Are active video games useful to combat obesity?1–3

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There has been a lot of interest in active video games (AVGs),4 sometimes called exergames, as a source of physical activity (PA). AVGs were originally designed and sold as an entertainment medium with the objective of making a profit. Members of the public health and kinesiology communities saw the potential to increase PA by using AVGs. A key issue is whether AVGs, which generally (but not always) promote indoor/in-home PA, would be useful in combating the obesity epidemic. In-home activity has generally been ignored by obesity prevention interventions, thereby perhaps providing a unique niche for AVGs, especially for children who live in unsafe neighborhoods and are not allowed outside to play.

Some of the recent reviews of PA from AVGs have held out hope of positive outcomes (1), and some have been less than enthusiastic (2). A substantial number of articles documented that most AVGs can result in a player’s engaging in moderate to vigorous PA in the laboratory, but concern has been expressed about whether AVGs resulted in PA under more natural circumstances (3). One study showed that simply providing 2 AVGs to children resulted in no documented increase in PA (4), whereas at least 2 others showed that the use of AVGs contributed to a reduction in BMI (5, 6). Within this maelstrom of apparently conflicting findings, substantial energy intakes were documented during AVG play (7, 8), suggesting that AVGs might contribute to obesity, not prevent it. Furthermore, a theory (9) and evidence (10) were presented that PA (of any kind) performed earlier in a day is compensated with less PA later in the day or the next day.

In this context, Gribbon et al. (11) conducted an important study, the first to clearly place AVG play within an energy balance framework, addressing both the energy intake and energy expenditure (EE) sides of balance. They hypothesized that the increased EE from AVG play would be compensated by energy intake and by ensuing reductions in PA (EE).

The authors recruited 13- to 17-y-old male adolescents but used a substantial number of exclusionary criteria, which limits generalizability. The sample was relatively small (n = 36), which limits the authors’ ability to make statements about lack of differences across conditions. A crossover design was used. Although the time between conditions (1–4 wk) would be long enough to attain washout in a pharmaceutical trial, one wonders what effects on behavior in later conditions might have occurred from memory of earlier conditions. However, random sequencing should minimize these possible effects. Participants were assigned to 1 of 3 exposures (1 h rest, 1 h entertainment game play, 1 h AVG play) on alternating days separated by 1–4 wk. EE was measured during the three 1-h experimental exposures by using a metabolic analyzer. PA was measured on the day of each exposure and for the 3 ensuing days by using accelerometers from which EE was estimated; diet was also measured.

Consistent with many other studies, the authors reported substantially increased PA EE during AVGs but not for the 24 h of the experiment, nor for the 3 ensuing days. There were no between-group differences in dietary intake during the experimental period, the 24 h, or the ensuing 3 days. In most considerations, the substantial increase in PA EE during AVG play would be considered supportive of using AVGs for promoting PA. The lack of increased caloric intake during AVG play, in combination with the increased PA, would ordinarily suggest that AVGs could be useful in addressing obesity. The authors, however, concluded the reverse. Their argument hinged on the lack of statistically significant between-group differences in EE during the 24 h including the experiment as evidence for compensation, thereby limiting the value of AVGs. At this point, the authors appear to have forgotten their own citations of the literature that compensation occurs for all PA; should we not encourage any activity because compensation occurs? Furthermore, the measurement of

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4 Abbreviations used: AVG, active video game; EE, energy expenditure; PA, physical activity.

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EE during the experiment, when differences were detected, was made directly with a Cosmed K4b2 metabolic analyzer (a precise measure of EE), whereas the measurement of PA with ensuing EE estimation during the 24-h period was made with an Actical accelerometer (Philips Respironics), which is not a precise measure of EE. The significant between-group difference in EE during the hour of AVG versus non-AVG play appears to have been ~700 kJ (from looking at their Figure 3). The statistically non-significant between-group difference (AVG play group higher) during the 24 h appears to have been ~500 kJ (from looking at their Figure 4). The small sample size and lower-quality estimated EE measure for the 24-h period put limits on when authors can claim lack of differences.

At this time, it appears likely that opposing scientists will continue to believe what they want, in turn determining how they interpret the Gribbon et al. results. It is hoped that this study will be replicated by other groups, with larger samples, between-group designs, and perhaps more consistent measures (e.g., all accelerometry). It would also be valuable to test the compensation ideas under more naturalistic circumstances.

Research has identified a variety of enhancements that could be incorporated that would likely increase PA from AVGs (12, 13). Recent innovations in games in general and in AVGs in particular have been astounding. New technology (e.g., sensors) may come bundled with AVGs that further enhance their PA potential, when we learn how best to use them. For example, the AVG that used the Kinect sensor (Microsoft) in the Gribbon et al. study appears to have resulted a substantially higher increase in PA than with earlier AVGs that used game controllers (3). It has been difficult for researchers to stay ahead of the possible contributions of the many innovations that are occurring with AVGs. Some of us believe that the future of AVGs to enhance PA is bright, but the research needs to clarify the extent of, and limits on, their contribution. We can’t assume “If they build it, kids will be active.”

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REFERENCES