

Kids with cerebral palsy may benefit from video game play

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Like their healthy peers, children with disabilities may spend too much time in front of a video screen. For children with cerebral palsy (CP), this leads to an even greater risk of being overweight or developing health issues such as diabetes or musculoskeletal disorders. A group of scientists has found that video games such as Nintendo's Wii offer an enjoyable opportunity to promote light to moderate physical activity in children with CP, and may have a role to play in rehabilitation therapy. Their research is published online today in the *Archives of Physical Medicine and Rehabilitation*.

"Active video games (AVG) provide a low-cost, commercially available system that can be strategically selected to address specific therapeutic goals," says lead investigator Elaine Biddiss, PhD, of Toronto's Bloorview Research Institute at Holland Bloorview Kids Rehabilitation Hospital, and the University of Toronto, Canada. "While our results did not show that AVG game play can be regarded as a replacement for more [vigorous physical activity](#) or muscle strengthening, we found that some games may provide targeted therapy focused on specific joints or movements."

Seventeen [children](#) with CP were studied while playing four AVGs: [Wii Bowling](#), [Tennis](#), [Boxing](#), and [Dance Dance Revolution \(DDR\)](#). Energy, motion, and [muscle activity](#) data were captured, and the children completed a survey to indicate their level of enjoyment playing the games. The researchers evaluated the intensity of the physical activity, the therapeutic potential of AVG play, and the practical considerations

surrounding the use of AVGs for physical activity promotion.

They found that children with mild CP can attain moderate levels of [physical activity](#) during AVG play with games that require full body movements, such as Wii Boxing and DDR, but the activity is not vigorous enough to build endurance or strength. However, they did find that AVG play encourages repetitive movement and provides feedback to the user through on-screen avatars and game scores, which could promote neuroplastic change. The children reported high levels of enjoyment, which also enhances neuroplasticity.

Researchers found that certain games, such as Wii boxing, may be a good choice for encouraging and training faster wrist movements. This is important for children with CP as they commonly experience difficulty in extending their wrists. Children with hemiplegia, a form of CP that affects the limbs on one side of the body, frequently underutilize their affected limb regardless of their functional abilities. In the study, children engaged both upper limbs when playing Wii Boxing or DDR. "Wii boxing, or similar games, may be an effective motivational environment for encouraging increased movement speed of the hemiplegic limb, in addition to the bilateral use of the limbs, because in-game success is strongly linked to these two metrics," notes Dr. Biddiss.

The range of motion of the dominant limb was well within the typical norms associated with upper limb movements in able-bodied individuals. While further safety studies are needed, this suggests that AVG should be a relatively low impact activity for children with CP. The researchers noted considerable variability in the participant's strategies to succeed in the game. Participants may adapt a movement that minimizes physical effort to maximize in-game rewards. In a therapeutic setting, it may be necessary to train and provide rewards for appropriate movement styles.

"While not a replacement for structured exercise and physical therapy,

AVGs may encourage children with CP to be physically active and to practice complex motor activities. There are many opportunities for further research. Future development and optimization of AVG technologies may usher in a new age in physical rehabilitation where virtual environments provide an arena for neuroplastic change in the comfort of one's home," concludes Dr. Biddiss.

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