



# The importance of physical activity for learning and wellbeing

School resources

There is an extensive body of research demonstrating that physical activity improves physical and mental health. Being active reduces the risk of obesity, diabetes, smoking later in life, and depression<sup>1</sup>. Physical activity may also lead to better social outcomes, such as happiness and trusting others<sup>2</sup>. Research also demonstrates that physical activity supports executive function and metacognition<sup>3</sup>, and it is associated with improved academic achievement<sup>4</sup>. To improve life trajectories, the [WHO guidelines](#) on physical activity have been incorporated in government guidelines in countries such as [the UK](#), [Australia](#), [Canada](#), and [New Zealand](#).

In recent years, some countries have reduced the time spent on physical activity and education in schools, redirecting more time to academic subjects with the aim that it will lead to improved academic performance and, ultimately, later life outcomes. However, this is not necessarily the case, and indeed, reducing the time spent on physical activity and movement may lead to poorer academic outcomes. What is more, the digital revolution has drastically reduced the time that children and adolescents spend being active, and sedentary screen time has been linked to poorer mental and physical health<sup>5</sup>.

## How physical activity supports learning

Neuroscientific research focused on improving both executive function and metacognition has identified physical activity interventions that may improve aspects of executive function such as [working memory](#), and the ability to reason quickly and think abstractly to solve problems. [Executive function](#) allows us to flexibly adapt our behaviour in the pursuit of a goal by coordinating our thoughts and actions and includes skills such as inhibiting our reaction to the external environment or regulating our emotions or behaviour to complete a task. Strong executive function skills are linked to positive behaviour, healthy choices<sup>6</sup>, and greater success at school and in the labour market<sup>7</sup>. Metacognition allows us to reason quickly to solve a problem or be creative and has been linked with being an effective learner.

## Using physical activity to promote learning

There are a number of ways that teachers can use movement and physical activity in targeted ways to promote positive behaviour and learning in the classroom. Firstly, teachers can focus on the amount of time spent on and the intensity of physical activity: for example, a one-off aerobic activity session can be used to increase adrenalin and dopamine levels in the body, which immediately improves attention. Practising aerobic activity over several weeks increases the formation of new blood vessels and neurons in the brain, and these sustained changes in the brain structure lead to improved memory and learning<sup>8</sup>.

Teachers can also apply different types of physical activities at different stages of children's development. There are certain types of physical activity that help to promote executive function and self-regulation skills in younger students<sup>9</sup>: [games](#) that require behavioural and emotional regulation are particularly beneficial. Good options include musical chairs and musical statues, in which children move about as music is playing, then scramble to sit down on a chair or freeze when it stops. In these games, children have to control their movements when the music stops and control their emotions when they are excluded. Games that involve co-operation are helpful as well. In one such game, a child covers their

eyes and is led on a walk by a peer. The two children must work together towards a common goal and control their emotions when the task becomes challenging. This kind of exercise helps children improve their emotional regulation skills so they may be less influenced by their emotions in the classroom and better able to focus on the task at hand. When children reach adolescence, schools and parents might encourage them to play organised sports that require behavioural control. Holistic movement practices such as yoga have also been shown to boost self-regulation in adolescence<sup>10</sup>.

It is also possible to incorporate types of physical activity that have targeted academic or learning benefits alongside academic instruction in the classroom. For example, in one activity ('Find your pair'), students move around the classroom in a movement pattern assigned by the teacher or a student (for example, skipping), collect a card scattered on the floor which includes either a maths problem or the answer to a problem, find the classmate with the matching card (answer or problem, respectively), and continue moving in place as a pair until the teacher checks all paired cards. Older students could complete a multiplication relay race with teams fetching numbers to be sorted on an answer sheet. Studies have shown that physically active academic lessons improve academic performance more so than academic instruction alone, as it supports students staying on-task<sup>11</sup>.

A broader approach to types of physical activity is applying **cognitively enriched movement-based physical activities**. A cognitively enriched activity is one that requires complex patterns in a varying environment. Animal studies have shown that complex movements rather than simple and repetitive movement patterns lead to growth in the areas of the brain related to cognition. Creating an engaging environment by using props has also improved learning areas of the brain in animals<sup>12</sup>. To this end, researchers have started to look at the benefits of how physical activity is taught, investigating the content of the learning, the environment, and children's enjoyment of the activity.

Physical activity can be incorporated into a student's day through classroom routines. This may include activities like physically active breaks which can be five to ten minutes long and include fitness, aerobic exercises such as running or star jumps, or some of the activities and games mentioned above. However, the main way that students can experience being physically active is through the P.E. curriculum. Examples of these types of activities include dance and individual and team ball sports.

## Linear and non-linear pedagogy

Two different types of pedagogy can be used in physically active lessons, and both play an important role at different stages of motor skill learning. **Linear pedagogy** involves the acquisition of technical skills, which is achieved through constant or block training using drills or fixed choreography which are reproduced until the motor skill mastered. It is used in situations when a child is new to a physical activity or in early primary school. Once the child has gained the necessary motor skills and confidence related to the movement or activity, teachers can use **non-linear pedagogy**. This type of pedagogy involves adjusting the task, the environment, or both to engage the participant.

**Task adjustment** may be done by varying the task itself, or by adjusting the environment in which the task is performed. The task may be varied by changing the rules of a game or altering the number of participants in the task. Instructions can also be used to adjust the task by using open-ended problem-solving instructions, such as 'Show me any kind of...', 'Show me any other way to...', or 'How would you do that differently?'. The **environment can be adjusted** by changing the size of the space or changing the equipment. For example, you could move from an outdoor space such as a school field to an indoor space with boundaries, or introduce different props, such as different music in dance or a range of different balls in sports. Modifying the task and/or environment supports the development of executive functions through inhibiting routine movement patterns (inhibitory control) or flexibly switching between

variable tasks (cognitive flexibility). It may also be motivating for the student by allowing an element of choice and freedom to experiment.

The following vignette provides an example of how dance can use linear or non-linear pedagogy in the P.E. curriculum, with a particular focus on improvised dance which creates an inclusive environment for all movement capabilities. Choreographic dance can improve working memory as students have to practise a set sequence of moves<sup>13</sup>, and improvised dance can help with creativity<sup>14</sup>.

There are many dance genres that are taught in schools including barn, folk, and ballroom, as well as culturally specific dances such as the haka from Aotearoa New Zealand, sirtaki from Greece, or salsa from Cuba. These types of dances have a set choreography and are best taught by using demonstration, with learners copying the steps with limited variation in the task and environment (linear pedagogy). Modern dance can also be taught using choreography, such as copying a sequence of movements to express a theme or message. This maybe a starting point to master different motor skills and learn about physical boundaries.

Another way modern dance can be taught is by using improvisation that may or may not have a theme or message. Teaching improvisation to children involves limited demonstration so that the children come up with their own moves instead of copying someone else. Improvisation also uses pair or group work to generate movements (such as meeting and parting), uses different types of music which tends to be focussed on the drum, uses the entire space instead of practicing on the spot, and, most importantly, applies open-ended problem-solving instructions (non-linear pedagogy).

Below is an extract of what this would look like for a primary school P.E. dance class:

'Can you move around the room in general space moving the whole body? Can you change direction moving backwards and sideward? Can you change levels – high, middle, low? Freeze. Show me just the head moving now, from straight side to side and then round and round in a curvy motion. How many ways can you bend your neck to move your head? Turn it? Roll it? Twist it? Can you shake it slowly? Fast? How big a movement can you do with your head? How small? When I play the drumbeat, move the whole body around the space again GO – can you move at different speeds fast or slow, in a straight path, curved path? Freeze – in a shape. Show me just your shoulders moving now. Can you lift them one at a time? Roll them? Push them back? Push them down? What else can you do with your shoulders? How fast can they move? How slow? When I play the drumbeat move around the room once more. Freeze - in a low shape. Show me just the back moving now. Can you move the back side to side then like a wave in curvy way? How many other ways can you move your spine? When I play the drumbeat move the whole body again. Can you move backwards or sideward? Freeze'.

## Endnotes

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