

AI-assisted drawing therapy for children with ADHD: A randomised controlled trial

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01 Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is a prevalent neurodevelopmental disorder in children, characterized by inattention, hyperactivity, and impulsivity. Current first-line treatments include pharmacotherapy and Cognitive Behavioral Therapy (CBT), but both face limitations such as side effects, high cost, and poor adherence.

Global Prevalence: WHO reports approximately 3.1% among children aged 10-14 and 2.4% among adolescents aged 15-19, with boys diagnosed three times more often than girls.

Drawing therapy (DT) has gained traction as a non-pharmacological intervention, allowing children to express internal states non-verbally. However, DT remains underexplored in the context of ADHD due to challenges with sustained attention and engagement.

03 Study Design

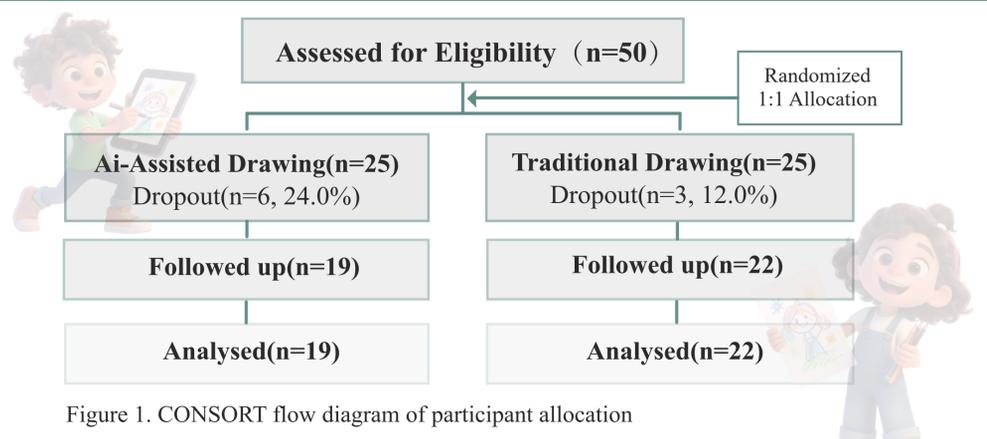


Figure 1. CONSORT flow diagram of participant allocation

05 Conclusion

AI-assisted, drawing-based art therapy produced greater improvement in the pre-specified primary outcome (SNAP-IV inattention) and select WFIRS-P domains (e.g., Family, total score), whereas conventional drawing therapy yielded broader reductions in oppositional defiant symptoms and the overall SNAP-IV severity. Effects were modest and domain-specific; larger, multi-center trials are needed to confirm efficacy and identify which children benefit most.

Clinical Implications:

AI-assisted art therapy offers a promising complementary approach for ADHD treatment, particularly for inattention symptoms. Future research should explore optimal patient selection criteria and long-term maintenance of treatment effects.

06 Ethics approval

This study follows the Helsinki Declaration and involves a randomized controlled trial. Ethical approval was obtained from the Ethics Committee of Macau University of Science and Technology (MUST-20230925001) and Zhuhai Maternal and Child Health Hospital (ZHFY-KXX-2023038, 2023 Ethics No. 175, 2023-11-08).

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02 Methodology

Randomized controlled trial (ChiCTR2400089640) with 24-week intervention period.

41
Participants

7-10
Age Range

24
Sessions

25-30
Minutes

Intervention Process:

01. Children create drawings based on themed prompts.
02. Artwork captured and encoded into keywords (3-5 words).
03. AI system (Midjourney V5) generates responsive artwork.
04. AI-generated feedback provided to children as reward.

Outcome Measures:

SNAP-IV-26: Assessed attention, hyperactivity/impulsivity, and oppositional defiant behavior ($\alpha = 0.903, 0.891, 0.941$)*

WFIRS-P: Evaluated functional impairments across 6 domains ($\alpha = 0.727-0.886$)*.

04 Results

Full data is available in the text.

Table 3. Mean (standard deviation), change from baseline scores, and between-group change scores for descriptive statistical analyses and the independent samples t-test results for the two groups for SNAP-IV-26

ADHD Symptom	Comparison between Groups	
	Mean Change	p-value
Attention	-1.090	0.035*
Hyperactivity-Impulsivity	0.082	0.076
Oppositional defiant behavior	1.706	0.010*
SNAP-IV-26 Total Score	4.777	0.041*

Note: **P < 0.05; *P < 0.01; **P < 0.001 (two-sided t-tests). Mean change = (AI Δ - Control Δ); The higher scores indicate worse status on both scales, negative values favour the AI group.

Table 4. Mean (standard deviation), change from baseline scores, and between-group change scores for descriptive statistical analyses and the independent samples t-test results for the two groups for WFIRS-P.

ADHD Symptom	Comparison between Groups	
	Mean Change	p-value
FAMILY	-0.803	0.041*
SCHOOL ACTIVITIES	-0.067	0.058
LIFE SKILLS	-0.067	0.968
SELF-CONCEPT	0.308	0.036*
SOCIAL ACTIVITIES	-0.009	0.997
RISKY ACTIVITIES	-1.417	0.082
WFIRS-P Total Score	-0.009	0.047*

Note: **P < 0.05; *P < 0.01; **P < 0.001 (two-sided t-tests). Mean change = (AI Δ - Control Δ); because higher scores indicate worse status on both scales, negative values favour the AI group.

Key Funding

1. AI-generated images boost treatment participation in children with ADHD.
2. AI-assisted drawing enhances home, school, and daily life functioning.
3. Both AI and traditional therapies significantly reduce ADHD symptoms.
4. AI images reduce anxiety and improve self-esteem in task execution.
5. Male subjects are more easily distracted by AI, indicating a need for tailored approaches.



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