

# EndeavorRx video for ADHD

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Policy contains: Attention deficit and hyperactivity disorder; digital therapeutics; EndeavorRx video.

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## Coverage policy

EndeavorRx™ video (Akili Interactive Labs Inc., Philadelphia, Pennsylvania) for attention deficit hyperactivity disorder is investigational/not clinically proven and, therefore, not medically necessary.

### Limitations

No limitations were identified during the writing of this policy.

### Alternative covered services

Medication (stimulants and non-stimulants); behavior management.

## Background

Attention deficit hyperactivity disorder is a psychiatric and neurodevelopmental condition that affects a child's ability to function. Symptoms generally include developmentally inappropriate loss of concentration and focus, inattentiveness, hyperactivity, and impulsivity. The disorder is usually first suspected in childhood during elementary school with children demonstrating difficulty completing tasks, becoming disorganized and forgetful, and losing things. A diagnosis is made based on these symptoms before age 12. Symptoms interfere with daily living activities and last six months or longer. Although the condition begins in childhood, it frequently extends into adulthood. The three main subtypes are predominantly inattentive, predominantly hyperactive-impulsive, and a combination of the two (Magnus, 2023).

An estimated 7 million (11.4%) of U.S. children have been diagnosed with attention deficit hyperactivity disorder, typically between ages 3 and 17 years. The disease’s prevalence in boys is more than double than that of girls (15% compared to 8%), and 78% of children with the condition has at least one other co-occurring condition (Centers for Disease Control and Prevention, 2024a).

The causes of the condition have remained elusive, but several risk factors have been implicated. Studies of twins have identified a genetic link in some cases. Other suspected risk factors include brain injury; exposure to environmental toxins (e.g., lead) during pregnancy or at a young age; alcohol and tobacco use during pregnancy; and parental mental health and family environment (Centers for Disease Control and Prevention, 2024a).

Treatment is age-specific and can include medication with or without behavioral therapy. Among children with attention deficit hyperactivity disorder, approximately 32% children received both medication treatment and behavior treatment, but 30% received no treatment (Centers for Disease Control and Prevention, 2024b).

Current therapies do not help all children with attention deficit hyperactivity disorder, and alternative treatments are sought. Digital therapeutics (software applications for clinical use) have been proposed to improve attention problems.

In 2020, Akili Interactive Labs, Inc. received regulatory approval to market EndeavorRx as a class II device indicated to improve attention function as measured by computer-based testing in children ages 8 to 12 years old with primarily inattentive or combined-type attention deficit hyperactivity disorder who have a demonstrated attention issue (U.S. Food and Drug Administration, 2020a). EndeavorRx is the first game-based digital therapeutic granted approval by the federal government for the condition intended to be used as an adjunct to clinician-supervised treatment (U.S. Food and Drug Administration, 2020b).

Findings

Guidelines

Current guidelines for treatment of pediatric attention deficit hyperactivity disorder do not include the use of digital therapeutics, including the EndeavorRx video game (Barbarese, 2020; Wolraich, 2019).

Evidence review

The evidence for EndeavorRx consists of two reported studies performed in children under controlled conditions. EndeavorRx appears safe and well-tolerated and offers short-term improvement in inattention and hyperactivity, but its effectiveness in real world settings and over the long term is unclear.

Before developing EndeavorRx, Akili Interactive tested prototype digital treatments. In one of these, 80 children were randomized into those with and without attention deficit hyperactivity disorder. Significant neuropsychological improvements were observed for the 40 cases, but not for the 40 controls (Davis, 2018).

Regulatory approval for EndeavorRx was based on five studies, with a total of more than 600 participants. The primary study was a controlled trial (n = 348) of children ages 8 to 12 years old. All participants were required to have a definitive diagnosis of attention deficit hyperactivity disorder, scores on several ratings scales indicating attention problems, an intelligence quotient above 80, no comorbid psychiatric conditions, and no use of medications for the disease that could not be discontinued (Kollins, 2020).

Children in the case group played the EndeavorRx video game for five five-minute sessions per day, five days a week for four weeks. The control group played a game whose objective was to find and connect letters on a grid to spell words during the same period. Major findings include:

	Cases (180)	Controls (168)	P value
Test of Variables of Attention	47%	32%	.0058 *

Attention Performance Index	11%	4%	.033	*
ADHD Rating Scale (> 2 points)	74%	73%	.77	
ADHD Rating Scale (> 30%)	24%	19%	.23	
Impairment Rating Scale	48%	37%	.049	*
Clinical Global Impressions (< 2 post-intervention)	17%	16%	.86	
Clinical Global Impressions (1 post-intervention)	1%	1%	.96	
Self-Reported Improvement on Exit (patients)	73%	66%	.15	
Self-Reported Improvement on Exit (parents)	56%	44%	.025	*

\* Significance at  $P < .05$ .

The percentage of patients experiencing intervention-emergent adverse effects during the study period was higher for cases (7%,  $n = 12$ ) versus controls (2%,  $n = 3$ ). Ten of the 12 effects on the test patients were frustration (5), headache (3), and emotional reaction (2). No serious adverse effects were experienced by either group, and there were no discontinuations (Kollins, 2020).

An update to this trial ( $n = 206$ ) of children ages 8 to 14 with attention deficit hyperactivity disorder taking or not taking stimulant medication assessed the impact of AKL-T01, an application and video-game-based treatment for inattention. Subjects used the game for four weeks, followed by non-use for four weeks. Impairment improved in groups taking or not taking medication, both significant at  $P < .001$ ) after four weeks, with no side effects, and improvements persisted up to one month (Kollins, 2021).

A systematic review examined the effects of game-based therapeutics, including EndeavorRx, in randomized controlled trials on children and adolescents with attention deficit hyperactivity disorder. The investigators indirectly compared the outcomes of game-based digital therapeutics, medication, and controls. Outcomes were reported as standard mean difference (95% confidence interval). Both digital therapeutics and controls improved inattention (0.28 [0.14 to 0.41] and 0.21 [0.03 to 0.39], respectively) and hyperactivity/impulsivity (0.28 [0.03 to 0.53] and 0.30 [0.05 to 0.55], respectively). However, medication had outcomes superior to digital therapeutics for these indicators (Oh, 2023).

Video games, such as EndeavorRx, may improve treatment adherence, as they are perceived as enjoyable activities. Drop-out rates for EndeavorRx were 5.45% (Kollins, 2020) and 12.13% (Kollins, 2021), lower than most other video game-based treatments. However, long-term efficacy is uncertain (Caselles-Pina, 2023).

In 2024, we added a systematic review (Caselles-Pina, 2023) and guideline references, and deleted several older references. No policy changes are warranted.

## References

On August 1, 2024, we searched PubMed and the databases of the Cochrane Library, the U.K. National Health Services Centre for Reviews and Dissemination, the Agency for Healthcare Research and Quality, and the Centers for Medicare & Medicaid Services. Search terms were “attention deficit and hyperactivity disorder,” “digital therapeutics,” and “EndeavorRx video.” We included the best available evidence according to established evidence hierarchies (typically systematic reviews, meta-analyses, and full economic analyses, where available) and professional guidelines based on such evidence and clinical expertise.

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## Policy updates

9/2020: initial review date and clinical policy effective date: 10/2020.

9/2021: Policy references updated.

9/2022: Policy references updated.

9/2023: Policy references updated.

9/2024: Policy references updated.