



# Acute Physical Activity for Motor and Academic Learning in Education-based Settings

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## Exercise is good for learning, is it not?

Have you ever heard about exercise and its benefits? Of course you have, all the time. As a society, we have long been aware of the importance of exercise for our health. Not just physical health, but also mental and social health. In fact, physical activity brings people together and gives us a superior emotional well-being. In recent years, exercise has also been shown to be an important factor in improving cognition. In other words, the mental processes that result from brain activity and enable us to organise and carry out certain behaviours. Pretty important, isn't it?

You may not be impressed by what we have said so far. But let us ask you a question: If you had a way of learning better and remembering what you learn in class, would you use it to get better academic grades? Naturally, we all would. In fact, this is one of the conclusions of several studies<sup>1-3</sup>).

Based on previous research, movement-based strategies have been developed to improve children's learning and academic performance. Some examples are active breaks or PAL<sup>4</sup>. Active breaks are short periods of physical activity between lessons, or even in the middle of a lesson, to improve pupils' attention and readiness to learn<sup>5</sup>. PAL consists of sessions designed to learn academic content through physical activity<sup>6</sup>. An example might be the use of geometric shapes to solve a motor game. (Figura 1)

## What about an exercise bout?

However, it is sometimes difficult for schools to integrate physical activity systematically because it requires changes to the timetable or even the organisational structure of the school. That is why we want to talk about specific physical activity. Did you know that when we exercise, we generate a number of resources that the brain uses for long-term learning and consolidation processes? We produce neurochemicals and changes in the excitability of brain regions that facilitate the

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### Conflict of interest

The authors declare no conflicts of interest.

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**Figure 1.** PAL lesson example where mathematics content is integrated into a motor game. Extracted from Díaz (2023) (7).

molecular and systemic processes involved in encoding and maintaining learning in the long term.

We would therefore like to emphasise the opportunities offered by Advanced Physical Activity (APA) in an academic setting. For example, before learning a list of new words, perform 15 minutes of intense exercise. Such a simple strategy could make it easier to remember and recall new words the next day. In fact, this was the conclusion of a recent study that compared the effects of intense exercise or rest on the retrieval performance of a list of learned words<sup>8</sup>. In particular, they found that the exercisers recalled significantly more new words one day later. Although the effectiveness of APA in improving the acquisition and consolidation of academic learning needs to be further investigated, its potential for application appears to be high.

### APA for motor learning

There is a question. When we discussed the potential of APA to improve academic learning, were you thinking about PE-related learning? Well, that is what we are

focusing on. APA can be used to support academic motor learning. A recent study showed that APA improved performance on a volleyball serve the next day compared to people who rested<sup>9</sup>. The benefits are not only seen a day later, but also beyond. Many studies have shown that a single session of exercise can improve motor performance for up to a week after initial learning<sup>10,11</sup>. Such improvements occur without subsequent practice, known as offline gains. It has also been shown that different types of exercise can be effective<sup>12</sup>, as can doing the exercise both before and immediately after learning<sup>13</sup>.

These findings are potentially relevant to schools. Physical education can take place either immediately before or after an intense exercise session. Or even within the physical education sessions themselves. Suppose we are learning a new motor skill. One strategy could be to do physical education immediately before or after to improve the consolidation of this motor skill. Both schools and PE teachers themselves can use APA to improve motor learning processes.

Some caution must be applied to the above. The field of APA for motor learning is new and more research is needed to validate the above conclusions. This includes studies conducted directly in school settings. However, we are faced with a strategy that can be efficient, economical and simple to improve academic learning, both declarative and motor. Should we use it?

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