

The most effective AI tools and interventions for supporting executive function challenges in neurodivergent individuals (ADHD, Autism) are **AI-driven cognitive training programs, serious games, adaptive assessment platforms, social robots, and AI chatbots**, with the strongest evidence for improvements in working memory, attention, inhibitory control, and daily task independence—though results are mixed and more rigorous, long-term studies are needed.

1. Introduction

Executive function (EF) challenges are common in neurodivergent populations, particularly among individuals with ADHD and Autism Spectrum Disorder (ASD), impacting planning, working memory, attention, and self-regulation. Recent research highlights a range of AI-powered interventions—such as cognitive training programs, serious games, adaptive assessment tools, social robots, and AI chatbots—that show promise in supporting these challenges (Robledo-Castro et al., 2022; Pergantis et al., 2025; De Chiusole et al., 2024; Medina et al., 2021; Van Dam et al., 2022; Desideri et al., 2020; Robledo-Castro et al., 2023; Mohai et al., 2022; Timaná et al., 2024; Williams & Park, 2023). Systematic reviews and randomized controlled trials report that AI-based cognitive training and serious games can improve working memory, attention, and inhibitory control, especially in children with ADHD and ASD (Robledo-Castro et al., 2022; Medina et al., 2021; Robledo-Castro et al., 2023; Timaná et al., 2024). Social robots and AI chatbots have demonstrated benefits in promoting daily task independence and self-regulation (Pergantis et al., 2025; Van Dam et al., 2022). Adaptive assessment platforms like PsycAssist and computer-adaptive versions of classic neuropsychological tests offer personalized evaluation and training, enhancing user engagement and diagnostic precision (De Chiusole et al., 2024; Mohai et al., 2022). However, the evidence base is still developing, with heterogeneity in study designs, populations, and outcome measures, and some studies report mixed or non-significant results (Robledo-Castro et al., 2022; Robledo-Castro et al., 2023; Timaná et al., 2024). There is a consensus that while AI tools hold significant potential, further research is needed to optimize their design, ensure inclusivity, and validate long-term outcomes (Pergantis et al., 2025; Sarkar, 2025; Perry et al., 2024; Desideri et al., 2020; Robledo-Castro et al., 2023; Timaná et al., 2024; Williams & Park, 2023).

2. Methods

We searched over 170 million research papers in Consensus, including Semantic Scholar, PubMed, and other major databases, using targeted queries on AI interventions for executive function in neurodivergent individuals (ADHD, Autism). A total of 1018 papers were identified, 737 were screened, 308 were deemed eligible, and the 35 most relevant papers were included in this review.

Search Strategy



FIGURE 1 Flow diagram of the literature search and selection process.

Eight unique search groups were executed, covering foundational theories, intervention types, user experiences, and domain-specific applications.

3. Results

3.1. AI-Driven Cognitive Training Programs

Systematic reviews and meta-analyses indicate that AI-powered cognitive training programs—often gamified and adaptive—are among the most widely studied interventions for EF challenges in neurodivergent children (Robledo-Castro et al., 2022; Medina et al., 2021; Robledo-Castro et al., 2023; Timaná et al., 2024). These programs target working memory, attention, inhibitory control, and planning, with several studies reporting significant improvements, particularly in working memory and attention for children with ADHD (Robledo-Castro et al., 2022; Medina et al., 2021; Robledo-Castro et al., 2023; Timaná et al., 2024). However, results are heterogeneous, with some studies showing no significant effects, and risk of bias remains a concern (Robledo-Castro et al., 2022; Robledo-Castro et al., 2023).

3.2. Serious Games and Gamified Interventions

Serious games, including those using AI for adaptive difficulty and personalized feedback, have shown positive effects on EF domains such as attention, cognitive flexibility, and working memory in neurodiverse children (Azevedo et al., 2023; Timaná et al., 2024; Tiitto, 2019). These games are often integrated into educational and therapeutic settings, promoting engagement and inclusion. However, variability in game design and study quality limits generalizability (Timaná et al., 2024; Tiitto, 2019).

3.3. Adaptive Assessment and Personalized Tools

AI-based adaptive assessment platforms like PsycAssist and computer-adaptive versions of classic tests (e.g., Tower of London) provide personalized evaluation and training, improving diagnostic accuracy and user experience (De Chiusole et al., 2024; Mohai et al., 2022). These tools are well-received by users and clinicians, and adaptive algorithms allow for real-time adjustment to individual capabilities (De Chiusole et al., 2024; Mohai et al., 2022).

3.4. Social Robots, AI Chatbots, and Virtual Assistants

Social robots (e.g., Tessa) and AI chatbots have demonstrated benefits in supporting daily task execution, self-regulation, and independence for individuals with executive dysfunction (Pergantis et al., 2025; Van Dam et al., 2022; Desideri et al., 2020). Chatbots can reinforce executive skills and provide digital assistance, though their use is still in early stages and requires further validation (Pergantis et al., 2025). Virtual assistants and AI-driven reminders are also reported as helpful by neurodivergent users, especially for task management and time estimation (Campbell et al., 2023; Williams & Park, 2023).

Key Papers

Paper	Intervention Type	Population	Key Results	Study Design
(Robledo-Castro et al., 2022)	AI cognitive training programs	School-age children, elderly	Benefits for working memory, attention, inhibitory control; more evidence needed for ASD/ADHD	Systematic review (264 studies)
(Medina et al., 2021)	AI-driven cognitive stimulation (KAD_SCL_01)	Children with ADHD	Improved inhibitory control, working memory, cognitive flexibility; neural changes observed	RCT (n=29)
(Van Dam et al., 2022)	Social robot (Tessa)	Individuals with executive dysfunction	Increased independence, goal attainment, positive user experience	Multiple-case study (n=18)
(Timaná et al., 2024)	Serious games	Neurodiverse children (ADHD, ASD, Down syndrome)	Significant improvements in attention, working memory, cognitive flexibility	Systematic review (16 studies)
(De Chiusole et al., 2024)	Adaptive assessment platform (PsycAssist)	Individuals with clinical conditions	Positive user/clinician feedback, personalized assessment and training	Usability study

FIGURE 2 Comparison of key studies on AI interventions for executive function in neurodivergent individuals.

Top Contributors

Type	Name	Papers
Author	Carolina Robledo-Castro	(Robledo-Castro et al., 2022; Robledo-Castro et al., 2023)
Author	Luis Carlos Rodríguez Timaná	(Timaná et al., 2024)
Author	Kirstin van Dam	(Van Dam et al., 2022)
Journal	<i>Brain Sciences</i>	(Pergantis et al., 2025; De Chiusole et al., 2024)
Journal	<i>JMIR Serious Games</i>	(Timaná et al., 2024)
Journal	<i>Journal of Medical Internet Research</i>	(Medina et al., 2021)

FIGURE 3 Authors & journals that appeared most frequently in the included papers.

4. Discussion

The evidence base for AI tools supporting executive function in neurodivergent individuals is growing, with the strongest support for AI-driven cognitive training programs, serious games, and adaptive assessment platforms (Robledo-Castro et al., 2022; Medina et al., 2021; Robledo-Castro et al., 2023; Timaná et al., 2024; De Chiusole et al., 2024). These interventions are generally well-received and show positive effects on working memory, attention, and inhibitory control, especially in children with ADHD and ASD (Robledo-Castro et al., 2022; Medina et al., 2021; Robledo-Castro et al., 2023; Timaná et al., 2024). Social robots and AI chatbots offer promising support for daily task management and independence, but their effectiveness is less well-established and requires further research (Pergantis et al., 2025; Van Dam et al., 2022; Desideri et al., 2020). Despite these advances, the field faces challenges: study designs are often heterogeneous, sample sizes are small, and there is a lack of long-term, real-world outcome data (Robledo-Castro et al., 2022; Robledo-Castro et al., 2023; Timaná et al., 2024). Additionally, most interventions are designed for children, with limited research on adults or workplace settings (Desideri et al., 2020; Campbell et al., 2023; Williams & Park, 2023). Ethical considerations, user privacy, and the need for participatory, inclusive design are also highlighted as critical for future development (Horvat & Horvat, 2025; Sarkar, 2025; Vallverdú, 2025; Williams & Park, 2023). Overall, while AI tools show significant potential, more rigorous, longitudinal, and inclusive studies are needed to establish best practices and optimize interventions for diverse neurodivergent populations.

Claims and Evidence Table

Claim	Evidence Strength	Reasoning	Papers
AI-driven cognitive training and serious games improve working memory, attention, and inhibitory control in neurodivergent children	 Strong	Multiple systematic reviews and RCTs show significant improvements, especially for ADHD; some heterogeneity in results	(Robledo-Castro et al., 2022; Medina et al., 2021; Robledo-Castro et al., 2023; Timaná et al., 2024)
Social robots and AI chatbots can increase independence and support daily task management	 Moderate	Case studies and early trials report positive effects, but evidence is less robust and mostly short-term	(Pergantis et al., 2025; Van Dam et al., 2022; Desideri et al., 2020)
Adaptive assessment platforms enhance personalized evaluation and training	 Moderate	Usability studies and clinician feedback support improved engagement and diagnostic accuracy	(De Chiusole et al., 2024; Mohai et al., 2022)
Evidence for long-term and real-world effectiveness is limited	 Moderate	Most studies are short-term, with small samples and limited follow-up	(Robledo-Castro et al., 2022; Robledo-Castro et al., 2023; Timaná et al., 2024; Williams & Park, 2023)
Most interventions target children; research on adults and workplace settings is lacking	 Moderate	Reviews and surveys highlight a gap in adult-focused and workplace interventions	(Desideri et al., 2020; Campbell et al., 2023; Williams & Park, 2023)
Ethical, privacy, and inclusivity concerns require more attention	 Moderate	Qualitative and theoretical work emphasizes the need for participatory, inclusive, and ethical design	(Horvat & Horvat, 2025; Sarkar, 2025; Vallverdú, 2025; Williams & Park, 2023)

FIGURE 4 Key claims and support evidence identified in these papers.

5. Conclusion

AI tools and interventions—including cognitive training programs, serious games, adaptive assessment platforms, social robots, and chatbots—show promise for supporting executive function challenges in neurodivergent individuals, especially children with ADHD and ASD. However, evidence is mixed, and more rigorous, inclusive, and long-term research is needed to optimize their effectiveness and accessibility.

5.1. Research Gaps

Key gaps include a lack of long-term outcome data, limited research on adults and workplace settings, and insufficient attention to ethical, privacy, and inclusivity issues.

Research Gaps Matrix

Intervention Type	Children (ADHD/ASD)	Adults	Daily Living	School/Education	Workplace
Cognitive Training	8	2	3	7	1
Serious Games	7	1	2	6	GAP
Adaptive Assessment	5	1	2	4	GAP
Social Robots/Chatbots	4	1	4	2	GAP
Workplace/Adult Tools	1	2	1	GAP	1

FIGURE 5 Heatmap of research coverage by intervention type and context.

5.2. Open Research Questions

Future research should focus on long-term effectiveness, adult and workplace interventions, and participatory, ethical design for diverse neurodivergent populations.

Question	Why
What are the long-term effects of AI-based cognitive training and serious games on executive function in neurodivergent individuals?	Longitudinal studies are needed to determine if short-term gains translate to lasting improvements in real-world functioning.
How can AI interventions be adapted for adults and workplace settings to support executive function in neurodivergent populations?	Most research targets children; adult and workplace needs are underexplored but critical for lifelong support.
How can participatory and inclusive design improve the accessibility and ethical deployment of AI tools for neurodivergent users?	Engaging neurodivergent stakeholders ensures tools are relevant, effective, and respectful of user autonomy and privacy.

FIGURE 6 Open research questions and their significance for future work.

In summary, AI interventions offer promising support for executive function challenges in neurodivergent individuals, but further research is essential to maximize their impact, inclusivity, and real-world relevance.

These papers were sourced and synthesized using Consensus, an AI-powered search engine for research. Try it at <https://consensus.app>

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