Exergames: good for play time, but should not replace physical education

September 22 2017, by Vaughan Cruickshank, Dean Cooley And Scott Pedersen

Credit: AI-generated image (disclaimer)

More and more young Australians are playing video games during their leisure time. Fortunately, video game manufacturers have introduced "exergames" in an effort to make this typically sedentary activity more physically engaging. These "active" video game consoles, like the

Nintendo Wii, offer gamers sporting experiences that mimic the real game or sport.

Health and physical education (HPE) teachers have embraced this technology in their classes to motivate children who show a lack of interest in traditional physical education activities. However, these exergames don't provide the same skill development as traditional physical education.

Research shows benefits are not the same for Exergames

At the University of Tasmania, researchers in the Active Work Laboratory are investigating exergames and their contribution to skill development in children. More specifically, they have looked at how children develop the ability to process or prepare for complex movements that involve crossing the midline of the body.

The ability to cross the midline is important because it helps the right and left sides of our brains communicate. This link allows both sides of the body to move together more efficiently to perform a wide variety of everyday tasks such as reading, writing, crawling or riding a bike. These types of skills are often utilised in high-level sports like tennis, and should be taught during physical education.

In our previous research, we showed that teaching children deliberate ball-bouncing strategies can improve how quickly they are able to process complex movements. To see if exergames could produce similar results, we randomly assigned boys and girls between the ages of seven and 12 to one of three groups:

- A Nintendo Wii tennis group that required children to perform

midline-crossing movements across the body.
- A Nintendo Wii bowling group that did not require midline crossing movements.
- A control group of seated children who only played a hand-held video game requiring no arm or leg movements.

Children's ability to process movements was measured before and after they participated in their training groups. Our results showed exergame training was not sufficient to produce the same improvements children gained from the ball-bouncing games. We concluded that teachers should be wary of replacing traditional physical education instruction with the use of exergames.

There are several possible reasons for these results.

Exergames have a greater margin of error

Previous research has found games involving actual movements require more focus and brain activity than the movements necessary for success during video gameplay. Exergames allow for a greater margin of error to be successful. This greater range might allow for a player to have slower processing speed and still win the game, but in a real ball- bouncing game, the same slower processing speeds would result in a failed catch. These real games require the player to organise several muscles to produce both gross and fine motor movements with precision to catch a ball.

Real gameplay, then, might "train" the brain to physically perform the movements better than virtual gameplay.

Variability in feedback

Feedback a player receives during gameplay, both virtual and real, has the potential to promote skill development. Exergames are designed to make this virtual feedback seem as real as possible through visual graphics, auditory prompts, and haptic feedback (such as vibrations made by handheld game controllers).

However, moving the exergame controller through space does not accurately replicate moving an actual object such as a tennis racket or bowling ball, because of differences like weight, grip and aerodynamics. Performing movements with actual sporting equipment also allows for greater variability in feedback. For example, the "feeling" of hitting a well-timed tennis shot versus a poorly-timed one. The decreased authentic feedback available during exergame play might contribute to less improvement in movement processing speeds.

Exergames are "one-size-fits-all"

Another important factor in skill development is the ability to tailor activities during training to the needs of the learner. Traditional physical education allows for increases in task difficulty as soon as a student is competent.

In contrast, exergame training requires repetitive movement skills and only allows for advancement once the present stage is completed. This code is hard-wired, and the time for each stage cannot be changed by teachers or students. This difference prevents the physical educator from providing training experiences tailored to each child's skills or level.

The exergame environment is still a "one-size-fits-all" experience that lacks the individualisation abilities of traditional physical education.

Exergames are better than nothing, but not better

than real exercise

While parents should encourage their children to play exergames instead of sedentary video games during leisure time, we do not recommend HPE teachers replace traditional physical education with exergames when motor skill improvement is the primary goal of the lessons.

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