Chronic Diseases Journal

DOI: 10.22122/cdj.v13i3.959 Published by Vesnu Publications

The efficacy and implementation of AKL-T01 digital therapeutic in management of attention-deficit/hyperactivity disorder (ADHD) in children: A rapid review of recent evidence

Avin Khateri, Maziar Afshar

Social Determinants of Health Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran

Review Article

Abstract

BACKGROUND: Attention-deficit/hyperactivity disorder (ADHD) is a prevalent neurodevelopmental disorder, often inadequately addressed by conventional treatments. Digital therapeutics (DTx) like AKL-T01 (EndeavorRx), a video game-based intervention, have emerged as innovative alternatives for improving attentional control. This rapid review synthesizes recent evidence on the efficacy and implementation of AKL-T01 in managing ADHD across diverse populations.

METHODS: This rapid review involves a systematic search of PubMed, Scopus, and Web of Science (2020-2023) which identified 127 records, with 122 excluded during screening (78 irrelevant, 44 non-English/non-peer-reviewed). Five studies evaluating AKL-T01 were included. Outcomes included attentional performance [Test of Variables of Attention (TOVA) Attention Performance Index (API)], ADHD symptoms, and usability metrics.

RESULTS: Across 1516 participants, AKL-T01 demonstrated significant improvements in objective attention measures [mean TOVA effect size: ~0.5 standard deviation (SD) versus methylphenidate's: ~1.0 SD], particularly in pediatric populations. Parent-reported outcomes showed mixed results. Compliance rates averaged 83%-96%, with minimal adverse effects.

CONCLUSION: AKL-T01 shows promise as a safe, adjunctive DTx for pediatric ADHD. Ethical considerations (e.g., data privacy, neurodiversity-affirming frameworks) and long-term efficacy require further study.

KEYWORDS: Attention Deficit-Hyperactivity Disorder; Digital Therapeutics; Video Games; Therapeutic Uses; Review

Date of submission: 02 Mar. 2025, ***Date of acceptance:*** 09 May 2025

Citation: Khateri A, Afshar M. **The efficacy and implementation of AKL-T01 digital therapeutic in management of attention-deficit/hyperactivity disorder (ADHD) in children: A rapid review of recent evidence.** Chron Dis J 2025; 13(3): ??-??.

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by persistent patterns of inattention, hyperactivity, and impulsivity that significantly impair daily functioning and quality of life (QOL).[1] As one of the most commonly diagnosed pediatric mental health disorders, ADHD affects approximately 5% of children worldwide and exerts a substantial burden on families, healthcare systems, and society.[2] Attentional difficulties specifically are associated with impairments in multiple domains, including academic functioning, social behavior, and adaptive functioning in children and adolescents.[1-3]

Current front-line interventions for ADHD include both pharmacological and non-pharmacological treatments, which have

Corresponding Author:
Maziar Afshar; Social Determinants of Health Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran
Email: maziar.afshar@yahoo.com

demonstrated short-term efficacy.[4] However, these traditional approaches face significant limitations.[4,5] Pharmacological treatments often have side effects that limit their acceptability and may not be suitable for all patients due to caregiver preferences or concerns about abuse, misuse, and diversion.[4] Meanwhile, behavioral interventions face accessibility barriers due to the shortage of properly trained pediatric mental health specialists and variability in insurance coverage.[6] Studies in both the United States (US) and the United Kingdom (UK) have found that most children with pediatric mental health needs lack proper access to services (Figure 1).[7]

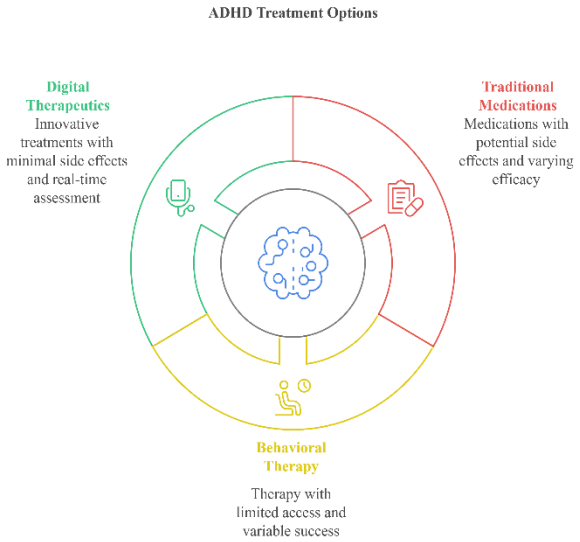

Figure 1. ADHD treatment options

Digital therapeutics (DTx), such as AKL-T01 (EndeavorRx), have emerged as promising alternatives.[8] These evidence-based clinical technologies can provide real-time assessment through high-dimensional data collection during patient engagement, potentially offering objective measures of treatment adherence, engagement, and symptom change.[9,10] This capability could reduce reliance on retrospective, subjective symptom reporting and enhance the efficiency of clinical visits.[10,11]

AKL-T01, a Food and Drug Administration (FDA)-authorized video game-based intervention, engages patients through video game graphics and reward loops while employing real-time adaptive mechanisms that continuously personalize difficulty based on user performance.[12,13] It targets attentional control through adaptive difficulty mechanisms that engage frontoparietal networks, which modulate dopamine pathways implicated in ADHD pathophysiology.[12-14] Recent trials, including the Software Treatment for Actively Reducing Severity of ADHD (STARS-ADHD) randomized controlled trial (RCT) (Kollins et al., 2020), demonstrate significant improvements in objective attention measures [e.g., Test of Variables of Attention (TOVA) scores].[15] Subsequent studies (Stamatis et al., 2024) extend these findings to adolescents and adults, suggesting broad applicability.[16,17]

While these findings are promising, significant challenges remain in translating DTx into globally applicable care.[18] Equity challenges, such as reliance on technology in low-income populations,[19] and ethical risks of overmedicalization (e.g., pathologizing neurodiversity) are understudied.[20]

This rapid review synthesizes recent evidence (2020-2023) on AKL-T01's efficacy, safety, and implementation challenges, focusing on objective cognitive outcomes, real-world applicability, and ethical considerations. By analyzing five comprehensive studies,[15-17,21,22] the clinical impact, implementation outcomes, and broader implications for ADHD management are explored. The analysis focuses particularly on objective measures of attention, behavioral outcomes, and practical considerations for clinical implementation.

Methods

This rapid review adhered to a structured protocol to synthesize recent evidence on AKL-T01's efficacy and implementation for ADHD management. The following steps were

executed to ensure rigor while aligning with rapid review standards (Figure 2).

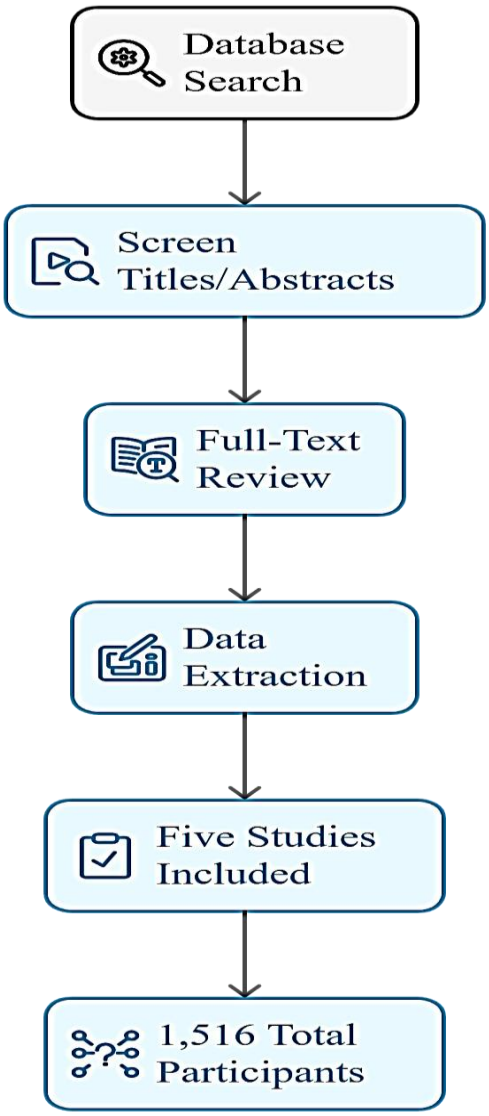

Figure 2. Systematic search and study selection process

A systematic search was conducted across PubMed, Scopus, and Web of Science (January 1, 2020-December 31, 2023). Search terms included keywords and synonyms:

Intervention terms: "AKL-T01", "EndeavorRx", "digital therapeutic", "digital therapeutics", "gamified cognitive therapy", "adaptive digital intervention", "video game-based cognitive training"

Condition terms: "ADHD", "attention-deficit/hyperactivity disorder", "attention deficit hyperactivity disorder"

Outcome terms: "attention", "cognitive", "executive function".

Strategies were tailored to each database in consultation with a medical librarian (Table 1).

Study selection process: The study selection process was carried out in two stages. First, titles and abstracts were screened to identify potentially relevant studies. Then, a full-text review of the potentially eligible articles was conducted. Two independent reviewers (AKH and MA) performed both stages, using standardized forms in Covidence systematic review software. Of 127 initial records, 122 were excluded (78 irrelevant, 44 non-English/non-peer-reviewed).

Inclusion criteria: Studies were included if they met specific criteria. The study design had to fall under one of the following categories: RCTs, non-RCTs, prospective cohort studies, case-control studies, or systematic reviews with meta-analyses. The study population had to consist of participants diagnosed with ADHD according to Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5) criteria[23] and could include any age group or geographical location. Studies were included only if participants were diagnosed with ADHD using DSM-5 criteria. While some studies used supplementary tools like the Conners 3 for symptom assessment, DSM-5 diagnosis was mandatory for inclusion. The intervention had to involve AKL-T01, either as a primary or adjunctive treatment, with a minimum duration of 4 weeks, and conducted in any setting (clinical or home-based). Primary outcomes needed to include quantitative measures of attention or ADHD symptoms, while secondary outcomes could include QOL, functional outcomes, or adherence measures. Only studies published in English and peer-reviewed journals between January 2020 and December 2023 were considered.

Table 1. Search strategy

Database	Search Syntax
PubMed	["AKL-T01" (All Fields) OR "EndeavorRx" (All Fields) OR ["digital therapeutic" (All Fields) OR "digital therapeutics" (All Fields)] AND ["Attention Deficit Disorder with Hyperactivity" (MeSH) OR "ADHD" (All Fields) OR "Attention-Deficit/Hyperactivity Disorder" (All Fields) OR "Attention Deficit Hyperactivity Disorder" (All Fields)] AND ["2020/01/01" (Date of Publication): "2023/12/31" (Date of Publication)]
Scopus	TITLE-ABS-KEY ("AKL-T01" OR "EndeavorRx" OR "digital therapeutic*") AND TITLE-ABS-KEY ("ADHD" OR "Attention-Deficit/Hyperactivity Disorder" OR "Attention Deficit Hyperactivity Disorder") AND TITLE-ABS-KEY ("attention" OR "cognitive" OR "executive function*") AND publication year > 2019 AND publication year < 2024 AND language (English)
Web of Science	TS = ("AKL-T01" OR "EndeavorRx" OR "digital therapeutic*") AND TS = ("ADHD" OR "Attention-Deficit/Hyperactivity Disorder" OR "Attention Deficit Hyperactivity Disorder") AND TS = ("attention" OR "cognitive" OR "executive function*") Refined by: AND languages: (English) AND publication years: (2020-2023)

ADHD: Attention-deficit/hyperactivity disorder

Exclusion criteria: Studies were excluded if they met certain criteria. Case reports, narrative reviews, opinion pieces, protocol papers, or conference abstracts without full data were excluded. Studies were also excluded if they involved participants without a formal ADHD diagnosis or if they included mixed neurodevelopmental disorders without separate ADHD data. Additionally, studies that focused on digital interventions other than AKL-T01 or had an implementation duration of less than 4 weeks were excluded. Non-English language publications, non-peer-reviewed sources, or duplicate publications of the same study were also not considered.

Data extraction: A standardized and pilot-tested form was used for data extraction. The data extracted included various study characteristics, such as authorship, publication year, study design, setting, sample size, and study duration. Information on funding sources and potential conflicts of interest was also collected. Population characteristics, including age, gender, geographic location (all studies were US-based), ethnicity, ADHD subtype and severity, comorbidities, and concurrent treatments, were documented. Details of the intervention, such as the implementation protocol, duration, frequency, adherence rates, and technical specifications, were also extracted. Finally, outcome measures related to both primary and secondary outcomes were recorded, including the assessment tools used, the timing of assessments, and any effect sizes or confidence intervals (CIs) reported.

The data extraction was conducted independently by two reviewers using Research Electronic Data Capture (REDCap) tools, and a third reviewer verified a random 20% sample for quality control. Studies with incomplete outcome reporting were excluded during full-text screening. For included studies, missing data were noted but not imputed. Moreover, data privacy measures were noted but not analyzed due to focus on efficacy.

Data analysis: Data analysis was conducted in three phases. The first phase involved a descriptive analysis of the study characteristics. In the second phase, a narrative synthesis of the intervention effects was performed, summarizing the findings from the included studies and assessing effect direction (improvement/no change). The third phase focused on assessing the implementation outcomes of the interventions. Due to the heterogeneity in the outcome measures and study designs, a meta-analysis was not conducted. Instead, effect sizes were reported where available, and patterns across studies were identified through thematic analysis.

Results

Study characteristics: Five studies evaluating the efficacy and usability of AKL-T01 in managing ADHD were included. These studies comprised various designs, including an RCT, multicenter open-label studies, and secondary analyses. The total sample across the studies included 1516 participants, encompassing children, adolescents, and adults. Most studies targeted pediatric populations (mean age range: 9.0-9.7 years), while two analyses extended findings to adolescents and adults. The proportion of male participants ranged from 67% to 70%, and all studies diagnosed ADHD based on DSM-5 criteria (Table 2).

Primary outcomes: The primary outcome across studies was the improvement in attention performance, as measured by the TOVA Attention Performance Index (API) or similar cognitive metrics:

- *Kollins et al. (2020)*[15]*:* The RCT demonstrated significant improvements in the TOVA API among the AKL-T01 group (mean change: 0.93) compared to the control (mean change: 0.03, P = 0.0060).
- *Kollins et al. (2021)*[22]*:* A multicenter open-label study observed a mean TOVA API improvement of 0.86, confirming efficacy under non-controlled conditions.
- *Flannery et al. (2024)*[21]*:* Secondary analyses reported significant TOVA API improvements, highlighting robustness across subpopulations.
- *Stamatis et al. (2024)*[16,17]*:* Both a secondary analysis and a single-arm trial indicated significant gains in Attention Comparison Score (ACS) with mean improvements of 2.64 in adolescents and similar results in adults.

Secondary outcomes: Secondary outcomes varied across studies, including parent-reported ADHD symptoms, clinician-rated functional impairments, and QOL metrics:

- No significant group differences were observed in parent/clinician-reported et al.[15]
- Improvements in attention consistency (e.g., reduced reaction time variability) were noted in multiple studies, such as Kollins et al.[22]
- *Stamatis et al. (2024)* reported increased QOL in adults and reductions in ADHD-Rating Scale (ADHD-RS) scores in adolescents, with mean total score reductions of 5.3.[16,17]

Safety and usability: AKL-T01 was well-tolerated, with mild side effects such as frustration and headache occurring in fewer than 7% of participants. Compliance rates were high, averaging 83% to 96% across studies, reflecting the feasibility of the intervention as an at-home treatment.

Key insights and limitations: The cumulative evidence suggests that AKL-T01 effectively improves objective measures of attention, such as the TOVA API, particularly in pediatric populations. However, parent and clinician-reported measures of ADHD symptoms showed less consistent improvement. Differences in secondary outcomes across studies may reflect variations in study design, sample characteristics, or measurement tools.

This analysis underscores the potential of AKL-T01 as a safe, engaging, and accessible DTx for ADHD, addressing the limitations of conventional pharmacological and behavioral interventions. Future research should explore its long-term efficacy, optimal dosing schedules, and applicability to diverse ADHD subpopulations.

Discussion

This rapid review synthesizes evidence from five comprehensive studies on AKL-T01, a novel DTx for ADHD management.[15-17,21,22] The findings consistently demonstrate that AKL-T01 improves objective measures of attention, particularly the TOVA API with effect sizes [~0.5 standard deviation (SD)] robust across pediatric populations. However, improvements in parent- and clinician-reported ADHD symptoms were less consistent, highlighting a gap between laboratory-based cognitive gains and real-world behavioral outcomes.

Table 2. Summary characteristics of included studies

Study	Study design	Population characteristics	Intervention details	Primary outcomes	Secondary outcomes	Key conclusions
Kollins et al.[15]	Randomized controlled trial	348 children (mean age: 9.7 years, 69% boys) with ADHD, without comorbid conditions, not on ADHD medication during the trial	AKL-T01 or active control, 25 minutes/day, 5 days/week for 4 weeks	Mean TOVA API improvement: AKL-T01 (0.93), control (0.03), P = 0.006	No significant difference on parent/clinician-reported ADHD-RS, but AKL-T01 improved attention consistency and processing speed (TOVA subscales)	AKL-T01 demonstrated efficacy in improving attention with a favorable safety profile. Further studies are needed for long-term effects and generalizability.
Kollins et al.[22]	Multicenter, open-label	206 children (mean age: 9.0 years, 67% boys), ADHD diagnosis based on DSM-5 criteria, 130 on stimulant medication and 76 not on stimulants during the trial	AKL-T01, 25 minutes/day, 5 days/week for 4 weeks, delivered via a video-game-like digital platform as adjunct to medication, with 4-week pause	Mean TOVA API improvement from baseline: 0.86 (95% CI: 0.58-1.14), statistically significant (P < 0.001)	Improved attention consistency (TOVA subscales) and response time, no significant adverse events reported	AKL-T01 demonstrated effectiveness in improving attention in children with ADHD, both on and off stimulant medication, with a favorable safety and tolerability profile.
Flannery et al.[21]	Secondary analysis	579 participants (children, adolescents, and adults; mean age: 11.7 years, 68% boys), ADHD diagnosis based on DSM-5 criteria, not on ADHD medication during the trials	AKL-T01, 25 minutes/day, 5 days/week, for 4-6 weeks, delivered digitally	Statistically significant TOVA API improvements for both boys and girls (mean change: boys: 0.98, girls: 0.91, P < 0.05)	No significant sex-based differences in outcomes; improved attention consistency and processing speed observed across all participants	AKL-T01 was effective in improving attention across different sexes and age groups. The findings suggest generalizability of the intervention's effectiveness, though further research is needed for long-term outcomes.
Stamatis et al.[16]	Secondary analysis of 3 trials	3 trials: adults (n = 221, mean age = 39.9 years, 70% women), adolescents (n = 162, mean age = 14.4 years, 41% girls), children (n = 180, mean age = 9.7 years, 31% girls), all with ADHD	AKL-T01 game-based treatment for 4-6 weeks, personalized adaptive levels	Significant improvement in TOVA-ACS across groups: adults (β = 0.16, P < 0.001), adolescents (β = 0.09, P = 0.007), children (β = 0.06, P = 0.014)	Increases in quality of life (adults) and reduced ADHD symptoms (adolescents)	AKL-T01 metrics correlate with improvements in validated measures of attention and clinical outcomes.

Table 2. Summary characteristics of included studies (continue)

Study	Study design	Population characteristics	Intervention details	Primary outcomes	Secondary outcomes	Key conclusions
Stamatis et al.[17]	Single-arm trials	Adolescents (n = 162, mean age = 14.4), adults (n = 221, mean age = 39.9), ADHD diagnosis, varied stimulant use	AKL-T01, 5 days/week for 4 weeks (adolescents) or 6 weeks (adults)	Adolescents: mean TOVA-ACS improvement of 2.64 (P < 0.0001), adults: mean TOVA-ACS improvement of 6.46 (P < 0.0001)	ADHD-RS improvements: adolescents (mean total score change = -4.59), adults (mean total score change = -8.27), adults also reported improved quality of life (AAQOL mean change = 7.84)	Evidence suggests AKL-T01 improves attention and ADHD symptoms across age groups with good compliance and a favorable safety profile.

ADHD: Attention-deficit/hyperactivity disorder; TOVA: Test of Variables of Attention; API: Attention Performance Index; ADHD-RS: Attention-deficit/hyperactivity disorder-rating scale; DSM-5: Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition; CI: Confidence interval; ACS: Attention Comparison Score; AAQOL: Adult ADHD quality of life

AKL-T01 offers several advantages over traditional ADHD treatments.[4,11-15,22] The intervention is delivered through an engaging video game interface, which promotes adherence (compliance rates: 83%-96%) and minimizes stigma.[6,13,15,22] Its digital nature addresses barriers to access, such as the limited availability of trained mental health professionals and the logistical challenges associated with behavioral therapies. Moreover, the mild and infrequent side effects of AKL-T01 make it an attractive alternative or adjunctive option to pharmacological treatments which often have more significant safety concerns.[11-15] Notably, AKL-T01's adaptive difficulty system targets frontoparietal networks – key circuits implicated in ADHD's dopamine/norepinephrine dysregulation[15,22] – which may explain its specificity compared to generic "brain training" tools.

These findings suggest that AKL-T01 could serve as a valuable tool in comprehensive ADHD management, particularly for families seeking non-pharmacological or supplementary interventions. The intervention's scalability also positions it as a promising approach for underserved populations or regions with limited mental health resources. However, its TOVA effect size (~0.5 SD) is half that of methylphenidate (~1.0 SD), suggesting that it is best positioned as an adjunctive rather than a standalone intervention.[24,25]

The studies included in this review demonstrated robust methodologies, including RCTs and large sample sizes (1516 participants), which enhance the credibility of AKL-T01's reported efficacy in improving objective attention measures like the TOVA API.[15-17,21,22] High compliance rates (83%-96%) and mild side effects (e.g., frustration, headache in < 7% of participants) further support AKL-T01's feasibility as a non-pharmacological intervention.[15,22] The intervention's engaging video game interface and adaptive algorithms targeting frontoparietal networks[12,14] address barriers to accessibility and stigma, positioning it as a scalable solution for underserved populations. However, limitations must be acknowledged. Subjective outcomes, such as parent- and clinician-reported ADHD-RS scores, often failed to align with objective cognitive improvements,[26] potentially due to the short study durations (4-6 weeks) or insensitivity of these measures.[15,22] Geographic bias is evident, as all studies were US-based, limiting generalizability to low-resource settings where Internet access or cultural relevance of game design may hinder adoption.[27] Ethical risks, including data privacy concerns for minors and the potential for overmedicalization (e.g., framing ADHD as a "cognitive deficit") remain understudied. Additionally, commercial bias is notable, as most studies were industry-funded, underscoring the need for independent replication.[28] Missing data in some studies, though noted, were not imputed, introducing potential skew. Long-term efficacy (> 6 months) and impacts on academic/social functioning remain unclear,[29] as does applicability to adolescents, adults, and individuals with comorbidities.[15-17,22]

Future research should prioritize long-term outcomes to assess whether TOVA improvements translate to meaningful gains in academic performance or social functioning while expanding diversity through trials in non-Western populations and low-income settings to evaluate structural barriers such as limited broadband access (reported in ~30% of underserved households). Integrating neuroimaging [e.g., functional magnetic resonance imaging (fMRI)] could validate AKL-T01's mechanistic impact on frontostriatal networks, bridging gameplay mechanics with neurocognitive outcomes. Finally, developers and clinicians must balance messaging by adopting neurodiversity-affirming frameworks that celebrate strengths while addressing impairments, ensuring DTx interventions avoid stigmatization.

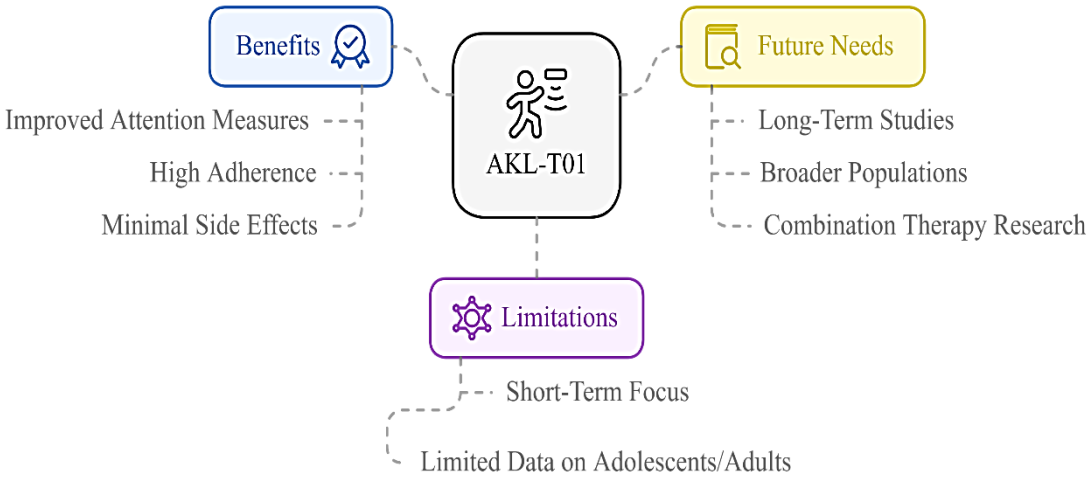

Figure 3. Conceptual model of AKL-T01 digital therapeutic's clinical impact and implementation in ADHD management

Conclusion

AKL-T01 represents a promising advancement in ADHD management, offering a safe, engaging, and accessible option for improving attention in pediatric populations. While further research is needed to clarify its long-term benefits and impact on broader ADHD symptoms, AKL-T01 aligns with the growing demand for innovative, patient-centered therapeutic approaches. With continued investigation, it has the potential to become a cornerstone of comprehensive ADHD care (Figure 3).

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

The authors gratefully acknowledge the support provided by the Social Determinants of Health Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran.

Financial support and sponsorship

The authors declare that no financial support, sponsorship, or funding was received for the work reported in this paper.

References

1. Bokor G, Anderson PD. Attention-Deficit/Hyperactivity Disorder. J Pharm Pract. 2014; 27(4): 336-49.
2. De La Fuente A, Xia S, Branch C, Li X. A review of attention-deficit/hyperactivity disorder from the perspective of brain networks. Front Hum Neurosci. 2013; 7: 192.
3. Saccaro LF, Schilliger Z, Perroud N, Piguet C. Inflammation, Anxiety, and Stress in Attention-Deficit/Hyperactivity Disorder. Biomedicines. 2021; 9(10): 1313.
4. De Crescenzo F, Cortese S, Adamo N, Janiri L. Pharmacological and non-pharmacological treatment of adults with ADHD: a meta-review. Evid Based Ment Health. 2017; 20(1): 4-11.
5. Serrano-Troncoso E, Guidi M, Alda-Díez J. Is psychological treatment efficacious for attention deficit hyperactivity disorder (ADHD)? Review of non-pharmacological treatments in children and adolescents with ADHD. Actas Esp Psiquiatr. 2013; 41(1): 44-51.
6. Biederman J, Spencer T. Non-stimulant treatments for ADHD. Eur Child Adolesc Psychiatry. 2000; 9 Suppl 1: I51-9.
7. Fridman M, Banaschewski T, Sikirica V, Quintero J, Chen KS. Access to diagnosis, treatment, and supportive services among pharmacotherapy-treated children/adolescents with ADHD in Europe: data from the Caregiver Perspective on Pediatric ADHD survey. Neuropsychiatr Dis Treat. 2017; 13: 947-58.
8. Hong JS, Wasden C, Han DH. Introduction of digital therapeutics. Comput Methods Programs Biomed. 2021; 209: 106319.

9. Heusser AC, DeLoss DJ, Cañadas E, Alailima T. Leveraging machine learning to examine engagement with a digital therapeutic. Front Digit Health. 2023; 5: 1063165.
10. Aapro M, Bossi P, Dasari A, Fallowfield L, Gascón P, Geller M, et al. Digital health for optimal supportive care in oncology: benefits, limits, and future perspectives. Support Care Cancer. 2020; 28(10): 4589-612.
11. Cho CH, Lee HJ. Could Digital Therapeutics be a Game Changer in Psychiatry? Psychiatry Investig. 2019; 16(2): 97-8.
12. Montani V, De Filippo De Grazia M, Zorzi M. A new adaptive videogame for training attention and executive functions: design principles and initial validation. Front Psychol. 2014; 5: 409.
13. Anguera JA, Boccanfuso J, Rintoul JL, Al-Hashimi O, Faraji F, Janowich J, et al. Video game training enhances cognitive control in older adults. Nature. 2013; 501(7465): 97-101.
14. Maple A, Palko L, Cañadas E, Jina A. STARS Adjunct Trial: Evidence for the Effectiveness of a Digital Therapeutic as Adjunct to Treatment With Medication in Pediatric ADHD. CNS Spectr. 2023; 28(2): 215-6.
15. Kollins SH, DeLoss DJ, Cañadas E, Lutz J, Findling RL, Keefe RSE, et al. A novel digital intervention for actively reducing severity of paediatric ADHD (STARS-ADHD): a randomised controlled trial. Lancet Digit Health. 2020; 2(4): e168-e78.
16. Stamatis CA, Heusser AC, Simon TJ, Ala'ilima T, Kollins SH. Real-time cognitive performance metrics derived from a digital therapeutic for inattention predict ADHD-related clinical outcomes: Replication across three independent trials of AKL-T01. Transl Psychiatry. 2024; 14(1): 328.
17. Stamatis CA, Farlow DN, Mercaldi C, Suh M, Maple A, Savarese A, et al. Two single arm trials of AKL-T01, a digital therapeutic for adolescents and adults with ADHD. Npj Ment Health Res. 2024; 3(1): 30.
18. Sareban M, Treff G, Smeddinck JD, Hussein R, Niebauer J. Opportunities and barriers for reimbursement of digital therapeutics in Austria: Findings From expert interviews. Digit Health. 2025; 11: 20552076241299062.
19. Borges do Nascimento IJ, Abdulazeem H, Vasanthan LT, Martinez EZ, Zucoloto ML, Østengaard L, et al. Barriers and facilitators to utilizing digital health technologies by healthcare professionals. NPJ Digit Med. 2023; 6(1): 161.
20. Rahsepar Meadi M, Sillekens T, Metselaar S, van Balkom A, Bernstein J, Batelaan N. Exploring the Ethical Challenges of Conversational AI in Mental Health Care: Scoping Review. JMIR Ment Health. 2025; 12: e60432.
21. Flannery JE, Hinshaw SP, Kollins SH, Stamatis CA. Secondary analyses of sex differences in attention improvements across three clinical trials of a digital therapeutic in children, adolescents, and adults with ADHD. BMC Public Health. 2024; 24(1): 1195.
22. Kollins SH, Childress A, Heusser AC, Lutz J. Effectiveness of a digital therapeutic as adjunct to treatment with medication in pediatric ADHD. NPJ Digit Med. 2021; 4: 58.
23. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. Arlington, VA: American Psychiatric Publishing; 2013.
24. Faraone SV, Biederman J, Spencer TJ, Aleardi M. Comparing the efficacy of medications for ADHD using meta-analysis. Med Gen Med. 2006; 8(4): 4.
25. Faraone SV, Buitelaar J. Comparing the efficacy of stimulants for ADHD in children and adolescents using meta-analysis. Eur Child Adolesc Psychiatry. 2010; 19(4): 353-64.
26. Zhang S, Faries DE, Vowles M, Michelson D. ADHD Rating Scale IV: psychometric properties from a multinational study as a clinician-administered instrument. Int J Methods Psychiatr Res. 2005; 14(4): 186-201.
27. Gazzaley A, Rosen LD. The distracted mind: Ancient brains in a high-tech world. Cambridge, MA: Mit Press; 2016.
28. Ioannidis JP. Why most published research findings are false. PLoS Med. 2005; 2(8): e124.
29. Klingberg T, Fernell E, Olesen PJ, Johnson M, Gustafsson P, Dahlström K, et al. Computerized training of working memory in children with ADHD--a randomized, controlled trial. J Am Acad Child Adolesc Psychiatry. 2005; 44(2): 177-86.