

Review Article

# Occupational therapists' interventions with children with attention-deficit/hyperactivity disorder: a scoping review

*Atuação de terapeutas ocupacionais com crianças com transtorno do déficit de atenção com hiperatividade: uma revisão de escopo*

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## Abstract

**Introduction:** Attention-Deficit/Hyperactivity Disorder (ADHD) begins in childhood and is associated with dysfunctions in the dopaminergic and noradrenergic systems, resulting in impulsivity, inattention, and disorganization, which impair children's occupational performance. **Objective:** To understand how occupational therapists have structured their practices in caring for children with ADHD. **Method:** A scoping review was conducted through searches in PubMed, OTseeker, and the Virtual Health Library. Articles published in the last five years that described occupational therapy interventions with children with ADHD were included. The selection was performed by two independent researchers, and the extracted data were presented descriptively, with emphasis on therapeutic approaches, their objectives, and reported outcomes. **Results:** Eleven studies were included, most of which focused on enhancing executive functions. Strategies and resources used encompassed cognitive training, parent training, digital games, white noise, transcranial stimulation, expressive groups, and table tennis. The studies reported improvements in working memory, processing speed, inhibitory control, sustained attention, handwriting, motor skills, and parental satisfaction. **Conclusion:** Occupational therapy offers promising interventions for the care of children with ADHD, particularly in enhancing executive functions. Although the number of studies remains limited, the presence of randomized clinical trials strengthens the evidence base. Emerging approaches show potential to expand therapeutic practice but still require further investigation.

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**Keywords:** Attention Deficit Disorder with Hyperactivity, Occupational Therapy, Child, Executive Function.

### Resumo

**Introdução:** O Transtorno do Déficit de Atenção com Hiperatividade (TDAH) tem início na infância e está associado a disfunções nos sistemas dopaminérgico e noradrenérgico, resultando em impulsividade, desatenção e desorganização, que comprometem o desempenho ocupacional das crianças. **Objetivo:** Compreender como os terapeutas ocupacionais têm estruturado suas práticas com crianças com TDAH. **Método:** Revisão de escopo com buscas nas bases PubMed, OTseeker e na Biblioteca Virtual em Saúde. Foram incluídos artigos publicados nos últimos cinco anos, que descrevessem intervenções práticas de terapia ocupacional com crianças com TDAH. A seleção foi conduzida por duas pesquisadoras independentes e os dados extraídos foram apresentados descritivamente, com ênfase nas abordagens terapêuticas implementadas, seus objetivos e resultados obtidos. **Resultados:** Foram selecionados 11 estudos, sendo que a maioria apresentou intervenções centradas no aprimoramento das funções executivas. As estratégias e recursos utilizados incluíram treinamento cognitivo; orientação parental; jogos digitais; ruído branco; estimulação transcraniana; grupos expressivos; e prática de tênis de mesa. Os estudos apontaram ganhos em memória de trabalho, velocidade de processamento, controle inibitório, atenção sustentada, caligrafia, habilidades motoras e satisfação dos pais. **Conclusão:** A terapia ocupacional dispõe de intervenções promissoras para o cuidado de crianças com TDAH, com destaque para o aprimoramento das funções executivas. Embora o número de estudos seja reduzido, a presença de ensaios clínicos randomizados fortalece a base de evidências. Abordagens emergentes mostram potencial para ampliar a prática terapêutica, mas ainda demandam maior investigação.

**Palavras-chave:** Transtorno do Déficit de Atenção com Hiperatividade, Terapia Ocupacional, Criança, Função Executiva.

## Introduction

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), Attention-Deficit/Hyperactivity Disorder (ADHD) is characterized by a persistent pattern of inattention, hyperactivity, and impulsivity that compromises the individual's functioning and development. The manual classifies ADHD into three subtypes, according to the predominant characteristic: hyperactive, inattentive, and combined (when both symptom clusters are present). This disorder begins in childhood, with symptoms manifesting before the age of 12, in at least two different contexts, such as school and the family environment (American Psychiatric Association, 2022).

ADHD is frequently associated with comorbidities, such as learning disorders, Autism Spectrum Disorder, Obsessive-Compulsive Disorder, Developmental Coordination Disorder, depression, anxiety, sleep disorders, and epilepsy (Drechsler et al., 2020; Lai et al., 2019; Gnanavel et al., 2019; Seo et al., 2022; Silva et al., 2023). Its estimated worldwide prevalence among children and adolescents ranges from 3% to 8%, depending on the classification system used (Hora et al., 2015; Brasil, 2022; Polanczyk et al., 2014). The etiology of ADHD is multifactorial, involving genetic, biological, and environmental factors (Silva et al., 2023).

The review conducted by Couto et al. (2010) indicates that ADHD is associated with dysfunctions in dopaminergic and noradrenergic neurotransmission systems, especially in frontal brain regions (such as the prefrontal cortex and the cingulate gyrus), subcortical structures (including the striatum and the mediodorsal thalamus), and limbic areas (such as the nucleus accumbens, amygdala, and hippocampus). Alterations in neural activity, evidenced by neuroimaging studies, have been related to symptoms such as impulsivity, forgetfulness, inattention, disorganization, and reduced inhibitory control.

The symptoms of this disorder are not limited to childhood; however, they directly impact the child's occupations, leading to a reduction in quality of life compared to peers (Golchin et al., 2021). In the school context, ADHD is frequently translated into difficulties with sustained attention, organization, and planning, which compromises learning and may require curricular adaptations and additional pedagogical support to ensure equity in relation to classmates. In social interactions, difficulties with self-regulation and impulsivity can generate conflicts, distancing, or peer rejection, limiting opportunities for group participation and for building bonds outside the closest family circle. In the field of everyday occupations, impairment is observed in the performance of Activities of Daily Living and Instrumental Activities of Daily Living, which require planning, working memory, and attention. In addition, play and leisure, central occupations in childhood, tend to be impaired by difficulty maintaining game rules, negotiating roles, or sustaining attention in shared activities, which limits the exploration of diverse play experiences. The disorder may also interfere with rest and sleep, with consequences for physical and emotional well-being. Cumulatively, these limitations reduce the child's autonomy, impact self-esteem, and create barriers to full and satisfactory participation in comparison with peers (Cordier et al., 2010; García et al., 2023; Golchin et al., 2021; May et al., 2023; Mendes et al., 2018; Nielsen et al., 2017; Shifrin et al., 2010).

In view of the above, the importance of an interdisciplinary and comprehensive approach to the care of children with ADHD is evident, highlighting the role of occupational therapists (García et al., 2023; Nielsen et al., 2017). As members of multiprofessional teams, these professionals focus on promoting the child's participation in meaningful occupations, understanding the complexity of occupational performance, which involves skills, performance patterns, personal factors, and environmental demands (American Occupational Therapy Association, 2020).

In this sense, occupational therapy intervention recognizes that factors such as attention, executive functions, motor skills, and sensory processing directly influence performance and should be addressed in an integrated and contextualized manner to enhance participation and quality of life (Hahn-Markowitz et al., 2011; Ianni et al., 2021; Lelong et al., 2021; Nielsen et al., 2017; Pfeiffer et al., 2015; Reynolds & Lane, 2009). However, occupational therapy practice with children with ADHD should not be restricted to symptom management, but should also seek to promote engagement and participation in their different life contexts (Cordier et al., 2010; Nielsen et al., 2017).

Despite the expressive prevalence of ADHD in childhood and its impact on daily activities, school performance, social interactions, and emotional well-being, a gap is observed in the systematization of clear and consistent guidelines for professionals regarding identification, diagnosis, and intervention (May et al., 2023). Systematic reviews conducted to support the development of Australian evidence-based clinical practice guidelines indicate that non-pharmacological interventions can bring broad benefits to the functioning of children with ADHD, including the promotion of healthy habits, sleep optimization, adaptations in the school environment, and caregiver training. However,

such recommendations do not specifically include occupational therapy (May et al., 2023). Similarly, the International Consensus Statement of the World Federation of ADHD (Faraone et al., 2021) also makes no reference to occupational therapy practice.

The diversity of approaches and the dispersion of evidence hinder the consolidation of evidence-based practices in this field. Authors who have investigated occupational therapy interventions in children with ADHD emphasize the scarcity and limitations of existing studies, indicating the need for more robust research to guide professional practice (Nielsen et al., 2017).

In this scenario, conducting a scoping review proves to be particularly relevant, as it allows mapping, organizing, and synthesizing the available knowledge on the therapeutic strategies employed by occupational therapists, identifying gaps in the literature, and pointing out new research questions. By systematizing this information, the present study seeks to contribute to the improvement of professional practice, offering support for clinical decision-making, the qualification of health and education services, and the development of more effective and contextualized interventions for children with ADHD.

Thus, this study had the general objective of investigating how occupational therapists have structured their practices in the care of children with ADHD. Specifically, it sought to map the approaches employed and the objectives established, and to evaluate the outcomes of the interventions.

## **Method**

A scoping review was conducted, which, according to Arksey & O'Malley (2005), aims to map the key concepts of a research area, as well as identify the main sources and types of evidence available. This approach allows for comprehensive and detailed results, without being restricted to an overly delimited question, and is therefore suitable for exploring areas where knowledge is still dispersed or fragmented. Thus, it is a relevant strategy for evidence-based clinical practice, as it enables the synthesis and organization of knowledge (Barbosa Filho & Tricco, 2019).

This review followed the five steps established by Arksey & O'Malley (2005), which are: (1) defining the research question; (2) identifying relevant studies, with definition of databases, search strategies and inclusion criteria; (3) selecting studies; (4) mapping and extracting data; (5) synthesizing and discussing the data obtained.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist was also followed, which is a set of guidelines for conducting and reporting scoping reviews, aiming to ensure transparency and quality in the presentation of results (Tricco et al., 2018).

The review protocol was registered on the OSF platform, with DOI: 10.17605/OSF.IO/S8T6Z.

The following guiding question was established to guide the study: how have occupational therapists developed their practices working with children with ADHD?

The literature searches were conducted in October 2024, in the Pubmed, OTseeker and Virtual Health Library (VHL) databases. The following combinations of descriptors were used for the searches: "Attention Deficit Hyperactivity Disorder" AND "occupational therapy" AND child. In English, the terms used were: "Attention Deficit Disorder with Hyperactivity" AND "occupational therapy" AND child. The articles resulting from the search were transferred to the Rayyan literature review software, where eligibility was assessed and, consequently, inclusion in the present study was determined.

The following inclusion criteria were established for the selection of articles: studies in Portuguese, English, or Spanish; published in the last 5 years; that could be accessed in full; that described practices developed by occupational therapists (alone or in a multidisciplinary team); that presented practical interventions and not just theoretical discussions; and that involved work with children.

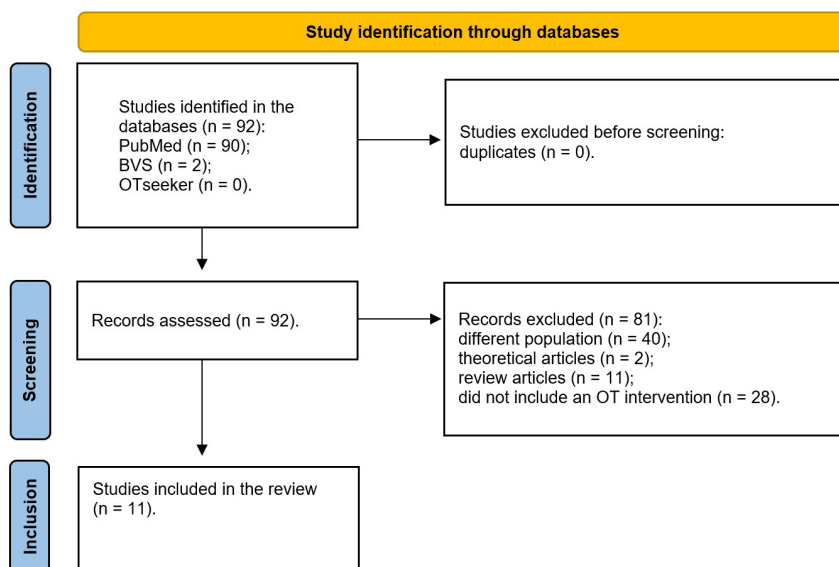
Thus, the following were excluded: review articles; publications in languages other than those indicated above or in periods prior to the last 5 years; not available in full; that presented only theoretical reflections; that only mentioned the presence of occupational therapists on the team, without describing their specific practices; that presented interventions with adolescents, adults, or the elderly.

The selection of articles was carried out independently by two researchers, with the initial eligibility analysis conducted by reading the title and abstract. Studies that raised doubts were read in full. Discrepancies in the selection were discussed between the researchers for the final inclusion of the articles.

For the descriptive analysis of the selected articles, the following data were extracted: title; author; country of origin of the study; year of publication; journal; objectives of the study; type of study; specific population; inclusion of occupational therapy in a multidisciplinary team; intervention performed by occupational therapy; results obtained in the intervention. The data will be presented in a table, with quantitative information and in narrative text.

## Results

After applying the search strategies to the selected databases, 92 studies were found, which were imported into Rayyan, where they were analyzed and blindly selected by the two researchers. No duplicates were identified, however, 80 studies were excluded because they did not meet the inclusion criteria, as can be seen in Figure 1. Thus, 11 studies were included in this scoping review.



**Figure 1.** Study selection flow diagram.

**Source:** Prepared by the authors, adapted from PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and registers only (Page et al., 2021).

The 11 studies included in this review are presented in Table 1. Of these, only 2 were developed entirely by occupational therapists (18.18%) (Lin, 2022; Pijarnvanit & Sriphetcharawut, 2024), while the others involved other professionals, namely: physicians (n=5) (Barkin et al., 2023; Berger et al., 2021; Frisch et al., 2020a, 2020b; Dakwar-Kawar et al., 2023), physiotherapists (n=4) (Barkin et al., 2023; Berger et al., 2021; Chang et al., 2022; Farias et al., 2021), and psychologists (n=3) (Berger et al., 2021; Dakwar-Kawar et al., 2023; Farias et al., 2021). It is noteworthy that, in two articles (Chen et al., 2022; Kim et al., 2020), it was only possible to identify the area of expertise of the other authors: mental health, neuroscience and rehabilitation, and cognitive development.

It was observed that 5 studies (45.45%) were published in occupational therapy journals (Frisch et al., 2020a; Farias et al., 2021; Kim et al., 2020; Pijarnvanit & Sriphetcharawut, 2024), one of which was in occupational therapy and physiotherapy (Frisch et al., 2020b). The distribution of the countries where the studies were conducted and the years of their publication are presented in Table 1.

**Table 1.** Articles selected for the review.

AUTHORS	COUNTRY	YEAR	TITLE	JOURNAL
Barkin et al. (2023)	Turkey	2023	How does therapist guided game-based intervention program effect motor skills in children with Attention Deficit Hyperactivity Disorder?: Single blind randomised study design	Research in Developmental Disabilities
Berger et al. (2021)	Israel	2021	Scaffolding the attention-deficit/hyperactivity disorder brain using transcranial direct current and random noise stimulation: a randomized controlled trial	Clinical Neurophysiology
Chang et al. (2022)	Taiwan	2022	Enhancing executive functions and handwriting with a concentrative coordination exercise in children with ADHD: a randomized clinical trial	Perceptual and Motor Skills
Chen et al. (2022)	Taiwan	2022	Listening to white noise improved verbal working memory in children with Attention-Deficit/Hyperactivity Disorder: a pilot study	International Journal of Environmental Research and Public Health
Farias et al. (2021)	Brazil	2021	Ser e estar criança em um grupo terapêutico a partir do Movimento Vital Expressivo (MVE): um relato de experiência (Free translation: Being and existing as a child in a therapeutic group based on Expressive Vital Movement (EVM): an experience report)	Revista Interinstitucional Brasileira de Terapia Ocupacional

Table 1. Continued...

AUTHORS	COUNTRY	YEAR	TITLE	JOURNAL
Frisch et al. (2020a)	Israel	2020	Parental Occupational Executive Training: feasibility and parental perceptions	Occupational Therapy Journal of Research: Occupation, Participation and Health
Frisch et al. (2020b)	Israel	2020	Parental Occupation Executive Training (POET): an efficient innovative intervention for young children with Attention Deficit Hyperactive Disorder	Physical & Occupational Therapy in Pediatrics
Dakwar-Kawar et al. (2023)	Israel	2023	Transcranial random noise stimulation combined with cognitive training for treating ADHD: a randomized, sham-controlled clinical trial	Translational Psychiatry
Kim et al. (2020)	South Korea	2020	Effects of a cognitive-functional intervention method on improving executive function and self-directed learning in school-aged children with Attention Deficit Hyperactivity Disorder: a single-subject design study	Occupational Therapy International
Lin (2022)	Taiwan	2022	The effects of white noise on attentional performance and on-task behaviors in preschoolers with ADHD	International Journal of Environmental Research and Public Health
Pijarnvanit & Sriphetcharawut (2024)	Thailand	2024	The effects of telehealth parent coaching on occupational performance and executive function of children with Attention-Deficit/Hyperactivity Disorders, and parent self-efficacy: a preliminary study	Occupational Therapy in Health Care

Regarding the study designs of the articles: 5 are randomized experimental studies (45.45%) (Barkin et al., 2023; Berger et al., 2021; Chang et al., 2022; Dakwar-Kawar et al., 2023; Lin, 2022), 1 is quasi-experimental (9.09%) (Frisch et al., 2020b), 2 have a mixed-methods design (18.18%) (Chen et al., 2022; Frisch et al., 2020a), 1 presents a single-subject design with an A-B-A scheme (9.09%) (Kim et al., 2020), 1 is a pre-test–post-test study (9.09%) (Pijarnvanit & Sriphetcharawut, 2024), and 1 is a case report (9.09%) (Farias et al., 2021).

Regarding the characteristics of the studied population, a total of 555 children aged between 3 and 12 years was obtained. More specifically, 490 had a diagnosis of ADHD and 65 presented typical development, with the latter participating in two studies (Chen et al., 2022; Lin, 2022) to form control groups.

A total of 29 standardized assessment instruments were used, 21 of which were employed in only one study. The instruments applied in two studies were: the *Clinical*

*Global Impression–Severity scale* (Berger et al., 2021; Dakwar-Kawar et al., 2023), the *MOXO-CPT* (Berger et al., 2021; Dakwar-Kawar et al., 2023), the *Digital Span* (Berger et al., 2021; Dakwar-Kawar et al., 2023), the *Stroop test* (Chang et al., 2022; Kim et al., 2020), and the *Canadian Occupational Performance Measure* (COPM) (Frisch et al., 2020b; Pijarnvanit & Sriphetcharawut, 2024). The only instrument used in four studies was the *Behavior Rating Inventory of Executive Function* (BRIEF) (Frisch et al., 2020b; Dakwar-Kawar et al., 2023; Kim et al., 2020; Pijarnvanit & Sriphetcharawut, 2024).

The therapeutic interventions applied in the studies were: Parent Occupational Executive Training (POET) (n=2) (Frisch et al., 2020a, 2020b); interventions using digital games and virtual reality (n=2) (Barkin et al., 2023; Berger et al., 2021); white noise (n=2) (Chen et al., 2022; Lin, 2022); Transcranial Random Noise Stimulation (tRNS) (n=2) (Berger et al., 2021; Dakwar-Kawar et al., 2023); a therapeutic group based on body expression and playfulness (n=1) (Farias et al., 2021); parent coaching via telehealth (n=1) (Pijarnvanit & Sriphetcharawut, 2024); Cognitive-Functional training (n=1) (Kim et al., 2020); and motor coordination activities (n=1) (Chang et al., 2022).

Parent Occupational Executive Training (POET) was described in two studies (Frisch et al., 2020a, 2020b) and was conducted over eight weekly sessions with a uniform structure: parents defined occupational goals to be achieved with their children; next, the occupational therapist presented potential strategies to address these demands, and the parents selected some to apply at home. Both studies demonstrated the effectiveness of the intervention; one of them (Frisch et al., 2020b) identified a significant improvement in children's executive functions, particularly in the inhibitory control and working memory scales. The other study (Frisch et al., 2020a), in turn, highlighted increased parental satisfaction regarding their children's daily occupational performance.

Interventions mediated by digital games also demonstrated promising results. Barkin et al. (2023) used virtual reality to promote motor skills in children with ADHD, comparing two groups: one with self-directed games and another with sessions conducted by occupational therapists. Although both groups showed improvements, gains were more expressive in the professionally mediated interventions, which highlights the value of therapeutic mediation in enhancing the effects of technology.

Complementarily, Berger et al. (2021) investigated the use of the ACTIVATE™ program, composed of five short-duration digital games aimed at strengthening executive functions. The intervention was combined with transcranial random noise stimulation (tRNS) or transcranial direct current stimulation (tDCS). The most significant results were observed in the group that received tRNS combined with the games, with a reduction in ADHD symptoms and improvements in working memory and cognitive processing speed. Dakwar-Kawar et al. (2023) also combined tRNS with computerized cognitive training, and their results reinforced the benefits of this modality of brain stimulation associated with cognitive interventions, with positive effects on both clinical symptoms and behavioral executive functions.

In addition to these approaches, two reviewed studies investigated the effects of white noise on cognitive and behavioral aspects of children with ADHD. Chen et al. (2022) evaluated verbal working memory performance in children with ADHD and with typical development (TD) under three auditory conditions: no sound, white noise, and pleasant music. The results indicated that children with ADHD showed better

performance under the white noise condition and worse performance in the absence of sound. In contrast, children with TD demonstrated the opposite pattern. In turn, Lin (2022) identified that white noise favored sustained attention and contributed to the reduction of hyperactive behaviors.

A distinct approach identified in the review was the use of Expressive Vital Movement (EVM) as a group therapeutic resource for children with ADHD, among other diagnoses. The therapeutic group, conducted in an outpatient clinic within the public health care network, consisted of 20 weekly sessions and aimed to stimulate body awareness and expressiveness in a playful manner and to promote a sense of collectivity among the children. Although this is an experience report without a structured evaluation of outcomes, the proposal broadens the discussion on the possibilities of occupational therapy practice beyond interventions focused exclusively on cognitive-behavioral aspects, valuing the expressive and relational dimensions of the child (Farias et al., 2021).

Kim et al. (2020) investigated the effects of a cognitive-functional intervention (Cog-Fun), aimed at teaching self-regulation strategies and environmental adaptation, demonstrating significant advances in executive functions and self-directed learning in children with ADHD after 16 sessions. The identified progress encompassed aspects such as planning, organization, inhibitory control, task shifting, and working memory. In addition to the improvements observed in the children, parents' reports indicated a positive perception regarding changes in their children's occupational performance, highlighting the relevance of active family participation in occupational therapy intervention processes.

Adopting an approach distinct from the previously discussed interventions, Pijarnvanit & Sripetcharawut (2024) investigated the effects of parent coaching delivered via telehealth on occupational performance and executive functions in children with ADHD. The program was structured into three phases, each composed of thirteen sessions, grounded in three pillars: goal setting, provision of theoretical and practical education, and application of problem-solving strategies. Although this is a preliminary study, with a small number of participants and no control group, the results suggest advances in children's executive functions, as well as a marked increase in parents' perception of their own parental competence. These findings reinforce the potential of active family involvement, even in remote formats, as a relevant component in therapeutic interventions for ADHD.

Finally, one study evaluated the effectiveness of motor coordination activities based on table tennis, associated with visual concentration, in promoting executive functions and improving handwriting in children with ADHD. The study included three groups: one that performed training with real table tennis, another with a simulated version using exergames, and a control group that did not participate in any intervention. Both the real and simulated training occurred over 12 weeks, with three weekly sessions. At the end of the intervention, both experimental groups showed significant improvements in handwriting, response time, and the time required to achieve writing automatization. However, only the group that participated in real table tennis training achieved significant advances in performance on the Wisconsin Card Sorting Test, a classic measure of higher cognitive functions such as cognitive flexibility and problem solving. These findings indicate that structured motor practice, especially in real contexts, may favor the development of executive functions and graphomotor skills in children with ADHD (Chang et al., 2022).

## Discussion

The review conducted indicated that, despite the significant worldwide prevalence of ADHD (Hora et al., 2015; Brasil, 2022; Polanczyk et al., 2014), few recent studies specifically address the role of occupational therapy with this population. However, it is noteworthy that nearly half of the included studies are randomized clinical trials, contributing significantly to the advancement of evidence-based practice in the profession, since this design is considered the gold standard in intervention research for presenting the highest level of scientific evidence (Elagami et al., 2022).

It was also observed that a wide variety of standardized instruments were used to assess participants, with emphasis on the BRIEF, which was the most frequently used. This instrument assesses executive functioning in children and adolescents aged 5 to 18 years through questionnaires answered by parents, teachers, or the adolescents themselves. Its results provide a global measure of executive functioning, in addition to two specific indices: behavioral regulation, which encompasses inhibitory control, flexibility, and emotional control; and metacognition, which includes initiative, working memory, planning/organization, organization of materials, and monitoring (Carim et al., 2012). Originally developed by Gioia et al. (2000), the instrument was translated and adapted for the Brazilian population by Carim et al. (2012).

It is important to highlight that, although the Statute of the Child and Adolescent (Brasil, 1990) defines a child as an individual up to 12 incomplete years of age, it was verified that some authors of the articles identified in the review searches referred to their participants as children but included individuals up to 12 years of age. These articles were therefore included to make the review feasible and in respect of the authors' choice for this inclusion.

Regarding therapeutic interventions, a variety of approaches were identified, such as POET; interventions with digital games and virtual reality; use of white noise; transcranial stimulation; therapeutic groups using playful and body expression resources; parent follow-up via telehealth; Cognitive-Functional training; and motor coordination activities.

Despite the diversity of types of intervention identified, most share a common objective: to promote improvements in executive functions (EFs). ADHD significantly impacts these skills, which consist of cognitive processes responsible for controlling behavior, thoughts, emotions, and attention (Souza et al., 2021).

It is estimated that approximately 50% of children with ADHD present alterations in executive functions, resulting in delays in the development of competencies such as planning, organization, and cognitive flexibility, among others (Qiu et al., 2023). Such difficulties compromise the performance of daily occupations and engagement in school, family, and social contexts. Executive functions show continuous development until the third decade of life, with a peak between 6 and 8 years of age, a period marked by intense myelination of the prefrontal cortex. Therefore, this age range is considered especially sensitive for the acquisition and strengthening of these skills. In general, executive functions are organized into three main components: self-control, related to impulse inhibition; working memory, which allows retaining and manipulating information; and cognitive flexibility, which enables adaptation to changes and creative problem solving. When impaired, these functions negatively affect performance in activities that require sustained attention, compliance with instructions, organization, and planning (Souza et al., 2021).

In line with the findings of the present study, a systematic review with meta-analysis conducted by Qiu et al. (2023) analyzed the effects of non-pharmacological interventions on executive functions in children and adolescents with ADHD. Among the types of intervention evaluated, game-based training stood out, demonstrating a significant impact on overall executive functions, especially working memory, which converges with the results found in this review. However, this approach did not show significant effects on inhibitory control and cognitive flexibility. In addition to game-based training, the meta-analysis identified favorable evidence for the use of cognitive training, which also promoted significant improvements in overall executive functions, corroborating the findings of this study. Other approaches analyzed included interventions based on specific curricula for the development of executive functions, mindfulness practices, neurofeedback training, and physical exercise, expanding the range of therapeutic strategies with potential to benefit the executive performance of children with ADHD.

Regarding the use of transcranial stimulation, benefits of tRNS were observed, defined as a non-invasive technique that applies electrical currents with random frequencies and amplitudes to modulate cortical excitability. This approach is particularly relevant for children with ADHD due to alterations in cognitive control and reward pathways (Nejati et al., 2024). Another study (Dakwar-Kawar et al., 2023) compared the two types of non-invasive brain stimulation, tRNS and tDCS, associated with Cognitive Training in children with ADHD, and showed that tRNS promoted greater benefits in processing speed. This advantage was especially observed under conditions of higher cognitive demand, such as prolonged tasks that induce greater mental fatigue, regardless of the nature or load of distractors. In addition, tRNS was better tolerated by participants, with fewer sensory side effects reported, such as tingling and itching, compared to tDCS. These findings, corroborated by the studies presented in this review, suggest that tRNS may represent an effective and clinically acceptable strategy to support children with ADHD in contexts of high cognitive demand, and may be a strategy adopted by occupational therapists.

White noise can be defined as a continuous and random sound that covers a wide range of frequencies (Baijot et al., 2016), and has been studied as a possible modulator of attention and behavior. The reviewed studies are aligned with the literature that supports the benefits of white noise on the cognitive functioning of children with ADHD (Baijot et al., 2016), reinforcing its feasibility as an intervention strategy.

Lelong et al. (2021) warn that therapeutic approaches in occupational therapy have focused on ADHD symptoms, executive functions, and behavioral changes, but generally neglect fine motor difficulties. According to the review conducted by these authors, several studies report a wide variety of motor deficits in children with ADHD, including reduced handwriting skills, as well as lower precision in movement control and coordination, often described as abrupt or less fluid. Movement speed and temporal organization also appear to be affected. In addition, these children may present impairments in balance, body scheme, and spatial organization. Overall, motor development appears to be atypical in children with ADHD, with a delay of almost two years compared to neurotypical peers. Thus, it is important for occupational therapists to consider psychomotor aspects (such as gross and fine motor coordination, balance, spatial organization, etc.) in their practice with children with ADHD. Oliveira et al. (2018) also highlight the relevance of assessing motor skills in this group, since the

difficulties identified can guide specific interventions and promote participation in the school context.

This present scoping review presented a variety of interventions carried out by occupational therapists with children with ADHD. However, the literature points to the existence of other therapeutic approaches used by professionals from other health areas or by occupational therapists working with other age groups. Such approaches represent promising possibilities, still little explored, in occupational therapy practice with children with ADHD, and may be adapted and expanded to better meet the demands of this population. Among these interventions are video modeling of behavior (Wilkes-Gillan et al., 2021), mindfulness practice (Lee et al., 2022), the use of weighted blankets to improve sleep quality (Lönn et al., 2023), and equine-assisted therapy (Gilboa & Helmer, 2020).

A national survey conducted in Canada with occupational therapists (Ianni et al., 2021) indicated that interventions by these professionals with children with attention disorders frequently address different impairments related to sensory processing, fine motor skills, and participation in school contexts. The use of sensory approaches to manage behavioral symptoms associated with ADHD was highlighted.

A systematic review conducted by Nielsen et al. (2017) indicated that play-based interventions showed promising results with children with ADHD; however, these use varied approaches and do not follow standardized protocols, which hinders their reproducibility. Interventions involving the family have been shown to increase the generalization and transfer of gains to the child's daily life, reinforcing the importance of parental participation (Nielsen et al., 2017).

The treatment of children with ADHD should be individualized, considering the intensity of symptoms, life context, family organization, school environment, and personal history. The role of the occupational therapist is to promote a meaningful daily life through critical and humanized planning that encompasses the organization of routines, self-care, activities of daily living, social relationships, and participation in relevant occupations.

Considering the greater vulnerability of these children, the absence of compensatory strategies may result in significant impacts on health and functionality. In this sense, the work of the occupational therapist involves identifying weaknesses, limitations, and disruptions in daily life, as well as offering resources and adaptations that promote autonomy and full participation (Almohalha & Massita, 2021).

Although there are promising and evidence-based interventions for children with ADHD, the diversity of approaches, the absence of standardized protocols, and the limitation of robust studies highlight the need for further research to consolidate effective practices, integrating cognitive, motor, sensory, and family aspects.

## **Conclusion**

This review highlighted that occupational therapy offers several promising interventions for the care of children with ADHD, with an emphasis on promoting and improving executive functions, which are essential for performing daily activities and the overall development of this population. Although the number of studies available is still limited, the methodological quality, especially through randomized clinical trials, strengthens the evidence base for therapeutic practice.

In addition, the literature points to other therapeutic approaches that can also be incorporated and adapted to the occupational therapists work, expanding their field of intervention and potential impact. This expansion represents a relevant opportunity for occupational therapy to contribute broadly and innovatively to addressing the challenges posed by ADHD.

Therefore, further research on these emerging interventions is recommended, as well as the development and evaluation of specific programs that integrate different techniques and strategies. In this way, it will be possible to improve clinical practices and promote more effective, individualized interventions focused on the needs and contexts of children with ADHD and their families.

As limitations, this review did not include grey literature and did not specifically address interventions in adolescents, which indicates the need for future studies to expand knowledge about occupational therapy practice in this age group.

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### **Author's Contributions**

Emilly Gizzi Rodrigues contributed to the study design, data collection and analysis, and manuscript writing. Amanda Mota Pacciulio Sposito contributed to the study guidance, data collection and analysis, writing, and revision of the final work. All authors approved the final version of the text.

### **Data Availability**

The data supporting the results of this study are available from the corresponding author upon request.

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