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Emerging Digital Interventions for ADHD: An Overview of Ongoing Clinical Trials

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Abstract. *Introduction*: Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental condition characterized by inattention, hyperactivity and impulsivity. Analyzing registered clinical trials on digital interventions for ADHD can provide early insight into planned research directions. The study aims to review registered clinical trials to identify and characterize emerging research on digital interventions for ADHD. *Methods*: We systematically searched ClinicalTrials.gov, the EU Clinical Trials Registry and the WHO ICTRP for ongoing trials of digital interventions for ADHD. *Results:* Of 149 identified trials, 35 ongoing studies met inclusion criteria. The most common interventions were mobile apps (14), computerized training (6), virtual reality (5), and web-based programs (5). Intervention durations were typically 6–15 weeks (23), most commonly 12 weeks. Primary outcomes assessed included ADHD symptoms and neurocognitive functions (23), followed by emotional/psychological outcomes (18) and family-related outcomes (12). *Discussion and conclusion*: Registered trial protocols indicate a growing interest in digital approaches for ADHD, particularly app-based, medium-term interventions targeting both children and adults. However, as these findings are based on ongoing trials registrations rather than completed studies, conclusions regarding effectiveness cannot yet be drawn. The limited conclusion of safety-reported outcomes represents a critical gap that may constrain the future real-world applicability of these interventions.

Keywords. ADHD, Digital Health, Digital Intervention, Clinical trials

1. Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity. Its global age-standardized prevalence is estimated at 1.13%, affecting both children and adults [1], with prevalence in childhood (3–12 years) it reaches approximately 7.6% [2,3]. There is a growing

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interest in innovative approaches to support individuals with ADHD. Digital interventions are increasingly being developed as complementary tools to existing treatments. Evidence shows that digital interventions are associated with improvements in inattention and hyperactivity, and significant effects on overall symptoms, with most of the existing evidence focusing on children [4-7].

Clinical trials represent the gold standard for generating reliable scientific evidence on both the effectiveness and the safety of interventions. Reviewing clinical trial registries provides early insight into ongoing studies of digital innovations, allowing anticipation of trends, identification of evidence gaps, and assessment of forthcoming tools [8]. For clinicians, educators, policymakers, and families, this information is crucial to prepare strategies and set realistic expectations for future therapeutic options [9].

The objective of this study is to review registered clinical trials to identify and analyze forthcoming digital interventions for ADHD, providing insights into emerging approaches and trends in the field.

2. Methods

We conducted a systematic search to identify ongoing clinical trials investigating any type of digital intervention for ADHD in three major clinical trial registries: ClinicalTrials.gov, the EU Clinical Trials Registry, and the WHO-ICTRP. The search was performed on 16 September 2025, using the following keywords: ***Condition:*** ADHD, and ***Intervention:*** "artificial intelligence" OR "AI" OR "machine learning" OR "deep learning" OR "natural language processing" OR "neural networks" OR "sentiment analysis" OR "LLM" OR "Large Language Model*" OR "Chatbot" OR “digital twins” OR "mHealth" OR "mobile health" OR "mobile app" OR "mobile application*" OR "app" OR "digital health" OR "connected health" OR "smartwatch" OR "wearable" OR "sensor" OR “IoMT” OR "smartphone" OR "ehealth" OR "e-health" OR “telemedicine” OR “Telehealth” OR "virtual reality" OR "video games" OR "serious games" OR "website" OR "web portal" OR "Internet" OR "social network*" OR "social media" OR "online community" OR "Facebook" OR "Twitter" OR "X" OR "YouTube" OR "Instagram" OR "TikTok" OR "WhatsApp" OR "WeChat" OR "Telegram" OR "Snapchat" OR "Douyin" OR "BeReal" OR "Reddit" OR "Discord".

After removing duplicates, the full text of the registries was screened by two reviewers to verify their eligibility. Studies were included if they: 1) included a digital tool in the intervention; 2) targeted individuals with ADHD (all age groups, including those with comorbidities, as well as caregivers); and 3) were ongoing or active at the time of the search. Records that did not meet all three inclusion criteria were excluded.

From each record, one reviewer extracted the information exactly as reported in the registry at the time of the search (16 September 2025), including trial identifier, country, expected completion date, sample size, population age, type of digital intervention, intervention duration, and outcome measures. A second reviewer then verified the extracted information for accuracy. Findings were synthesized narratively, and outcome measures were classified using a thematic-analysis–like approach. Each outcome was coded by construct (e.g., ADHD symptoms, family functioning, intervention engagement), and similar codes were manually assigned into broader categories to identify patterns across trials.

3. Results

The search identified a total of 149 clinical trial records (77 from ClinicalTrials.gov, 41 from the WHO-ICTRP portal, and 31 from the EU Clinical Trials Register). After removing four duplicates, 145 records remained. These were read in full to assess eligibility: 66 were excluded for being completed studies (i.e., with a termination date prior to the search date) and 44 for not using any digital intervention. Therefore, a total of 35 trials were included (12 are expected to be completed by the end of 2025, 6 in 2026, 7 in 2027, 6 in 2028, and 2 in 2029. The expected end date was not specified in 2 trials). These trials are registered as being led by 13 countries, with the United States and Hong Kong being the most frequently represented (13 and 7 trials, respectively), followed by Germany (3 trials); Norway and Sweden (2 trials each); and Australia, Canada, China, Denmark, Finland, France, Israel, and Spain with 1 registered trial each. The flowchart diagram of the selection process and list of the 35 included trials is available at Zenodo (https://doi.org/10.5281/zenodo.18347954).

The 35 ongoing trials expect an enrollment of 6,425 individuals, most of whom will have a diagnosis of ADHD as the primary condition, while some trials also target additional conditions, such as autism spectrum disorder; oppositional defiant disorder; conduct disorder; anxiety; depression; bipolar disorder; schizophrenia; and post-traumatic stress disorder. A total of 17 trials specifically target children, 2 trials include both children and adults, and 16 trials focus exclusively on adults.

The most common digital interventions being tested are mobile apps (14/35 trials). followed by computerized training (6/35); virtual reality (5/35); and web-based programs (5/35). Less frequent are videoconferencing, and social media–based interventions. The interventions target children, adults, or both, with a mostly balanced distribution across age groups (See Table 1).

Most interventions last between 6 and 15 weeks (23/35 trials), with 12 weeks being the most common duration (7 trials). A smaller number of studies investigate very short (≤2 weeks, 3 trials) or long-term interventions (>3 months, 5 trials). In four trials, the intervention duration was not reported.

Table 1. Types of digital interventions for ADHD under evaluation in ongoing trials

Digital intervention type	Number of trials targeting chidren, adults or both (children and adults)	Total of trials (n/35) using this intervention type
Mobile apps	6 children; 8 adults	14 (40.0%)
Computerized training	3 children; 2 adults; 1 both	6 (17.1%)
Virtual reality (VR)	3 children; 2 adults	5 (14.3%)
Web-based programs	2 children; 2 adults; 1 both	5 (14.3%)
Videoconferencing (Telehealth, Zoom/Teams)	3 children; 1 adults	4 (17.1%)
Social media	1 adults	1 (2.9%)

A total of 167 outcomes is being measured in these 35 trials. The most common outcome measures relate to changes in ADHD symptoms and neurocognitive functions (measured in 23/35 trials), followed by emotional and psychological outcomes (18/35), and family-related outcomes (12/35). Only one of the analyzed trials included the measurement of adverse events related to the digital interventions in their outcome measures. Further details are presented in Table 2.

Table 2. Number of ongoing trials (n=35) measuring different types of outcomes

Outcome category	Specific outcomes	Number of trials
ADHD symptoms & neurocognitive functions	ADHD symptoms, executive functions (working memory, response inhibition, sustained attention, cognitive flexibility), neuropsychological performance, functional abilities	23
Emotional & psychological outcomes	Anxiety, depression, stress, mood, emotion regulation, negative emotions, psychological flexibility, self-efficacy, well-being, quality of life, personal functioning	18
Family related outcomes	Parenting stress, parent psychological flexibility, parent knowledge, family functioning, parent–child relationship	12
Intervention engagement & feasibility	Digital tool use, usability, engagement in care, adherence, recruitment rates, dropout rates, feasibility, tolerability	10
Behavioral outcomes	Disruptive behavior, oppositional defiant disorder, conduct disorder, aggression, antisocial acts, socialization and conflict behaviors	8
Academic, occupational & development outcomes	School functioning, academic performance, employment readiness and outcomes, motor development, language/communication, cognitive abilities, social life skills	7
Physiological measures	Hemoglobin, EEG frequency, head movements, heart rate	5
Other outcomes	Smartphone or social media use, mobile addiction, ADHD knowledge, goal attainment	5

4. Discussion and conclusion

In this study, we identified 35 ongoing clinical trials testing digital interventions for ADHD. Nearly half involve mobile apps, while computerized training, virtual reality, web-based programs, videoconferencing, and social media are also being investigated. Most interventions are designed for individual use, except videoconferencing, which involves interaction with a therapist or coach. The prevalence of app-based interventions (14/35) and medium-term durations (6–15 weeks) reflects growing interest in technology-based tools for ADHD. This trend aligns with prior reviews showing that digital interventions for ADHD can be beneficial across all age groups [4,5,10], with intervention durations typically ranging from 4 to 25 weeks [4]. In contrast with our findings, earlier reviews [4,11] reported that most digital interventions for ADHD were primarily computer-based, whereas the current landscape of ongoing trials shows a clear shift toward mobile apps and other emerging digital formats. Mobile apps are already well-established in society, while other technologies, including sensors, are also being explored but to a lesser extent. Interestingly, a substantial number of the trials target adults, reflecting a growing recognition that ADHD persists into adulthood [1] and that digital tools could help address gaps in adult care [4–7], where access to behavioral therapies is often limited.

Our study comes along with some limitations: by focusing on three major clinical trial registries (ClinicalTrials.gov, EU-CTR, and WHO-ICTRP), this review offers a snapshot of the ongoing research landscape, but we may have missed innovative digital approaches developed outside these registries. As this overview is based on registered and ongoing protocols, the findings describe planned interventions strategies rather than demonstrated effectiveness or safety outcomes.

The trial records clearly indicate that these studies are evaluating the effectiveness of these interventions in multiple dimensions e.g. ADHD symptoms, emotional outcomes, etc. A key gap identified is the lack of reporting on adverse events or safety evaluations (only one of the 35 analyzed trials including an adverse-event-related outcome (mobile app addiction), consistent with previous evidence showing that systematic reviews of digital interventions for ADHD rarely report adverse events [7]. Measuring safety of any intervention is particularly relevant, however previous literature has shown that many digital health studies fail to do so [12], limiting a full understanding of their feasibility and real-world applicability [13]. Without safety assessments, even interventions with favorable outcomes might overlook potential negative effects, usability challenges, or unintended harms of digital interventions for ADHD [7,13].

This work provides valuable early insight into emerging research trends in the design and focus of ongoing digital ADHD trials, including the preferred use of mobile apps and the inclusion of adult populations, while highlighting the need for transparency, safety reporting, and methodological rigor as these trials reach completion and publish their results.

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