

FACTS.

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express



BACKGROUND

Research on physical activity as a learning pathway provided by the child's growth environment has increased considerably in the past few years. For example, leisure-time physical activity and good cardiorespiratory fitness are known to be linked with good academic achievement at school. Physical activity has also been found to strengthen children's cognitive activity, especially their memory and executive functions. It also affects pupils' behaviour in the classroom.

Although there has been a lot of research on the link between leisure-time physical activity and learning, it was not until quite recently that more research has been conducted on the effects of physical activity during the school day. New information has been published especially on the links of physical activity during the school day with academic success and cognitive activity, but also with physical activity and factors that enable learning, such as concentrating on exercises, behaviour and social activities in the school environment.

Partly as a result of an increase in research, the important role of physical activity in supporting learning and activity-based approach to learning processes have been taken into account in the National core curriculum for basic education implemented in 2016. The Finnish Schools on the Move programme, aimed at making school days more active and enjoyable, has for its part increased the amount of physical activity during the school day and increased interest among teaching staff in the links between physical activity and learning.

What, then, have studies revealed about the effect of physical activity during the school day? The Finnish National Agency for Education and the LIKES Research Centre for Physical Activity and Health have published a status review for which information has been collected from studies published in science magazines between 1990 and 2016. Their cooperation partners were the Ministry of Education and Culture, the Finnish Schools on the Move

programme and the Future of Learning, Knowledge and Skills programme of the Academy of Finland. This Facts Express contains a summary of the content of the status review.

To summarise the research results, it can be said that physical activity during the school day contributes to children's learning and learning results in a number of ways. Therefore, researchers recommend that versatile physical activity suitable for the age and level of development of pupils be integrated into the pedagogical solutions used in learning and teaching.

- Koulupäivän aikainen liikunta ja oppiminen. Tilannekatsaus tammikuu 2018. ('Physical activity during the school day and learning. Status review January 2018'). Publications 2017:15. Finnish National Agency for Education. Marko Kantomaa, Heidi Syväoja, Sirpa Sneck, Timo Jaakkola, Kirsi Pyhältö and Tuija Tammelin.



FINNISH NATIONAL
AGENCY FOR EDUCATION



Ministry of
Education
and Culture








PERSPECTIVES TO PHYSICAL ACTIVITY DURING THE SCHOOL DAY

According to studies, children in comprehensive schools do a total of about 20 minutes of moderate-to-vigorous physical activity during the school day. Children get an average of one third (34%) of all their daily moderate-to-vigorous physical activity during the school day. The proportion is even larger (40%) among inactive children. Physical activity during the school day would seem to be particularly important regarding the total activity of inactive children¹.



Schoolchildren do an average of one third of their daily moderate-to-vigorous physical activity during their school day. The proportion is even higher among least active children.

PHYSICAL ACTIVITY DURING THE SCHOOL DAY INCLUDES THE FOLLOWING:

 <p>Physical education lessons</p>	 <p>Break-time</p>	 <p>After-school clubs</p>	 <p>Other structured physical activity</p>	 <p>Breaking sitting during lessons</p>	 <p>Activity integrated into teaching</p>	 <p>Journey to school</p>
<ul style="list-style-type: none"> • Physical education lessons cover the physical education in the curriculum guiding pupils in adopting a physically active lifestyle and educating them through physical activities. Positive experiences associated with physical education lessons and support for a physically active lifestyle are important. In optional physical education lessons, pupils may try out different sports. 	<ul style="list-style-type: none"> • Physical activity during break-times can be increased by taking pupils outdoors, training peer activators or allowing pupils to use the school's indoor facilities and sports equipment freely during break-times. Long activity-based breaks can be created by grouping lessons into suitable periods. 	<ul style="list-style-type: none"> • Active after-school clubs are a part of schools' club activities offering meaningful activities to children and young people after the school day. The aim is to give all pupils a chance to participate in at least one active after-school club. 	<ul style="list-style-type: none"> • Other structured physical activity during the school day means, for example, theme days or projects that include structured physical activity. 	<ul style="list-style-type: none"> • Breaks to continued sitting and physical activities during lessons break up schoolchildren's daily inactivity, of which almost half occurs at school. Sedentary periods can be interrupted by using a computer or tablet while standing. Pupils can also stretch their legs and change the sitting position or do an exercise session together. 	<ul style="list-style-type: none"> • Activity-based methods can be taken advantage of when physical activity is integrated into teaching. They can be used to test homework, inspire interest in a new topic, practise what has been learned and to concretise the topic pupils are studying. The school neighbourhood can also be used to support teaching and to teach lifestyle activity. 	<ul style="list-style-type: none"> • The journey to school also provides an opportunity for regular physical activity. For example, walking or cycling to and from school may account for a significant part of the daily activity of schoolchildren.

¹ Tammelin et al. 2015. School makes you move and sitting still. Finnish Schools on the Move research results 2010–2015, Jyväskylä: LIKES Research Centre

PHYSICAL ACTIVITY DURING THE SCHOOL DAY HAS MANY POSITIVE EFFECTS ON LEARNING

Studies published between 1990 and 2016 show that physical activity during the school day has many favourable effects on children's learning and learning results.

ACTIVE BREAKS, PHYSICAL ACTIVITY INTEGRATED IN TEACHING AND CLUBS ENHANCE ACADEMIC ACHIEVEMENT

A lot of research has been conducted on the importance of physical activity during the school day for academic achievement, and positive links have been found in most studies.

Especially, an active break held during the lesson and physical activity integrated in teaching have had a positive effect on grades and standardised test results.



There would seem to be positive effects particularly in the learning results in mathematics.

Key concepts

Learning is the core process in a person's growth and development. Learning results in changes in behaviour and the knowledge, skills and emotional reactions affecting it. Apart from helping to adapt to changes in the environment, learning also helps the individual to actively influence the environment and his or her own activities in it.

Learning is always an active selection and interpretation process that takes place in a cultural and social environment. A capable learner observes, assesses and regulates his or her thinking, motivation, feelings and behaviour. The experiences gained in the growth environment both create and regulate learning.

Physical activity is an important learning pathway provided by the growth environment. Physical activity is voluntary muscle activity that is controlled by the nervous system and increases the energy consumption of the human body. It is used to accomplish goals that are set in advance, the movements that serve achieving them and to gain experiences based on the activity. Physical activity can be examined from the perspectives of mode, quantity, duration, frequency and intensity.

Cognitive functions are related to receiving, storing, processing and using information. They include attention, observation, memory and thinking.

In psychology, the term **executive function** describes the coordination and control of information processing. Executive function regulates other cognitive functions essential for human activities, such as memory, attention and thinking. Executive function is responsible for the setting of goals, the planning of operating methods and the selection and control of the cognitive functions that are required to reach those goals.

Factors enabling learning mean matters that are important in terms of learning, such as behaviour in the classroom, concentrating on exercises and participating in the lesson. A capable learner is active and proactive and observes, assesses and regulates his or her thinking, motivation, feelings and behaviour. Learning skills can be improved throughout life.

EXAMPLES OF STUDIES USED IN THE SUMMARY

Author Year Country	What was done?	Results
Howie et al. 2015 United States	In the study, lessons of children aged between 9 and 12 were broken up with a a) 5, b) 10 or c) 20 minutes of structured physical activity or d) 10 minutes of sitting.	The pupils that participated in the 10 or 20-minute active breaks did better in the mathematics test than the pupils who participated in sedentary breaks.
Beck et al. 2016 Denmark	In a six-week study, pupils in the trial group were taught mathematics using either a) fine motor skills or b) gross motor skills. The pupils in the control group were taught mathematics as usual.	The pupils who were taught using gross motor skills did better in the mathematics test than the pupils in the group using fine motor skills or the pupils in the control group.
Koutsandreo et al. 2016 Germany	In the study, children aged 9 and 10 participated in afternoon activities on three days per week. The children were divided into three groups: 1) moderately strenuous physical activity, 2) physical activity that challenged motor skills and 3) a control group (help provided with homework).	The children whose groups engaged in physical activity did better in a test measuring working memory than the children in the control group. The test results of the children participating in physical activity that challenged their motor skills improved most.
Janssen et al. 2014 The Netherlands	The study measured the effect of a break on selective attention in four groups: 1) no break, 2) sedentary break, 3) break with moderately strenuous physical activity and 4) break with strenuous physical activity.	The pupils who participated in sedentary breaks and breaks with physical activity did better in an attention test than the pupils who did not have a break. The pupils who participated in moderately strenuous physical activity during the break did best in the test.
Goh et al. 2016 United States	In an eight-week study, 10-minute active breaks were added to the lessons of children aged between 8 and 12 according to the objectives of academic learning.	Student's ability to concentrate in the exercises improved during the study. An average of one 10-minute break was held in teaching during the school day.
Bunketorp Käll et al. 2015 Sweden	In the study, pupils from grades 4–6 in the trial school participated in PE lessons per week. The pupils in control schools had two weekly PE lessons.	The pupils with more PE had fewer behavioural problems than pupils in the control schools.

Active after-school clubs and other structured physical activity during the school day were also found to have a positive link with academic achievement. The positive effects were seen especially in the learning results in mathematics.

As regards physical education lessons, the results were partly inconsistent as a significant number of studies did not see a clear link between the number of physical education lessons and

academic achievement. However, even a considerable increase in the number of physical education lessons to the school day did not weaken achievement in other school subjects.

More research is needed on the effects of break-times and the effects of physical activity on the way to and from school.

PHYSICAL ACTIVITY DURING THE SCHOOL DAY MAY HAVE A FAVOURABLE EFFECT ON CHILDREN'S COGNITIVE ACTIVITY

The effects that physical education, active after-school clubs and other structured physical activity during the school day have on executive function account for the largest proportion of research results in the field of cognitive activity.

The effects on children’s cognitive activity are positive. This can be seen particularly in executive functions, for example, in inhibition, which means regulation of behaviour and reactions, in working memory and in cognitive flexibility, which includes the ability to adapt one’s thinking, to switch between concepts and models of thinking and to think about several things simultaneously. Physical activity would also seem to have a positive effect on attention.

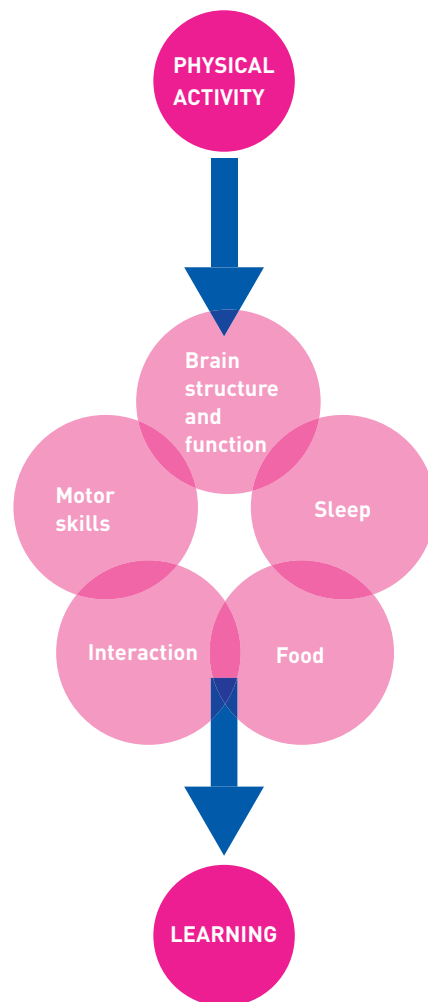
The link between physical activity during the school day and cognitive activity may also partly explain improvement in academic achievement.

Active breaks and physical activity that has been integrated into teaching are particularly useful.

PHYSICAL ACTIVITY DURING THE SCHOOL DAY BENEFITS ALSO MANY FACTORS ENABLING LEARNING

Most studies focusing on the link between physical activity during the school day and factors enabling learning have been carried out quite recently. Although the research area is young, the evidence provided by research is relatively unambiguous and consistent.

THE EFFECT OF PHYSICAL ACTIVITY ON LEARNING IS MEDIATED THROUGH MANY FACTORS



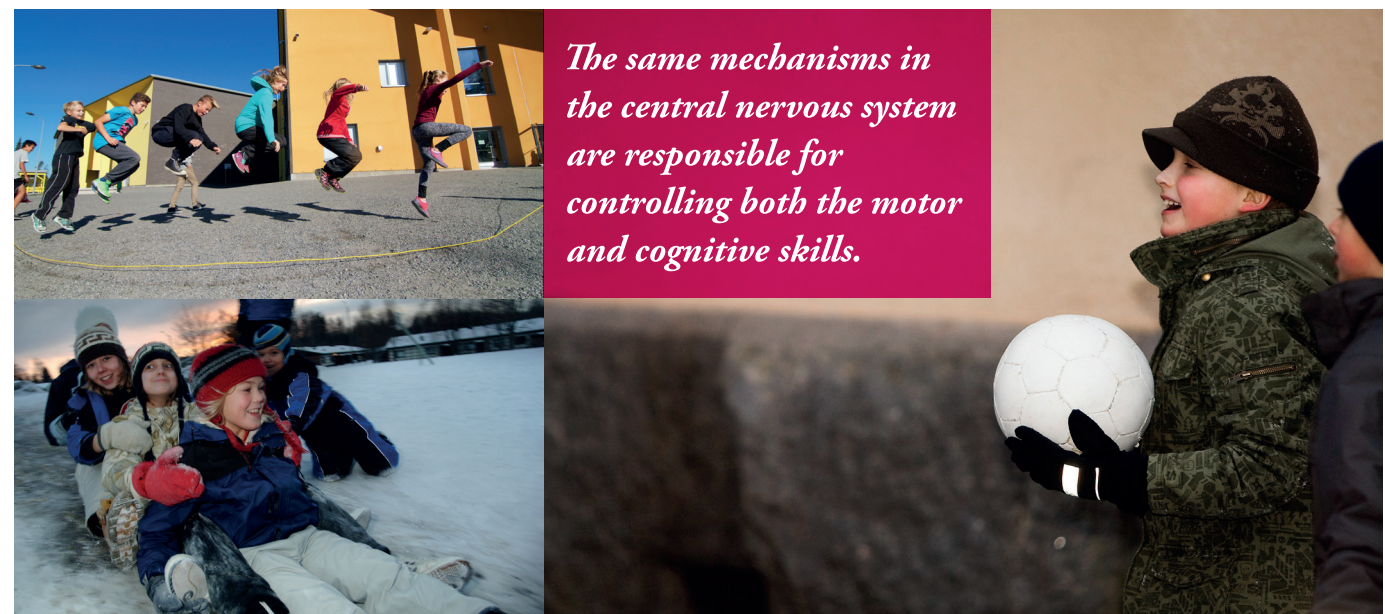
Physical activity during the school day would seem to improve, for example, classroom behaviour, concentration on exercises and participation in class – and thus learning itself. Active breaks during lessons and physical activity that has been integrated into teaching are particularly useful.

There has been very little research on the effect of break-times. Most studies have examined the effects of physical activity during the school day on behaviour, but more information is needed, for example, on its contribution to how children enjoy school.

PHYSICAL ACTIVITY DURING THE SCHOOL DAY ALSO INDIRECTLY CONTRIBUTES TO LEARNING RESULTS

Based on research results, physical activity does not necessarily contribute to learning results directly, but the effects are mediated through several other factors. This is true also for physical activity during the school day.

In addition to the entire body, the anatomical and physiological effects of physical activity also extend to the brain. Physical activity increases the volume and activity of the brain especially in



The same mechanisms in the central nervous system are responsible for controlling both the motor and cognitive skills.



the areas associated with memory and executive function. The changes caused by physical activity in the structures and activities of the brain create more opportunities for learning.

In addition, as the same mechanisms in the central nervous system are in charge of controlling both motor and cognitive skills, controlling motor skills contributes to the development of the brain. Versatile physical activity supports this system by enhancing neuromotor development and learning of motor skills.

Engaging in physical activity provides opportunities for social interaction and learning of social skills. It improves team work skills, self-regulation and the ability to work with different kinds of people. Physical activity also provides opportunities for releasing and processing emotions. These factors may partly explain the good learning results of physically active children.

In addition, physical activity during the school day may support the implementation of the recommendations for school meals and lengthen night-time sleep, improve its quality, and thus enhance learning and academic achievement.

THE SCHOOL DAY IN FINLAND IS SHORT FROM AN INTERNATIONAL PERSPECTIVE

Most of the studies on links between physical activity during the school day and learning are international. In many countries, the working methods and the school culture differ greatly from Finnish schools. For example, the Finnish school day is short by international standards and a small amount of time is used for teaching. There are a lot of breaks between lessons and they are relatively long. Almost all primary school children spend break-times outdoors and most do at least light physical activity during them.

The short Finnish school day is compensated by schools' club activities aimed at offering voluntary, versatile free-time activities to support children's and young people's growth. The aim is to give all pupils a chance to participate in at least one active after-school club. Club activities in secondary schools are aimed at supporting young people's interest in physical activity and support the forming of social relationships.

From an international point of view, the free school meals for all are exceptional, as is walking or cycling to and from school. Physical activity on the way to school may account for a significant part of schoolchildren's daily physical activity. If the journey to school is under 5 kilometres, about 80 per cent of Finnish children go to school on foot or by bike.

By international standards, Finnish schoolchildren aged under 15 use little time to do homework. People in Finland are confident that children can learn independently in everyday environments by helping each other.

The exercise Finnish school children get on their way to and from school is an important part of their physical activity.

The Finnish National Agency for Education is an agency operating in the administrative branch of the Ministry of Education and Culture. It is responsible for the development of education, early childhood education and care, and lifelong learning as well as for the promotion of internationalisation.

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