

(part 1)

Reasons to be Outside

Jan White and Liz Edwards



**OPENING
UP THE
OUTDOORS**

**ESTABLISHING
BELIEFS**



Reasons to be Outside

(part 1)

why young children need at least 3 hours
of outdoor play every day

Jan White and Liz Edwards



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Disclaimer

Whilst fascinating, human biology is messy, complicated and never straightforward! Findings in biological research can only 'indicate', rather than being definite, are often variable, and are always being questioned - so theories are constantly modified and updated. I have done my best to convey in brief summaries what the scientific literature is saying, so as to present you with food for thought about the many biological aspects of the human body in the outdoor environment, but this is NOT advice. The rule of thumb seems to be that things are often good for us in moderation, but problematic at high and low ends of their spectrum (such as sunlight and UV radiation). It is important to refer to the NHS website for the latest accepted health advice <https://www.nhs.uk>

What IS clear is that there are very many reasons for young children to spend lots of time playing in the outdoors, every single day! If you would like to find out more about particular aspects of the neurophysiology of being outdoors in early childhood, sign up for the Early Childhood Outdoors 'Outdoors 3 Hours A Day' advocacy campaign blog, in which I will provide some starter references and specialist books for delving deeper - visit www.earlychildhoodoutdoors.org

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OPENING UP THE OUTDOORS

Much has happened over the past decade in progressing the right of all young children to access play, and the learning that takes place through their play, in the outdoors. We now have a broad consensus across the UK and at all levels from Government to practitioners and parents, that outdoor play matters and that **‘outdoor learning’** is important – and increasingly, that this is as significant as indoor learning.

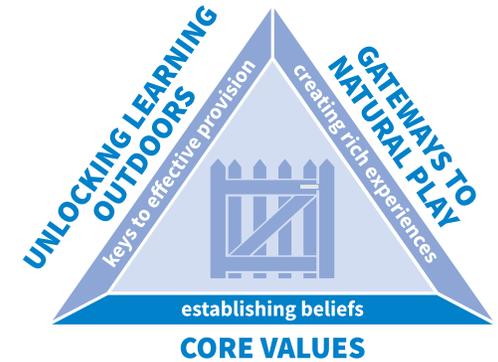
Along the way, many settings have been exploring their approach to outdoor play and learning, and several are pushing at the boundaries of what it really means to be in the outdoors, what kind of outdoor environment can be harnessed, such as woodlands, beaches and the street, and in what ways the outdoors can be used for the benefit of young children. Exciting times are ahead for the field of outdoor play and learning!

However, many early years settings still have to work with difficult access to the outdoors, uninspiring outdoor spaces, restricted funds for design, resources, training, outdoor clothing and so on, staff who are early on in their own journey of working well with the outdoor environment, and parents who are not yet fully on board with the setting’s intentions for learning outdoors. There is still much work to do! The outdoors has so much potential to offer to young children: **how can we unlock and open up this fabulous treasure trove?**

Opening Up The Outdoors builds on the remarkable success of Jan White and Liz Edwards’ previous Mud Play initiative, which aimed to deepen the understanding, importance, value and range of experiences from mud play as continuous provision and to support practitioners to achieve this (Making a Mud Kitchen 2011). This larger initiative shares the vision and goal of *more children thriving outdoors, more often and for longer, benefiting from richer and more meaningful environments offering authentic, rewarding and satisfying experiences* through a long term, three cornered approach tackling the **WHY**, **WHAT** and **HOW** of really good outdoor play.

Establishing beliefs

The **‘establishing beliefs’** booklets underpin understanding and thinking about being outdoors in the early years – providing firm foundations for moving forwards. As well as providing this value base, the **Opening Up the Outdoors** initiative includes two ‘how to do it’ strands that will help practitioners to provide learning through play outdoors that is rich, effective and satisfying – **WHAT** needs to be worked upon to fully harness the potential of the outdoors, and **HOW** to create the rich experiences that make for really good outdoor play.



3 hours outdoors every day, throughout early childhood

Reasons To Be Outdoors makes the case that young children must be able to play outside a great deal, every single day, throughout their childhood years. Why should young children be outdoors so much?

The science can help us to think more deeply about the question

As part of a series presenting the very many reasons that our youngest children need to be outdoors so much, this booklet attends to what is currently understood about the **neuro-physiological aspects** of child development and brain/body functioning that require the conditions provided by the outdoor environment - and which are usually limited or absent indoors. It draws together scientific studies in the biology of early childhood development, the researched effects of being outdoors, and how healthy child development is supported by active play in the outdoors. The focus here is on the biochemical process in brains and bodies that are influenced both by the conditions of the outdoor environment itself and by the ways children can be when they are outside.

Evolution happened outside and development requires the outdoors

Simply *being* outside is important! Just being outside has wide-ranging effects on physical and mental wellbeing, and it is a very different place that provides so much for brains, bodies and spirits. For almost all of the long history of human evolution (including of course the ancestors of the first *homo sapiens*), children and adults spent almost all of each day outside, so our evolution has been significantly shaped by the conditions of these outdoor environments. The result is that the neurological and physiological processes that run our brain/body systems (including the creation of feelings, emotions and thinking) have *an expectation* of these conditions. This is particularly important to think about for working out what young children need for full and healthy development of these basic biological processes and systems, which themselves underpin the rest of child development.

Better out than in!

It is also critical to realise that **indoor environments rarely meet these requirements adequately** – indeed they can often provide negative conditions, with results that can express themselves as behavioural issues or compromised learning. Perhaps we should be asking what is happening inside their bodies when young children are not outside?

Taken together, these reasons give us **3 vital messages**:

- children arrive *ready from birth* to be outside;
- children’s minds, bodies and spirits *require* the outdoors;
- young children must be in the conditions outdoors provides for a *minimum of 3 hours* a day, every day, across the year and throughout childhood.

3 hours a day might at first sound like quite a lot – but it is only a quarter of the child’s waking day.

3 hours a day each day amounts to 1000 hours a year. This is apparently about the amount of time western children spend looking at screens each day - mostly sedentary and indoors. Shouldn’t we be at least matching this with ‘the most high definition screen imaginable’? (1)

3 hours a day every day over 10 years amounts to 10,000 hours by the time the child is near the end of primary schooling. This is the agreed requirement as to the amount of experience and practice for becoming an expert. By the age of ten, **every child should be an expert** in being, playing and learning outdoors!



(1) <https://1000hoursoutside.com/who-we-are.htm>

Reasons to be outdoors: why young children need at least 3 hours of outdoor play every day

Natural light

Amongst the first things we usually notice on moving from indoors to outside are the brightness of the light and the freshness of cool, moving air. 'Full spectrum' natural light is critically important for many aspects of development during the early years. Indoors, light intensity is very much lower and artificial lights do not provide the full range of wavelengths we have evolved to require for healthy functioning and development.

Natural light stimulates production of the **neurotransmitter serotonin**, required for neurons to be able to process information by communicating with each other. Making us feel alert, energetic, able to think and ready to act, serotonin production creates the conditions in the brain needed for learning and remembering. A mind that is working well due to high levels of serotonin lifts mood, making us feel buoyant, happy and resilient - and able to function, communicate and socialise well.

Blue light in natural daylight helps children to sleep longer and more refreshingly at night through stimulating the pineal gland. This part of the brain regulates our 'biological clock' through alternately raising and lowering serotonin and melatonin production in the body in a nicely balanced circadian rhythm. Getting plenty of exposure to blue light during the day, particularly during the morning between 8am and 12am, is therefore necessary for maintaining the evening **levels of melatonin** that allow the child to benefit most from a good night's sleep.

Since sunlight maintains good sleep and immune system function, helps us to be alert and ready to learn, and stimulates production of vitamin D and the 'happiness' brain chemical serotonin, it is vital that children are bathed in natural light throughout the year.



Vitamin D and the immune system

The high intensity natural light we are bathed in whilst outdoors is also critically important for our body's ability to manufacture **vitamin D**. High levels of this chemical are needed for maintaining several aspects of health, including bones, blood cells and digestion, and a prolonged lack of this vitamin can result in the disease known as rickets. In particular, vitamin D aids the capture of dietary calcium from the blood into bone structure, which alongside lots of physical activity, results in strong bones in a healthy skeleton.

Playing outside in natural light provides a great mix of benefits for a healthy **immune system**. Sunlight itself (via the action of UV waves) and the vitamin D that it causes to be made in the body are both vital for the development and maintenance of good immune system function, helping also to calm the inflammation involved in eczema. Physical activity gives the immune system a power surge for the following 24 hours, and interestingly, recent research suggests that experiencing cold temperatures may also stimulate immune activity.

Research indicates that contact with the many beneficial microorganisms in the environment outside (particularly in soil – known as the 'old friends') stimulate healthy development of the immune system.

The '**hygiene hypothesis**' proposes that such contact helps to train the immune system to distinguish between 'self' and 'not self', so that allergies are less likely to develop. Other research suggests that skin contact with, or simply breathing in, common soil bacterium (*mycobacterium vaccae*) stimulates serotonin production, adding to the happiness that sunlight creates!

Cool, fresh air

Fresh air outside simply makes you feel good! Whilst sharing the air with other people in an enclosed indoor environment such as a classroom, this can drop to around 11% - making us sleepy and unable to concentrate, especially if the room is also warm. Outdoors, the **proportion of oxygen** in the air we breathe stays constantly at 20% and this cool, moving, oxygen-rich air is refreshing and enlivening. Moving air wakes up the brain, as does the contrast of cooler temperature, and high oxygen levels enable the mind to work at its best.

Studies have shown that enclosed indoor environments can have up to five times higher levels of **air pollution** than outside, due largely to volatile fire-retardant chemicals used in furnishings and the prevalence of plastics. These organic chemicals can be very harmful for developing lungs, especially as children breathe more rapidly than adults. High levels of air pollution outdoors due to smoke, transport fumes and industrial exhausts are an important consideration. However, in most circumstances, the air is literally fresher – and healthier – outside than in.

Temperatures outdoors vary and fluctuate both during the day and across the year. It is likely that though experiencing this variation the child's **physiology gradually learns** how to respond so as to maintain the body's optimum internal working conditions. In order to keep a steady core temperature of 37 degrees, we must shiver when too cold, producing extra heat from the muscles, and sweat when too hot, losing surplus heat through evaporation on the skin.



Forest bathing and aromatherapy

A leading theory as to why we feel so much better when surrounded by plants, especially coniferous trees, is that they release into the air we are breathing a **rich cocktail of organic compounds** that work synergistically to both soothe and enliven us. Absorbed through the nasal pathway, the molecules in this air both reach the brain and enter into body-wide blood circulation. Some of the components stimulate, whilst others sedate, having both uplifting and relaxing effects at the same time. Experiencing the combined feelings of pleasure in life and effortless attention, the child's mind and body is thus brought into the perfect state for generating curiosity, exploration, thinking and learning.

Experimental studies have shown that inhaling airborne plant chemicals can **lower stress hormone** (cortisol) production and blood pressure, reduce anxiety and increase the antioxidant defense system in the human body. In plant-rich environments, children are frequently reported to be calmer, more at peace, and more likely to play sociably.

Plants actually produce these chemicals to prevent attack by insects and microorganisms - hence they are collectively called *phytoncides*. But the effect they have on humans is likely to be because we co-evolved with plant filled environments, so that our physiology 'expects' the conditions they create. It is thought that their anti-bacterial properties influence our immune system, reducing the inflammation involved in allergies. This has long been harnessed (and extensively researched) in Japan in what is now known as **Shinrin-yoku** - or 'Forest Bathing'.



Highly sensory, multi-sensory, embodied learning

Young children take in their world in a highly sensory, first-hand way. Aware and alert to everything, they experience life intensely and 'in the moment' as sensation, internal as well as external – including light, sound, texture, temperature, motion, movement, stretch, smell and taste. Like sponges, their brains must soak up every detail and nuance, growing millions of neural connections, so as to build a huge data base of information and evidence to come to know about, understand and make 'sense' of their world.

The world outside provides the direct, hands-on experiences in a **highly sensory and multi-sensory environment** that young children must have for rich, meaningful, effective and useful learning. The outdoors has huge potential in this area, especially when it has sand, water, grass, wood, stone, vegetation and other natural materials and where experiences involve lots of handling and movement. Children with sensory impairments are especially supported in a highly sensory environment.

The information gathered in active, whole-bodied experiences that **activate both internal and external senses** at the same time is stored as 'felt meanings'. The acts of moving and doing are vital for creating solid embodied learning to draw on in the future - we can think in all the ways we experience. Experiential learning that makes lots of 'sense' builds up **intuitive intelligence** held in the brain-body. This then sits as the foundation that enables the abstract thought required in later, more academic learning.



Sensory development

Many children have sensory processing difficulties that can show themselves as learning, emotional or behavioural difficulties. The highly sensory and multi-sensory environment outdoors is exceptionally strong at providing young children with the vast amounts of sensory experiences they must have throughout their early childhood, so that healthy **sensory development and integration** can mature as it should.

We are primed at birth to develop the various sensory systems that allow us to sense our own bodies internally and 'take in' the external world. But each system requires enormous amounts of daily stimulation - provided by a huge range of active experiences of a richly varied nature - for them to become sophisticated enough to make sense of all the incoming information, process it effectively and be able to make good use of it. There is also much work to do so that each system becomes **well modulated**, so that it is neither overwhelming nor under-detected.

For example, the outdoors is filled with a wide range of noises in a **complex 3D soundscape** of varying qualities (pitch, tone, loudness and duration) that young children find very interesting. With lots of experience, they gradually come to hear sounds separately, understand what they relate to and what they mean, work out where they are coming from, how far away they are and which way they are moving. Being able to attend to some sounds while tuning the rest into the background is vital for **language development**, whilst some sounds (such as birdsong) have been shown in research to be soothing and relaxing.



Sensory integration

The world outdoors is also a wonderful **landscape of touch** experiences that develop this important and complex sensory system. **Feeling, handling and working** with materials and objects of many different and changing textures, shapes and forms informs the child about their own body and abilities, as well as about their world. Because being touched and stroked causes the release of the '**calm and connection hormone**' **oxytocin** in the brain-body, touch experiences can be very therapeutic for children, especially when they feel over-stimulated or agitated.

Further than this, it is imperative that the individual sensory systems are stimulated together, so that they **develop as one integrated whole**. When this happens, the brain becomes able to make use of them in a combined way so that they provide **multi-dimensional input** with each sensory stream interacting with and supporting each other, allowing for much more effective responses. For example, vision, motion (the vestibular system), body awareness (proprioception) and hearing must all be able to work together in a coordinated way for **good balance** to be achieved – so these need to be activated together through lots of active play every day over several years. Swinging, spinning on the spot and cartwheels are especially valuable for this development!



Developing good vision

New-born babies have fully developed eyes that can receive visual input from their external world, but all the work of becoming able to make sense and make use of this information (which takes place through development of the brain's visual cortex) has yet to occur. During the first year of life this is the sensory system that develops most rapidly, with visual experience being especially important before the age of three.

Vision can only develop well through spending plenty of time in a **richly complex 3D visual landscape**, but it is also critical that the child is able to move their own body in and through this complex 3D world. This is because external visual input must be processed in combination with internal input about motion in space (from the vestibular system) and movement of the body (from the proprioceptive system) arriving in the brain at the same time, for it to make useful sense. **Spatial awareness, spatial reasoning** and **hand-eye coordination** are clear consequences of this link, but many other aspects of visual development are also strongly reliant on integration with other senses, such as the ability to see objects as three-dimensional and strong peripheral vision (which keeps us safe from such things as moving cars). It also helps with controlling movement of the eyes in such tasks as following text across the page when reading.



Supporting healthy eyes and sight

Being active outdoors supports the ability of the lens to adjust between near and far (and all points in between – a much bigger range than is available indoors); the ability of the iris to adjust as the body moves between dark and light places; the ability of the eye muscles to both control fine eye movement and hold the steady gaze needed for reading; the ability of the visual cortex to develop binocular vision by successfully combining information from the two concurrent inputs; its ability understand perspective and see objects as 3D entities; its capacity to understand contrast, shadow and visual textures, and to see tone and shade nuances in colours.

Of increasing concern in the medical field is the sharply increasing incidence of **shortsightedness (myopia)** across many countries of the world – an increase so rapid that it that can only be attributed to environmental/ lifestyle factors. Whilst close work (such as digital screen use) and being so much more sedentary are likely to be involved, leading theories foreground **lack of lengthy exposure to natural light during the early years**. Even on overcast days outdoor light is 100-200 times brighter than artificial indoor lights, and it is considered that around **2 hours of bright outdoor light each day** is necessary for the eye to receive sufficient signals to slow its growth across the years of childhood. ‘Shortsightedness’ is caused by the eyeball being too long for the lens to focus distant images onto the retina, so that they appear blurred. Myopia, especially when severe, can affect eye health, increasing in the risk of sight loss later in life.



The importance of being active

The space, freedom and stimulation provided by the outdoors encourages young children to move, to be energetic and to use their whole body in activities, employing their torso and limbs rather than only hands and heads. Babies and children are biologically programmed to seek out as much movement and physicality as possible because of the enormous range of influences these have on their brains and bodies.

Medical guidelines for children under five in the UK recommend **at least 3 hours of physical activity**, spread across the day, every day. Young children are naturally active in short bursts, so ongoing access to the outdoor environment, so that children can access it whenever they feel the need, significantly raises activity and fitness levels. Plenty of physical activity builds bones, body tissue, neurological systems and brain connections, so it is not surprising that a considerable amount of research evidence links being active every day with a wide range of mental and physical health benefits, as well as improving cognitive functioning:

- **Higher fitness and agility levels** – the medical profession is even more concerned about low fitness levels than obesity for children's health;
- **Eating well and appetite management** – generating hunger but helping with good weight control;
- **Cardio-vascular** (lungs, heart and blood circulation) functioning is stimulated, and activity itself helps to push blood back up from the legs and to all parts of the body. Combined with oxygen-rich outdoor air, this means that **well-oxygenated blood** reaches all tissues, keeping them healthy and working optimally;



Active play does so much!

- Being physically active also improves flow in the **lymph system** (which, unlike blood, does not have its own pump) with the result that the immune system can quickly respond to invading viruses and other illnesses.
- Healthy **tendons and ligaments** in all joints around the body require good blood supply and lots of use;
- **Bone and joint** growth, strength, flexibility and health – resistance activity causes tiny ‘micro-breaks’ that stimulate new bone to be laid down;
- **Muscle development** occurs in same way – active use causes tiny tears, which then stimulate muscle tissue growth;
- **Core strength, flexibility and control** is vital for balance, coordinated action and even for easily sitting at a desk – teachers are increasingly saying that their children ‘fall out of’ their seats at school;
- **Dexterity** and comfort in using small tools (such as pencils for writing) comes from much large-scale work with the torso, shoulder, upper arm and hands co-operating together;
- Getting to sleep and **getting the most out of sleep** for restoration;
- As stamina and robustness improves, children are able to draw on **greater energy and inner drive** – this transfers to emotional and academic situations as well as physical ones;
- Physical play where children challenge themselves and embrace uncertainty increases **resilience and recovery**, so that they are able to bring their ‘whole self’ to bear on the task they have set for themselves.



Moving makes children happy

Many children are clearly much happier when they are free to move - and when children's movement needs are met, as they experience the need, behaviour issues tend to disappear. Movement is so foundationally critical that, "expecting young children not to move is like expecting them not to breathe"⁽²⁾. The space, freedom and provocations for movement that being outside provides has wide-ranging effects on how the body feels, on emotions and on how well the brain processes and functions:

Mental health is supported through satisfying the enormous biological drive to move, be active and use the body that young children experience. Being prevented from responding to this imperative creates unpleasant sensations and uncomfortable feelings, and in the long-term damages mental wellbeing.

Movement itself is enlivening. Movement in muscles and joints send proprioceptive (body awareness) signals to a centre in the brain that then **activates the whole brain**, waking it up and making it ready for new experience and new learning. Spinning in particular has been shown to increase concentration and enable organisation of thought processing in the brain.

Because movement is so developmentally important, a feedback reward system has evolved in the brain that encourages more of the same. Moving causes the production of the **neurotransmitter dopamine**, which is required for carrying information between neurons, so enabling them to communicate with each other. Special receptors activate a pleasure response when they detect this increase in dopamine, providing the active child with feelings of joy and the desire to keep moving.



(2) High Scope: Hohmann & Weikart 1995)



Movement supports thinking and learning

This combination of activation and increased dopamine production put the brain into an alert, self-regulated and internally motivated state that is perfectly poised for exploring, interacting, investigating, discovering and thinking.

More than this, movement also stimulates production of a **neural growth hormone (BDNF)** that helps to grow new nerve cells and connections between them (which is learning), and also helps to maintain these new connections so that they last (which contributes to memory).

Experimental studies have indicated that cognition improves when children and adults are active – even a single bout of moderate physical activity improved brain function. Amongst the mechanisms thought to be involved is increased **oxygenated blood flow** to brain tissues as well as an increase in production of neuro-protecting molecules related to memory formation.

Emotions and behaviour are much easier to self regulate when movement needs are met – this is often most apparent for boys but it is important to remember that it will also be true for girls. Action and physicality are known to be vital for the development of the **cerebellum and frontal cortex**, both of which are involved in regulation, organisation and planning, so are particularly essential for children with dyslexia, ADD, ADHD and ASD.

Every child needs to experience the **joy and happiness** of moving, enjoying what their body can do and deriving pleasure from the sensations of their body in action – truly feeling ‘life in every limb’. Feeling good in and about your body is the foundation for an emotionally and physically healthy life.



GATEWAYS to natural play – the HOW of playing and learning outdoors

The Shared Vision and Values for Outdoor Play and Learning in the Early years is presented in the foundational Opening Up the Outdoors booklet, **Valuing the Outdoors** (White & Edwards 2018), cornerstone of the ‘establishing beliefs’ **WHY** strand (available from Muddy Faces).

GATEWAY booklets are produced through collaboration between Early Childhood Outdoors and Muddy Faces, to support the aims of the **Opening Up The Outdoors** initiative through the ‘creating rich experiences’ **HOW** strand.

Each of the **GATEWAY** booklets has a clear ‘gateway’ in provision and experience outdoors that it seeks to open. Each booklet offers a simple, straightforward and easy to implement aspect of development and action, which actually opens up much more of the outdoors than at first meets the eye. Further booklets will address keystone provision such as playing with the rain, loose parts, woodwork and tools, den play and storytelling.

Opening each gate initiates a great way of harnessing the outdoors for enjoyable and worthwhile exploration and play – contributing to opening up the full richness of playing and learning outdoors, and capturing the best the outdoors can provide for supporting all children to thrive and grow. For ongoing information about Gateway booklets as they become available, visit the **Outdoor Hub** at www.muddyfaces.co.uk





Early Childhood
Outdoors

The National Centre for Outdoor Play, Learning and Wellbeing

Early Childhood Outdoors (ECO) is a social enterprise seeking to increase the amount and quality of outdoor experience for young children across the UK, through collaborative and enabling work with a wide range of development, teaching, research and design organisations providing support in this field, in order to maximise impact.

It aims to connect organisations and individuals, to build support capacity, and to deepen the pedagogy of being, playing and learning outdoors.

www.earlychildhoodoutdoors.org



MUDDYFACES

Forest School, Outdoor Play & Learning Resources

Muddy Faces sells Forest School, Outdoor Play & Learning Resources. Our resources have been developed by practitioners to support groups to be outdoors, connecting with nature and its elements.



Our **Outdoor Hub** is a free online resource providing lots of ideas, activities, events and information.

www.muddyfaces.co.uk

