

Technological Interventions for Youth with ADHD

WHAT IS THE STATE of the literature on technological interventions for children with ADHD? This research update examines two review articles published in 2022 of existing studies on this topic.

These literature reviews identify a number of technological interventions, such as cognitive training, neurofeedback treatment, telehealth and web-based treatment, mobile interventions, video games, wearables and sensors,



virtual and augmented reality, and robotics. Taken together, these studies indicate that more research exists on cognitive training and neurofeedback interventions, whereas fewer studies have been conducted on the use of other types of technology to enhance ADHD-related challenges.

Studies show more promising results for the positive outcomes of neurofeedback compared to cognitive training, for which research suggests that the generalizability of improvements may be limited. Regarding technological interventions outside of cognitive training and neurofeedback, although the numbers and types of studies are more limited, there appears to be promise for the potential of such technologies to improve treatment for ADHD.

Are digital health interventions effective?

This study reviewed published research relevant to technology and treatment for youth with ADHD between 2004 and 2022. The articles found were categorized into three content areas: cognitive training, neurofeedback interventions, and other digital health interventions.

Seven hundred seventy-five articles were found regard-

ing cognitive training, which involves computerized programs to improve executive functions, attention, and working memory. The authors note that systematic reviews and meta-analyses have found that the effects of cognitive training on ADHD symptoms and performance on tasks outside of the training program appear limited to similar types of tasks (e.g., performance on other computerized tasks similar to the task used in cognitive training). Therefore, there is a challenge for cognitive training to generalize its improvements to other types of performance or real-life settings, such as the academic or home context. Although limitations in the methodologies used in research so far suggest that it may be possible for cognitive training to yield some benefits, there is not enough evidence for these programs as front-line interventions for ADHD.

Regarding studies of neurofeedback, which involves using measurements of the brain activity of an individual to provide feedback and help with self-regulation, 242 articles were reviewed. The authors state that neurofeedback training appears to improve ADHD symptoms and can be an effective treatment option. However, there is a need for community treatment programs to be standardized so that they are comparable to the programs studied in the research.

Fifty-one studies were identified testing other digital health interventions, such as telehealth, web-based treatment, mobile health interventions, and video games. With respect to telehealth and web-based interventions, findings suggest that they may be effective. Turning to mobile health interventions, a study found that such interventions may help in improving adherence to medication treatment. However, no studies in this review examined the ability of such mobile interventions to improve ADHD symptoms directly.

Moving to video games to improve ADHD-related challenges (also called serious games), research suggests that such games can train organization, planning, and self-management skills.

Overall, various types of technological tools for youth with ADHD have been studied, and there is a need for studies to use more rigorous methodology to better understand the short- and long-term effects of such digital health interventions.

Lakes KD, Cibrian FL, Schuck S, Nelson M, & Hayes GR. (2022). Digital health interventions for youth with ADHD: A systematic review. *Computers in Human Behavior Reports*, 6, 1-13. <https://doi.org/10.1016/j.chbr.2022.100174>

Do emerging technologies show promise?

This study investigated emerging technological treatments for children with ADHD. Thirty-six articles were reviewed using various technologies, such as computers, mobile devices, wearables and sensors, virtual and augmented reality, and robotics.

The authors found that mobile health devices have shown promising results in terms of assessing emotions, helping with organization, and enhancing self-monitoring. Research on the use of sensors and wearables is more limited but suggest that these devices may be able to detect behaviors and give feedback to children to help them with behavior and self-regulation. Studies on games that have the purpose of improving self-regulation also appear to be promising in training self-regulation and collaborative skills. These serious games have been delivered by personal computers, mobile technology, sensors, and robots.

Little research exists on using augmented or virtual reality to increase self-regulation and decrease ADHD symptoms. How-

ever, existing preliminary studies suggest its possibility and potential. Similarly, although limited studies exist on computer software and web-based applications for children with ADHD, its use suggests potential applications.

Overall, more studies exist on neurofeedback and cognitive training, with less research on emerging technologies for interventions for ADHD. However, given the increasing use of technology in daily life, better understanding how such technology can be used to help individuals with ADHD has widespread potential.

Cibrian FL, Lakes KD, Schuck SE, & Hayes GR. (2022). The potential for emerging technologies to support self-regulation in children with ADHD: A literature review. *International Journal of Child-Computer Interaction*, 31, 1-13. <https://doi.org/10.1016/j.ijcci.2021.100421>



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