Does video gaming promote physical activity and enhance cognition?

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In today’s world we attach great importance to physical activity, since we know that it has a profound effect on health and cognitive performance. An innovative method of promoting physical activity is called “exergaming” – a neologism formed by combining the words “exercise” and “gaming.”

The term refers to a play-based approach to exercise, usually involving active video games. Rather than engaging in physical activity outdoors or at a gym or sports club, people can exercise at home, using a game console. There are those who celebrate exergaming as “the future of fitness,” while others regard it as a destructive product of our increasingly virtual, digital and technologized society.

Physical activity is beneficial for executive function

An active lifestyle is widely recognized to have a positive effect on health. Active people are less likely to get sick, they live longer, and they enjoy better quality of life. Accordingly, it is recommended that children and adolescents take part in some kind of athletic activity for at least 60 minutes each day. Fewer and fewer children are meeting this standard.

A lack of exercise is not only problematic for physical health; it also affects the brain. Several studies have demonstrated that an active lifestyle can have a positive effect on both mental health and cognitive performance – with notable benefits for executive function.

The umbrella term executive function refers to a certain kind of higher-level cognition that is required for concentration and enables people to understand ideas and think before acting. Executive function is especially important for children and adolescents; indeed, it can be a better predictor of school performance than IQ. Given its importance, researchers are searching for ways to promote executive function.

Studies have shown that physical activity can produce both short- and long-term improvements in executive function. Even participating in a single physical activity has been found to yield short-term improvements. This is particularly relevant for the school context, where cognitive performance is required. Students are expected to concentrate for long periods of time and pay close attention, with only a few short breaks.

Studies have also shown that participation in physical activity spread out over a period of time leads to a long-term improvement in executive function. This means that regular physical activity (for example over a period of eight weeks) may improve the executive function of children and adolescents – which is especially relevant to efforts to provide optimal development opportunities for young children.

It has long been known that having students go over the subject matter again and again is not enough; optimal support needs to be both stimulating and varied. Being physically active can affect executive function and promote well-being and overall health.
Better equipped to handle real life

Exergaming is a relatively new and innovative way of increasing physical activity. Initial studies with children and adolescents have shown promising results, suggesting that exergaming can serve as an alternative or complement to traditional sports activities. It may also have direct benefits for executive function.

Many educational researchers, however, oppose the increasing digitization of our society. They worry about rising media consumption, which can lead to a decline in exercise with far-reaching negative consequences. To counter these arguments we need to answer these questions: What can exergaming actually accomplish? When should it be used? And what are its limits?

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It’s beyond debate that there is nothing better than spending time participating in some kind of outdoor physical activity. Yet the child-appropriate use of virtual media can open up a number of new possibilities. With exergaming, for example, more media consumption doesn’t have to mean less physical activity. The goal is to make screen time active rather than sedentary.

Exergaming also makes it possible to reach specific target groups that find it difficult or impossible to engage in traditional sports. It can also encourage children – many of whom are not included in traditional sports programs – to become more active. Exergaming programs can be customized to meet the needs of certain groups, such as children and adolescents who suffer from motor weakness. The virtual world can never take the place of reality. Instead, new media should help make people better able to handle real life.

Using exergaming to improve cognitive performance

We, several researchers from the Institute of Sport Science of the University of Bern, demonstrated in a first study that physically and cognitively demanding exergaming can have a positive effect on executive function. In that study, we focused particularly on games that are cognitively demanding. We found that to produce an immediate improvement in executive function, an exergame has to be both physically and cognitively demanding (the control group played an exergame that is physically, but not cognitively demanding).

We are currently conducting a long-term intervention using exergaming in two additional studies (children and adolescents play a specific exergame three times a week). Here, too, the focus is on cognitive performance. We are including children with ADHD, mindful of the fact that they are often excluded from traditional sports activities and frequently show a deficit in executive function. We also want to offer targeted training for children who have survived cancer, a relatively small group that is widely dispersed and often suffers from cognitive and physical issues.

We have reached the following conclusions:

1. Exergaming is not a substitute for traditional sports activities. Traditional sports offer numerous advantages that exergaming cannot.
2. Exergaming must be used in a child-appropriate way (for example, setting regular times for playing the games).
3. Exergaming opens up a number of possibilities that can be used in a positive way. Certain groups are particularly likely to benefit from targeted training.
4. Exergaming can have a positive effect on both cognitive and physical performance.
5. To make the best use of exergaming, games should be customized to meet the needs of specific groups.

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