physical activity.

In this context, there is a need for social scientists to engage to a greater degree with medical scientists, in order to integrate behavioural and social understandings of children's use of outdoor spaces with measured health benefits. In order to increase the evidence base and further understanding in these areas there is a need to develop both inter-disicplinary research and cross-cultural/ country comparisons.

To understand the short- and long- term benefits of contact with nature and outdoor activities, it is important to engage in inter-disciplinary work that brings together the social sciences and the medical/ biological sciences. Health and health-related behaviour is the consequence of multifactorial processes and influences and it is necessary to consider the

relationships between the environment, society, individual behaviour and physiological impacts when investigating the root causes of health outcomes (Karpati et. al., 2002). Thus, inter-disciplinary research on children in the outdoors requires researchers to work together to generate shared understandings of what is meant by the 'outdoors', 'health' and 'wellbeing' and the methodological demands of working together to measure impact and understand actions. Such inter-disciplinary work on children in the outdoors will be important in providing an evidence base for policy makers that are involved in the implementation of new ways of encouraging outdoor use by children for positive health and facilitating environmental access. End users of such data, such as outdoor and health agencies, have lamented a lack of quantitative work on this subject, e.g. Health Council of the Netherlands (2004).

This literature review has also highlighted that parental fears and perceptions are important in setting the boundaries for children's outdoor use and that it is, therefore, important to engage with parents and guardians in the research process. However, research has also shown the utility of engaging with children as research subjects. Hart (1997) points to the need for a *"more radical social science [in which] children themselves learn to reflect upon their own conditions, so they can generally begin to take greater responsibility in creating communities different from the ones that they inherited."* Researchers still need to take hold of this call to engage with children as research participants and translate these insights into methodologies to study and understand their engagement with the outdoors.

However, there may be hesitancy amongst social science researchers to engage with children as research subjects, relating to ethical issues, reliability of results and the research skills needed to engage with children (Hill, 2005). Although research has effectively used interview-based techniques to explore older children's outdoor use – for example Orsini and O'Brien (2006) look at teenagers' motivations for cycling to school; there may be a need to engage with more novel methods when investigating the outdoor use of young children.

Tucker and Matthews (2001) highlight the value of constructing "discussion groups" based around existing friendships to gather information from 10 – 14 year olds. Innovative work such as Gharahbeiglue (2007) and Rudkin and Davis (2007) show the potential to engage with mediums such as drawing and photography as an alternative to questionnaire and interview in capturing children's perspectives. Smith and Barker (2001) also find that children themselves identify photography as well as "drawing pictures" as methods that they wished to engage with. Mikkelsen and Christensen (2009) show how qualitative methods can be integrated with the use of GPS tracking to map and understand the social context of children's movements. Wridt's (2004) study also highlights the potential of engaging with the biographical approach in asking adults to reflect on their childhood experiences of the outdoors.

It will be important for researchers to reflect on the degree to which their approaches to researching this topic are caught up with adult conceptualisations of 'childhood' and how children's experiences, and voices, can be accurately captured and represented in research (Aitken and Herman, 1997). There is a need to engage in debates over "children's competent social agency" (Vanderbeck, 2008), for these debates are linked to the very methodologies that researchers choose to use when investigating subjects relating to children's use of space (Barker and Weller, 2003). Research needs to recognise that 'childhood' itself is a social construct (Prout, 2005), with social boundaries and definitions, that it is constantly created, negotiated and renegotiated, in a process that involves multiple actors – including children, their parents, carers and wider social structures such as the educational system and the

state. As Gill (2005) highlights to (re)engage children with the outdoors and the associated health benefits of physical activities in outdoor spaces there is a need to tackle not only the design and physical accessibility of such spaces but "societal attitudes and public policies" that have acted as increasingly restrictive on children's use of outdoor/ public space.

There is the potential to draw further on the methods and theories developing around children's geographies – that have been used to investigate children's use of space and attachment to place (e.g. Matthews and Limb, 1999; Holloway and Valentine, 2000; Karsten, 2005) – in examining children's use of the outdoors. There is a need to take into account the ways in which children 'connect' with place (e.g see Chatterjee's 2005 exploration of "place friendship").

There are lessons to be learned also from children's participation literature, e.g. Linares Poton (2007) that could be translated/ harnessed into researching policies and interventions related to children's use of the outdoors. See, for example, the work of Murayama (2007) that highlights the role of children in "environmental participation projects" and the call for researchers and policy makers alike to recognise the value of children's "participation in social planning and research" (Lolichen, 2007).

6. Conclusions – towards a research agenda for children in the outdoors

This literature review has investigated the links between use of the outdoors and health within current literature, with a particular focus on research relating to children's use of outdoor spaces. It has shown that there general agreement about a positive relationship between use of the outdoors and health. Research has detailed that access to greenspace brings general health benefits and that, in particular, there is a link between use of the outdoors and increased levels of physical activity. Physical activity has been linked to tackling contemporary health problems, such as obesity, but exercise in the outdoors has been shown to be beneficial also because it facilitates contact with nature. It is generally reported that being outdoors contributes to higher levels of wellbeing– bringing physiological benefits such as stress reduction.

The literature review has shown that children are a key social group in relation to the health and outdoors agenda. Not only is there an increasing interest in facilitating outdoor play as a way of tackling a perceived increase in sedentary lifestyles and contemporary health problems but also as a way of 'reconnecting' children with nature. It is perceived that children have decreasing amounts of contact with natural spaces and natural features within their daily lives and research points out the key role that these could have within child development and education.

Therefore, the review has shown that there is much discussion within the research about children's play spaces – both those designed by adults and the spaces that children appropriate for their activities. There has been both a focus on incorporating natural elements into designed play spaces such as parks and school playgrounds but also of facilitating access to outdoors spaces not necessarily designated as 'for play' but in which children can engage in play activities and derive benefit from doing so in an outdoors location.

The role of parents, guardians and teachers as boundary setters or 'gate keepers' in relation to children's use of outdoor spaces has been widely discussed within the literature. The influence of parental fears and anxieties on children's mobilities and use of outdoor spaces suggests that increasing children's use of the outdoors is about more than just designing spaces that children like to play in. Much research suggests that, in line with Tandy's (1999) findings, children's use of outdoor space is a reflection of the ways in which they negotiate their own desires alongside "parental constraints". Encouraging use of the outdoors for positive health benefits requires an understanding of the myriad of influences on children's use of space – from children as social actors, to the role of societal pressures and public policy. To gain maximum benefit from research on children's use of the outdoors, researchers, therefore, need to think about how their findings can be translated into policies affecting children's use of the outdoors. Naker's (2007) discussion of the *"disjuncture between the rhetoric and the practice of promoting children's participation"* needs to be considered in relation to this issue.

This literature review has also revealed the focus within research on examining the (re)connection of children with nature and the outdoors within the educational context. More research is needed to examine the inter-connectedness of play, education and the outdoors. This is related to the need for more quantifiable evidence of the link between children's outdoor use and measured health benefits and greater use of "quantitative indicators" (O'Brien, 2004) in the monitoring of projects designed to engage children with the outdoors and nature. Work like Liddicoat et. al., (2007) emphasises that cross-cultural and country comparisons could be beneficial in providing further evidence in relation to this topic. There is a need to understand more about the motivations, behavioural decisions and constraints underlying the way in which children within different countries and regions understand nature and use the outdoors. This needs to sit within a comparison of the different cultural and political contexts that influence children's use of outdoor space. This will allow us to develop an understanding not only of the relationship between children's use of the outdoors and health but also of the influence of different socio-cultural contexts on such behaviour and health outcomes. There is also need for a more systematic engagement with the investigation of how outdoor experiences and health benefits differ for children of different ages and gender.

A research agenda for children in the outdoors that is inter-disciplinary in nature could take forward this important avenue of research. This will help increase understanding of what kinds of spaces, facilities and policies could promote use of the outdoors for positive health outcomes. It will help us move towards the development of a common theoretical framework, methods and standards of evidence that lay the foundations for collecting evidence on causal relationships between the natural environment and health.

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