

# Movement, green exercise and playgrounds in developmental age, for a correct lifestyle

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## ABSTRACT

The goal of this research is to demonstrate how physical activity in nature in children of developmental age can have benefits on a physical, mental and social level, especially if carried out outdoors. From the analysis of English articles published between 2000 and 2019, 7 publications met the inclusion criteria so they were selected to carry out the following systematic review. Results showed that exposure in nature stimulates higher levels of physical activity compared to indoor exposure environments, with a consequent improvement in basic motor skills. The positive effects were also found in the social sphere with an improvement in functional, constructive and symbolic activities. A correlation was found between neuropsychological abilities that occur in adulthood and the psychomotor stages acquired up to adolescence, because neuronal systems collaborate with cognitive systems: the interaction with the environment acts as a detonator for visual perception, motivation, cognition. This could be of further potential in people with disabilities and psychosocial problems. Also noteworthy are the mental benefits such as increased self-esteem, better mood, self-concept, problem solving skills, increased attention and learning skills as well as stress reduction.

**Keywords:** Nature; Physical activity; Motor development; Psycho-Social well-being; Physical well-being.

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## INTRODUCTION

In this review we aim to demonstrate how physical activity, especially outdoor (green exercise) in developmental age improves motor skills, which are closely related to psychosocial, cognitive and relational development. In fact, better physical well-being is found compared to indoor environments (Protocols: I. Fjørtoft (2000), I. Fjørtoft et al (2009), M. Valentini et al (2013), FC Hendry et al (2018), C. Guardino et al (2019)), helping to prevent non-communicable physical diseases, mental illnesses (anxiety, depression, loneliness, hyperactivity etc.) and in general in the quality of life. Motor activity is fundamental as in recent decades there has been a continuous increase in sedentary behaviours, obesity, diabetes and cardiovascular diseases from a young age (G.V. Polanczyk, G.A. Salum, L.S. Sugaya, A. Caye, 2015). The risk of obesity is high and children who are overweight and obese are likely to remain obese into adulthood while these diseases are largely preventable. The prevention of childhood obesity therefore requires a high priority (World Health Organization, 2016) to counter the "*pandemic of inactivity*" (HW Kohl 3rd, CL Craig, EV Lambert, S. Inoue, JR Alkandari, G. Leetongin, S. Kahlmeier, 2012), as well as the "*nature deficit disorder*" which concerns the increase in depressive disorders among adolescents (R. Louv, 2006). Furthermore, it is clear that the habits acquired in the first years of life are maintained in adulthood. Motor activity in nature thus helps prevent and promote mental, physical and social health. Consideration should be given to the positive impact that exposure to natural environments has on these disturbances (BG Berger, (2000), J. Pretty, J. Pavone, M. Sellens, M. Griffin, (2005), DG Pearson, TP Craig, (2014)) (Protocols: B. Davis et al (2006), Barton & Pretty (2010), M. Valentini et al (2013), FC Hendry et al (2018), C. Guardino et al (2019), C. Mnich et al (2019). Obvious improvements are noted in children with impaired cognitive and mental functions (Protocols: C. Guardino et al (2019), C. Mnich et al (2019), L. Mygind et al (2019). Many studies have already shown that exercise and physical activity alone have a positive impact on health (AE Bauman, 2004). The more traditional play areas, organized for safe movement, certainly develop basic motor activities and are fundamental, especially where there are no other possibilities. However, physical activity in nature shows a notable improvement in basic motor skills (Protocols: I. Fjørtoft (2000), I. Fjørtoft et al (2009), C. Mnich et al (2019), L. Mygind et al (2019)) because the presence of green structures produces positive effects on children by inviting them to play and improving physical activity, opening up to the practice of knowledge and discovery that for them is real activity and work. Diversity of materials favours sensory development according to one's aptitudes, starting from a healthy play environment. Skills such as climbing, running, jumping and in any case all the basic motor patterns exercised outdoors are also fundamental elements for cognitive maturation.

### **Motor skills and outdoor**

Play on the go, physical exercise are aspects to be privileged for the younger generations increasingly forced into indoor spaces. Causal link between natural environment, health and well-being, the natural bases and biophilia (E. O. Wilson, 1984) that will lead children to grow up as responsible citizens, part of a whole. These issues are dealt with in many countries and there are many initiatives promoted by international organizations to preserve public health and biodiversity. Already J. Piaget (1962) correlates mental development with that of play, arguing that it is the primary tool for the study of the child's cognitive process; the game stimulates. J.L. Frost (1992) supports Piaget's thinking by classifying play activities into three categories: functional activities (running, climbing, sliding, etc.), constructive activities (building huts, shelters and manipulating) and symbolic activities (role-playing, drama and social) that cannot be separated from each other. The natural environment therefore favours more opportunities for children. Irregular surfaces are continuous challenges in movement, as do vegetation and topography, and provide for a diversity of motion and different game ideas (Protocols: I. Fjørtoft (2000), K. Dowdell et al (2011). The transition from the traditional way of life, based on proximity to nature, to industrialization and globalized and high-tech services, reorganizes the perception that people have of themselves, including their perception of nature. For most people, nature,

yesterday an integral part of their subsistence and of the world around them, has become a place of recreation and free time (K. Pedersen, A. Viken, 2003). We have contributed to the ecological devastation, thus losing the relationship of facilitated access to nature. We need to rethink our place in the world, because although man thinks he can dominate the biosphere in reality he degrades it, at the same time degrading his own living conditions; reforming our knowledge and global thinking helps us to take care of the “*umbilical cord*” that unites us to nature (E. Morin, 2001). A natural environment can provide an environmental context for an activity or exercise program, thus promoting increased physical activity (D.E. Bowler, L.M. Buyung-Ali, T.M. Knight, & A.S. Pullin, 2010). Outdoor physical education stimulates a beneficial attitude towards nature and freedom of movement leads to discovering and peering around us to immerse ourselves in space, causing continuous stresses both in movement and in relational dynamics. Playing in natural environments leads to respect for the spaces in which you move. Until a few decades ago, contact with nature was facilitated for children and with it knowledge, exploration and research led to the development of the senses. A sensory education that reduces the distance between the self and the environment. Today's reality offers fewer opportunities for children to discover natural reality; environmental education can then be seen as a set of interventions that lead to create, to train an individual in his entirety, developing his mental, moral and physical faculties (A. Federici, M. Valentini, C. Tonini Cardinali, 2008). The school can then become a place that promotes in the new generations greater awareness and respect for issues related to sustainability, protection of the environment and of those who live there (Miur, 2018) and this leads to a teaching that aims to reunite man with nature through the development of a mentality of respect for the environment (E. Bardulla, M. Valeri, 1975).

## MATERIALS AND METHODS

A systematic search of the scientific literature was conducted following the guidelines for Reporting using the databases: PubMed, Elsevier, APA PsychNET, PubsACS, SpringerLink, MDPI, Cochrane, ResearchGate. The studies examined responded to inclusion criteria: preference of natural environments over indoor or concrete environments, physical (cardiovascular, respiratory, motor skills, etc.) and mental (self-esteem, mood, depression, etc.) benefits deriving from immersion in nature, as well as the positive effects that children have shown in the game thus affecting the socio-behavioural sphere.

Reflections on:

- Motor activity in nature always produces beneficial effects;
- Physical activity in nature offers no greater benefits than indoors;
- Motor activity in nature generates the same results as in the control group;
- Motor activity in nature causes a negative outcome.

### Summary protocols

I. Fjørtoft (2000): Study conducted in two kinder gardens in Telemark, Norway, with children aged 5-7, with an experimental group playing in a natural environment and a control group analysed in a traditional play environment. The first group of 46 children were offered free play and versatile activities in the nearby forest. This group used the forest every day for an hour or two throughout the year. Another 29 children of the same age group, from two kindergartens in the neighbouring district, are the comparison group: they use an outdoor playground for one or two hours a day, natural sites only occasionally. The observation, which lasted 9 months, began with a pre-test and ended at the end of the school year with a post-test. The tests carried out at the beginning and at the end of this experimental study evaluated whether and in which of the groups there were improvements in motor skills. A relationship was found between the presence or absence of natural environments in school courtyards, where students were more active. When provided with a natural

environment in which to play, children show significant growth in movement. The results obtained showed that the natural environment influences physical activity and motor development.

Table 1. Studies analysed in chronological order.

Authors	Participants	Age	Country	Exercise	Duration study	Motor research
Ingunn Fjørtoft, 2000	75: 46 experimental group 29 control group	5-7 years	Telemark, Norway	Free play: Kindergarden close to the forest Kindergarden with traditional playground	9 months	Paper & ResearchGate
Bernie Davis et al, 2006	59	3-5 years	Plymouth, UK	Exercise in the nature	6-10 weeks	Springer Link
	34	8-11 years			1 year	
Ingunn Fjørtoft et al, 2009	70: 42 experimental group 28 control group	6 years	Norway	Free play in a school with some concrete courtyard and in a school close to the forest	4 weeks	Research Gate
Jo Barton, Jules Pretty, 2010	1252 Multistudy (10 study)	All	UK	Walk, gardening		Pubs. ACS
				Green exercise in nature		
Kellie Dowdell et al, 2011	12	2-6 years	Sydney, Australia	School yards	12 weeks	Springer Link
Manuela Valentini et al, 2013	48:	9 years	Urbino, Italy	School yards	6 months	Pubs. Sciepub
	26 experimental group 22 control group					
Colette F Hendry et al, 2018	931:	Primary school	Los Angeles, California	School yards	2 years	Elsevier
	538 experimental group			Pre and post greening		
	393 control group					
Caroline Guardino et al, 2019	37:	5-6 years	Sud-Est USA	Class indoor & Class outdoor	6 weeks	Springer Link
	5 with special needs					
Carina Mnich et al, 2019	Multistudy (14 study)	3-14 years	Researchers from:		Study included between 2000 & 2019	MDPI
			Germany & Denmark			
Lærke Mygind et al, 2019	Multistudy (84 study)	Children & adolescents	Researchers From Denmark		Study included between 2004 & 2017	Elsevier

Source: own elaboration.

B. Davis et al (2006): Study conducted in England in forest schools. The children examined were 59 aged between 3 and 5 years and were led to carry out the educational program outdoors, in particular in a natural area with the presence of forest. The lessons lasted about 2 hours and 30 and the program lasted between 6 and 10 weeks. In the age group ranging from 8 to 11 years, the research was conducted in an education centre, site of a doctoral research project that studies the experiences of immersion in nature, of children who reside there for 5 days, in groups of up to a maximum of 34 children. The qualitative data collected comes from a careful observation of the scholars and from interviews with the teachers and the children themselves. The researchers at the end of this study have shown how schools in the forests improve motivation and lead to a positive attitude in learning, develop interpersonal skills and appreciation and care for the surrounding environment.

I. Fjørtoft et al (2009): Analyse two types of situations: the first in the natural environment represents the creative exploration by children, the other a typologically different environment on a more arid and asphalted surface which is less stimulating. We consider two groups of 6-year-olds attending junior high school in a town hall in southern Norway. One is located in a rural area where there is a concrete play area and a space in the forest. The other is located in the centre of the city, has no green spaces but only a concrete courtyard with equipment dedicated to play (swings, sandpit, slides, etc.) and a football field. It was demonstrated through monitoring systems (GPS, GIS, bpm) and a distinction of the sex of the examined, how the difference in the areas affected the free play of children. From the recording of the data, it was clear that the school in the city invited the participants to run and to play football, especially boys; in the rural area, however, play was more important for girls than for boys. The GPS track highlights the differences of the two areas, courtyard and rural area, from a cardiac point of view. Outdoor activity invites a lot to movement.

J. Barton and J. Pretty (2010): They conducted a multi-study examining 10 studies for a total of 1252 participants of all ages. The intention was to demonstrate how exercise outdoors can benefit mental health, especially in younger people. Practicing the activity for at least 5 minutes improves both self-esteem and mood. Doing activities near bodies of water further enhances the benefits. In fact, blue has the ability to relax bringing balance to the emotional sphere. The study shows how changes in self-esteem and mood are observed as the duration of activity varies. It also indicates that people with mental problems have had a major improvement in self-esteem, so they should be encouraged to undertake exercises in the green.

K. Dowdell et al (2011): The participants of this study are children aged between 2 and 6 years. Two urban schools were selected, in Sydney, Australia, with different play areas. One has an artificial "outdoor" environment (synthetic grass, sand basin, and various kinds of games), while the other school offered an environment that was always adapted by man to suit children, but with natural elements (grass, trees, bushes, rocks...). Scholars have based their research on observation and data collection, paying attention to social interactions and play behaviours, therefore to social, cognitive and motor skills and have also demonstrated the potential offered by outdoor teaching, making a substantial improvement in the child's play and abilities.

M. Valentini et al (2013): The observation develops over 6 months in 2 different school courtyards. Motor activity is shown to influence the increase of self-esteem in 9-year-old children. Two types of tests are used, the first to monitor motor goals and the other relational goals. The total number of participants was 48: 22 children belonging to the control group who participated only in the pre, during and post observation period testing activities. The experimental group made up of 26 children who kept the performance of motor activity constant, introducing lessons that aimed at the development of basic motor patterns, coordination and conditional skills. The results show that physical activity plays an important role in increasing self-esteem and motor skills.

C.F. Hendry et al (2018): The research on the typology of courtyards comes from an observation made in Los Angeles, California. The study intends to demonstrate the influence of physical activity on children following the increase of green spaces in an elementary school. It is a work that lasted approximately 2 years whose data were collected with direct observation and through accelerometers. They were used in the pre, upcoming post and 4 months post greening. The results obtained showed how the frequentation of green areas has increased, becoming more popular compared to cemented areas and to follow how the habits of pupils have changed from pre to post experiment. Children have gone from playing traditional games and sports to more creative games; the number of students initially observed as sedentary decreased by 10%. In terms of game intensity levels, there was an increase from pre to post greening in the majority of participants. To conclude, the data obtained suggest that the addition of green spaces in schoolyards increases the daily amount of motor activity in children, promoting social and individual well-being.

C. Guardino et al (2019): 6-week study in the USA, conducted on 37 children aged 5 and 6, including 5 with special needs (one diagnosed with autism, one with language disorders). We are looking for ways of learning in a traditional indoor classroom as opposed to an outdoor one. Quantitative data were collected through surveys submitted to teachers and through observation of children. Qualitative data, on the other hand, were collected through interviews with children and their observation. The results found were positive both by the teachers interviewed (although in some cases the external environment was a source of greater distractions) and by the children. In general, a greater perception of well-being, pleasure and interest in outdoor lessons was obtained. Important results were found in children with disabilities who showed greater commitment and were less distracted in outdoor classes than in indoor ones.

C. Mnich et al (2019): Multistudio (14 studies) which intends to provide an overview of the psychosocial and physiological effects of motor activity in greenery. The subjects examined have an age ranging from 3 to 14 years. Researchers from Germany and Denmark included studies published between 2000 and 2019. Physical activity in nature has shown greater benefits than indoors, but the researchers recommend further investigation into this issue.

L. Mygind et al (2019): Systematic review conducted by researchers from Denmark, who summarized and evaluated evidence of the benefits of experience in nature on mental, physical and social health in children and adolescents. They performed an electronic search of articles published between 2004 and 2017, selecting 84 that met their inclusion criteria. 60% of studies indicated benefits for mental, physical or social outcomes. Benefits for psychosocial indicators, for example self-esteem and predominant cognitive indicators.

## **DISCUSSION**

Although in the heterogeneity of the experiments, the duration times, the size of the groups and the variations of the assessment tools, all the studies emphasize an improvement in motor skills and the perception of well-being and pleasure from outdoor activities. Also evident is the increase in learning and attention in children with disabilities; motor commitment influences play, behaviour and the improvement of motor potential. Even self-esteem, creative, constructive and psychosocial, physiological and cognitive abilities, experience a marked increase compared to activities carried out indoors or in concrete play areas. The learning process makes use of the mood improvement and the decrease of stress level due to spaces that were tailored to the subject. We now know that motor learning is not simply a repetitive mechanical process but a consequence of exercises and experience, which lead to improvements in mental processing, making movement fast and functional for the purpose (A. Foschi, 2013). The neuronal plasticity, which is mainly expressed during the

first years of the subject's life (G. Sgandurra et al, 2007), makes every adolescent behaviour the node that is generated by connecting the genetic code and external stimuli (M. Duca, 2020). The exploration of space allows the child, time after time, while playing, to test himself and his own potential by measuring himself against the environment; this can also happen in an indoor environment (I. Fjørtoft, 2007) that promotes action and experimentation, as well as in those are-as designed and structured by adults with safe equipment, where the equipment allows repetitive and mechanical gestures that promote development (I. Fjørtoft, 2007). The creative phase of discovery and experimentation is missing, the richness of elements diversity that acts as a stimulus and encourages to test oneself in the face of new difficulties, to overcome known limits (M. Montalti, 2014; A. Lauria, M. Montalti, 2015). All together the studies that were analysed demonstrate the strong and current interest in outdoor physical activity for the younger generations. Further research is needed to allow for a greater comprehension of especially regarding a higher numerical sample and for a longer period of time. The work of the researchers in investigating this target audience, which is not easy to consider as minors (privacy laws, collaboration of parents, of the educational institution) and difficulty in finding a high randomized sample, should be positively emphasized.

## CONCLUSION

In the theory of "*affordance*", nature invites use (J. Gibson, 1979), we find the synthesis that explains what the quid is: exploratory play and awareness of one's knowledge starting from one's own abilities are favoured in natural areas. It is the very structure of the natural areas and the changing of the seasons that create that something more than structured areas; the strength in developing and launching new games in a place where one is part of the whole, at the same time actors and directors of new knowledge, skills, competences. In nature as in man, differences and diversities are valued: added value of a sustainable ecosystem in its entirety. Movement in nature by creating role-playing games, relating to others, with things, with the environment, managing emotions and developing divergent thinking, will contribute in the younger generations to lifelong education and training, to healthy lifestyles. A further step will be to design and create structured play areas, providing a more child-friendly green architecture where these aspects are considered, with the collaboration of different figures: designers, therapists, pedagogists, graduates in Motor Sciences and, inevitable, the directly interested, children for a culture of outdoor movement.

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