

Video Games in Assessing and Treating ADHD

THIS RESEARCH UPDATE focuses on one overarching question: what is the role of video games in assessments and interventions for ADHD?

The first study described is a systematic review of video games for evaluating and treating ADHD, and the second study discussed is a study of a particular computer game to improve impulsivity for ADHD.

Are serious video games useful?

This review begins by describing challenges to assessment and treatment of ADHD. The authors describe the category of “serious games,” which are games that do not have a primary purpose of fun, entertainment, or enjoyment. There are existing reviews of games for different child health difficulties, such as neuromotor dysfunctions, reducing anxiety symptoms, and improving obesity. The authors searched for original studies in peer-reviewed journals that had results specific to individuals under 18 years of age, and that either examined the use-

fulness of video game-based tools to assess ADHD and related challenges, or tested the effectiveness of video game-based treatments for child ADHD.

Eleven studies were reviewed that evaluated ADHD. They used gamified tasks to measure executive functioning, which were video game versions based on the Conners Continuous Performance Test. The CPT involves responding based on whether an “X” is on the screen (for example, pressing a spacebar quickly when a letter that is not “X” is on the screen and not pressing the spacebar when “X” is on the screen). The gamified tools that drew from CPT principles were found to be generally useful in distinguishing ADHD from non-ADHD.

For the eleven reviewed studies of gamified treatments to ADHD, most involved video game-delivered cognitive training (for example, tasks that included solving puzzles or memory exercises). These studies found that cognitive training was associated with improved cognitive function. Only one of these studies of gamified cognitive training



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alone showed improvement in reduced ADHD symptoms, and another of these studies showed improved life skills (for example, time management). The rate of engagement with these games was generally high, with mixed findings for satisfaction with the games. The sample was composed of a majority of preadolescent males, which was consistent with the more simplified video game content.

Compared to traditional treatment, serious games may be engaging and less burdensome. More research is needed regarding long-term engagement levels. Results from this study must also be qualified by the low number of studies reviewed (22 studies in total). Based on this review, there appears to be support for the role of video games in ADHD assessment and treatment. However, continued research beyond the studies reviewed would contribute to more definitive results.

PeñuelasCalvo I, JiangLin LK, GirelaSerrano B, DelgadoGomez D, Navarro-Jimenez R, Baca-Garcia E, & Porrás-Segovia A. (2020). Video games for the assessment and treatment of attentiondeficit/hyperactivity disorder: A systematic review. *European Child & Adolescent Psychiatry*, epub ahead of print.

Is the Antonyms game effective?

This study describes one particular serious game, Antonyms, and provides results from an initial “proof of concept” study. The authors explain that Antonyms is based on the Dual Pathway Model (DPM) proposed by Edmund Sonuga-Barke, FBA, FMedSci, which theorizes that ADHD is identified by impairment in two developmental paths: one related to executive functions and the other related to motivation.

Thus, Antonyms was developed to assess and improve three main aspects of ADHD related to these pathways: inhibition (being able to retrain oneself on a particular behavior while continuing with a larger task), impulsivity (acting without careful thought to obtain instant gratifica-

tion), and cognitive flexibility (adapting one’s thought process about a situation when necessary). The hope of the developers is that training in these three areas via Antonyms will help users stay focused on important aspects of their life and react more thoughtfully to situations.

The game is designed such that the user is represented as a superhero who must complete several mini-games increasing in difficulty to save a realm across the Earth. In order to complete the mini-games, the user must exhibit effective executive functioning and motivational skills (for example, inhibition, planning, emotion regulation, and attention to detail) which are based on common neuropsychological tests (for example, the Conners Continuous Performance Tests and the Stroop test, which requires naming the color ink of the word rather than the written text of the word or vice versa).

Researchers presented Antonyms to sixteen boys 8–11 years of age; eight boys had a previous ADHD diagnosis and eight did not. Each boy completed two 45-minute testing sessions with a psychologist to learn about Antonyms, take two standard neuropsychological tests used to diagnosis ADHD, and play Antonyms. Results on the neuropsychological tests were related to performance in Antonyms and boys with ADHD performed worse on both the neuropsychological tests and Antonyms compared to boys without ADHD.

The researchers posit that results lend some support for Dr. Songuga-Barke’s DPM theory, given that scores on Antonyms were associated with scores on standardized tests used to diagnose ADHD related to inhibition and impulsivity control. Thus, the researchers argue that this study may provide indirect evidence for the potential use of Antonyms in ADHD assessment and treatment; however, they acknowledge that treatment studies with larger samples are needed to evaluate the efficacy of Antonyms. **4**

Crepaldi M, Colombo V, Mottura S, Baldassini D, Sacco M, & Antonietti A. (2020). Antonyms: A computer game to improve inhibitory control of impulsivity in children with Attention Deficit/Hyperactivity Disorder (ADHD). *Information*, 11, 230.

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Lauren Haack, PhD, is an associate clinical professor and attending psychologist in the department of psychiatry and behavioral sciences at the University of California, San Francisco. Her research and clinical practice focus on accessible and culturally attuned evidence-based services for vulnerable youth and families, with a particular specialty in ADHD services for children of Spanish-speaking, Latinx families. She has served on *Attention*’s editorial advisory board.

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