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Oral narrative structure and coherence of children with attention deficit hyperactivity disorder

Estrutura e coerência da narrativa oral de crianças com transtorno de déficit de atenção e hiperatividade

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Keywords

Narration
Children's Language
Language Development
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ABSTRACT

Purpose: This study aimed to characterize and compare the use of typical story grammar elements and global coherence level in the oral narrative of children with Attention Deficit Hyperactivity Disorder with the narrative of children without the disorder and with typical development. **Methods:** A total of 40 children of both sexes aged 5 to 10 years who attended elementary school participated in the study, 20 of whom were diagnosed with Attention Deficit Hyperactivity Disorder (ADHD Group), and 20 with typical development (TD Group). Participants from each group were similar in sex, chronological age, schooling and socioeconomic status. The wordless picture book *Frog, Where Are You?* was used to elicit the oral narrative analyzed for the presence of the main typical elements of the story schema (character, theme/topic, event/plot and outcome), and afterwards their narration was classified according to four different levels of organization corresponding to the global story coherence level. **Results:** The ADHD Group presented lower scores on the structural elements "theme/ topic" and "outcome" and a narrative with lower degree of coherence compared to the TD Group. **Conclusion:** The children with ADHD included in this study presented difficulties to use typical story grammar elements, mainly related to the maintenance of the central theme and outcome of the story. These elements are considered fundamental for construction of narrative coherence, which justifies the lower levels of global coherence found in the oral narrative of the ADHD Group.

Descritores

Narração
Linguagem Infantil
Desenvolvimento da Linguagem
Transtornos do Desenvolvimento Infantil
Transtorno do Déficit de Atenção e Hiperatividade

RESUMO

Objetivo: O objetivo do estudo foi caracterizar e comparar o uso de elementos típicos da gramática de história e o nível de coerência global na narrativa oral de crianças com Transtorno de Déficit de Atenção e Hiperatividade à narrativa de crianças sem o transtorno e com desenvolvimento típico. **Método:** Participaram 40 crianças com idade entre 5 e 10 anos, de ambos os sexos, que frequentavam o ensino fundamental, sendo 20 com diagnóstico de Transtorno de Déficit de Atenção e Hiperatividade (Grupo TDAH) e 20 com desenvolvimento típico (Grupo TD). Os participantes de cada grupo eram semelhantes quanto ao sexo, idade cronológica, escolaridade e nível socioeconômico. O livro "*Frog Where Are You?*" foi utilizado para eliciar a narrativa oral de história, que foi analisada quanto à presença dos principais elementos típicos do esquema de história (personagem, tema/tópico, evento/trama e desfecho) e posteriormente classificada dentre quatro diferentes níveis crescentes de organização, correspondendo ao nível de coerência global da história. **Resultados:** O grupo TDAH apresentou menor pontuação nos elementos estruturais "tema/tópico" e "desfecho" e narrativa com grau de coerência inferior quando comparado ao grupo TD. **Conclusão:** As crianças com TDAH deste estudo apresentaram dificuldades no uso de elementos típicos da gramática de história, principalmente relacionados com a manutenção do tema central e desfecho da história. Tais elementos são considerados fundamentais para a construção do sentido da narrativa, o que justifica os níveis inferiores de coerência encontrados na narrativa oral do grupo TDAH.

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INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that affects approximately 5% of children in different cultures and can persist in adulthood in approximately 2.5% of cases, which impacts on the social, academic and professional functioning and development of the individual[1].

The ADHD diagnostic criteria established by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)[1] are based on the frequency and time since the onset of symptoms, including, among the main criteria, the existence of persistent patterns of lack of attention and/or hyperactivity-impulsiveness during the six months preceding presentation or beginning before 12 years old.

Language, motor or social impairments are among the developmental disabilities considered comorbidities of ADHD. Although language impairments are not part of ADHD diagnostic criteria, it is common for parents to report that their children have undergone speech-language intervention at preschool age, as well as interventions due to academic difficulties at school age[2].

On this topic, there is no doubt that in the field of studies on the developmental trajectory of individuals with ADHD, performance in academic and cognitive skills underlying the reading and writing learning process has been systematically investigated, both in the national and international scientific scenario, as the review study showed[3]. On the other hand, there is little research on the performance of spoken language of individuals with ADHD, although difficulties both at the receptive and expressive level have been described in this clinical group[4].

The literature shows discussions about whether impairments in the development of oral language and the symptoms of ADHD constitute comorbidities or they are secondary to the deficits in executive functions, which are often found as part of the clinical picture of ADHD. Studies that showed no significant differences in the performance of children with language disorder and ADHD compared to children with language disorder without ADHD in standardized language tests have supported the hypothesis of language impairments as comorbidities. This finding suggests that the language impairments observed in cases of ADHD would constitute a primary, not a secondary sign—therefore, a comorbidity[5].

On the other hand, other studies have discussed language impairments in ADHD as secondary manifestations of impaired executive or behavioral functions. Among them, the findings obtained from naturalistic samples of oral language (e.g. conversation and narrative) indicated losses mainly in the context of pragmatic and discursive skills with significant impairments in speech coherence[4,6-8]. According to this perspective, the losses in executive functions would justify the emergence of both behavioral and social communication problems, as well as other cognitive problems (e.g. operational memory) that impact on the development of language skills (e.g. phonology)[9].

Impairment in pragmatics has been the most consistent finding among the studies with individuals with ADHD[7,10-12]. They include the presence of speech impairments and disregard for conversational principles, maintenance of the topic, and exchange of communicative shift rules, even though these individuals may present similar performance to their peers of the same chronological age in standardized tests that assess specific linguistic skills, such as vocabulary[13].

Studies on oral story narration of individuals with ADHD have shown that their performance is below the expected for their age, both in comprehension and production tasks[13,14], although the most evident losses have been observed in narrative production[6,15,16].

Performance in oral story narrative tasks of individuals with ADHD has been characterized by the presence of significant losses in narrative coherence[6,8,15,17,18], as well as losses in the ability to present explicit relations of causality among the narrated events, resulting in predominantly descriptive narratives[17-19]. In the context of comprehension, the main difficulty lies in the ability to make inferences, apparently because they cannot establish the necessary links between the information conveyed orally, possibly due to memory and management failures caused by shorter attention times[8,20,21].

The studies focusing specifically on narrative performance showed that the content of the narrative tends to be compromised, although individuals with ADHD often show an increase in linguistic productivity, expressing more communicative units in the narrative than their peers of the same chronological age. This could be explained by the difficulty they present in inhibiting verbal behavior, planning and organizing the content of the narrative[6,8,13-16].

As mentioned, oral narrative coherence impairment has been pointed out in the literature as a frequent manifestation in ADHD. Thus, this study was proposed based on the hypothesis that the narrative skills of children with ADHD would present lower levels of global coherence compared to the narrative skills of children with typical development. However, one issue poorly explored in the literature that could provide significant directions for an intervention program focusing on the oral story narrative with individuals with ADHD is understanding which structure elements of the story narrative schema could be more impaired, thus reflecting on the difficulty of these individuals to produce coherent stories.

This study proposed to investigate narrative coherence by searching for information on the global story organization skills, which falls on the investigation of macrostructural aspects of the narrative. From the macrostructural perspective, in investigating story narrative coherence, it is assumed that the typical structural elements of the story grammar model are fundamental both to the structure and to establish the global coherence of the narration, since the structural elements (e.g. characters, setting, situation problem and outcome) are articulated around a thematic axis, and thus the story is perceived by the listener as being globally coherent to a greater or lesser extent[22].

Thus, the aim of this study was to characterize the use of typical elements of story grammar and the global coherence level in the oral narrative of children with Attention Deficit Hyperactivity Disorder and compare it with the narrative of children without the disorder and with typical development

and no complaints regarding the main areas of development (motor, cognitive and language).

METHODS

This study was approved by the Research Ethics Committee (Protocol No. 0408/2011), and all individuals had their participation authorized by their parents and/or legal guardians upon signing the informed consent form.

The study included 20 individuals with an interdisciplinary diagnosis of Attention Deficit Hyperactivity Disorder (ADHD Group), between 6 and 10 years old, 14 males and 6 females. The participants were schoolchildren who attended public education from the 1st to 5th grade. An interdisciplinary team performed the clinical diagnosis of ADHD in accordance with the criteria established by DSM-IV-TR[23], in force at the beginning of the study. The majority of participants were diagnosed with ADHD combined type (65%). All cases were undergoing drug treatment at the time of evaluation, one case with clonazepam and the others with methylphenidate hydrochloride (Table 1).

For comparison purposes, 20 individuals with typical development (TD Group) also participated. They were selected in the same schools of the participants with ADHD, respecting the same sex, chronological age and schooling criteria of the ADHD Group, in addition to not presenting complaints regarding the main areas of development (motor, cognitive and language).

The oral narrative of the story was elicited with the picture book *Frog, Where Are You?*[24]. The book consists of 29 pages organized into 24 wordless figure boards with sequential events. All participants were instructed to handle the book in order to familiarize themselves with the material and the theme, so that afterwards they could narrate the story orally with the support of the book. For analysis purposes, the narration was recorded and fully transcribed.

The typical elements of the story narrative schema and the global story coherence level were analyzed as per Spinillo and Martins' proposal[22]. According to this system, the global coherence level was established from the four main typical story elements: (1) permanence of the characters throughout the narration; (2) maintenance of the theme/topic; (3) main event/ plot or situation problem; and (4) outcome. Each of these four elements was assessed on a three-point Likert scale with an ascending level of complexity. The scores attributed to each of the items analyzed (character, theme/topic, event/plot and outcome) were grouped to obtain the classification of the coherence level, as shown in Figure 1.

This study used the system of analysis by judges. Two independent judges (speech-language therapists) performed the classification without previous knowledge of the group to which the children belonged. For cases of disagreement between the two judges, a third judge, also a speech therapist with experience in the aforementioned analysis, intervened. For statistical analysis of the data, we used the likelihood-ratio test on the SPSS (Statistical Package for Social Sciences) program version 20.0. The significance level adopted was of 5% (0.05).

Table 1. Characteristics of the group with Attention Deficit and Hyperactivity Disorder

Individual	Sex	Age	School grade	Classification according to ADHD type	Active ingredient of the medication
1	M	6 years old	1st grade	Combined	Methylphenidate hydrochloride
2	M	7 years old	2nd grade	Combined	Methylphenidate hydrochloride
3	M	7 years old	2nd grade	Combined	Methylphenidate hydrochloride
4	M	8 years old	2nd grade	Inattentive	Methylphenidate hydrochloride
5	M	8 years old	2nd grade	Combined	Methylphenidate hydrochloride
6	M	8 years old	3rd grade	Inattentive	Methylphenidate hydrochloride
7	M	8 years old	2nd grade	Inattentive	Methylphenidate hydrochloride
8	M	8 years old	3rd grade	Combined	Methylphenidate hydrochloride
9	M	8 years old	3rd grade	Combined	Methylphenidate hydrochloride
10	F	8 years old	3rd grade	Combined	Methylphenidate hydrochloride
11	M	9 years old	3rd grade	Inattentive	Methylphenidate hydrochloride
12	M	9 years old	4th grade	Inattentive	Methylphenidate hydrochloride
13	M	9 years old	4th grade	Combined	Clonazepam
14	F	9 years old	3rd grade	Combined	Methylphenidate hydrochloride
15	F	9 years old	3rd grade	Combined	Methylphenidate hydrochloride
16	F	9 years old	3rd grade	Combined	Methylphenidate hydrochloride
17	F	9 years old	3rd grade	Combined	Methylphenidate hydrochloride
18	M	10 years old	4th grade	Combined	Methylphenidate hydrochloride
19	F	10 years old	5th grade	Attention deficit	Methylphenidate hydrochloride
20	M	10 years old	5th grade	Attention deficit	Methylphenidate hydrochloride

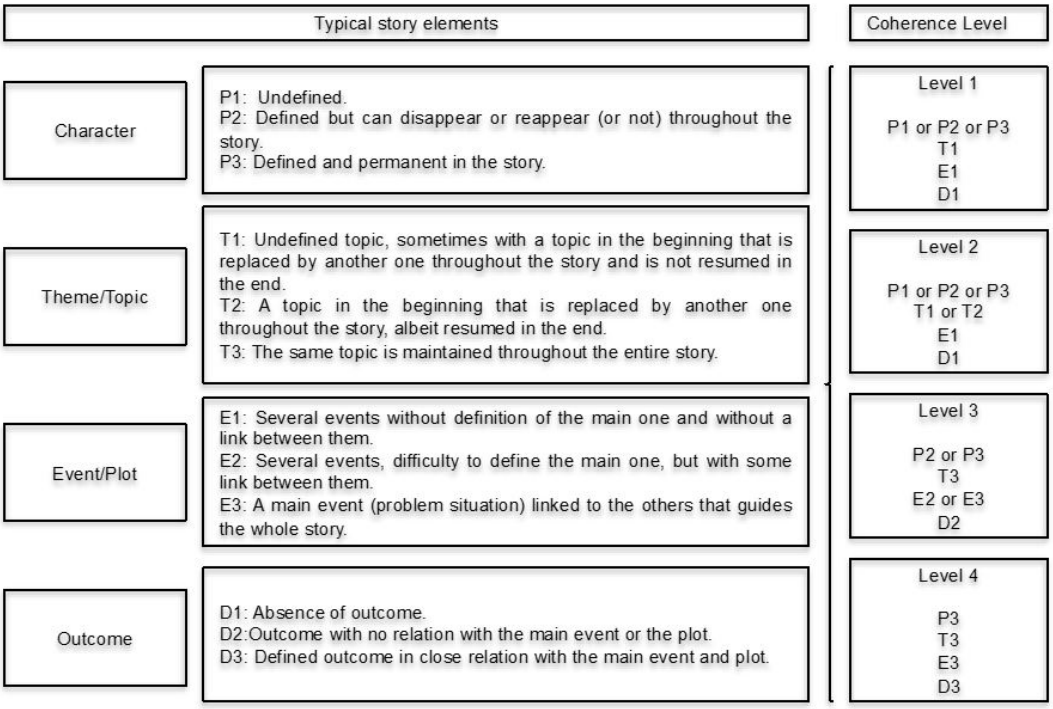

Figure 1. Representation of the classification system of global story coherence level adopted in the study and proposed by Spinillo and Martins[22]

RESULTS

Table 2 shows the respective percentages of children regarding the typical story elements, which were identified from the narrative sample and its respective classification categories, as provided by the global coherence level classification system adopted in this study (character, theme/topic, event/plot and outcome).

A statistically significant difference was found between the ADHD and TD Groups in all story elements analyzed, except for the element "character". The story element "character" was the only one that presented a similar distribution between the groups (ADHD and TD), where most children from both groups were classified at the most complex level (Level 3).

The data distribution shows a higher concentration of participants in the ADHD Group in the lower levels of classification (level 1 and 2), especially with regard to the elements "event/plot" and "outcome".

For these elements, the lowest classification level found in the TD Group was level 2 (35% for both elements, "event/plot" and "outcome"). It was observed that the instances of level 2 found in the TD Group corresponded to younger children.

In relation to the "theme/topic" element, while the children of the TD Group are all at the most complex level (T3), the children in the ADHD Group are distributed among the three levels of classification (T1, T2 and T3). Nevertheless, it is worthy of note that most of them are distributed between levels 2 and 3—50 and 20%, respectively.

Table 2. Comparison between the ADHD and TD Groups as to the typical story elements

Typical story elements	Category	Groups				p
		ADHD		TD		
		Freq.	Perc. %	Freq.	Perc. %	
Character	P1	0	0.00	0	0.00	0.368
	P2	1	5.00	1	5.00	
	P3	19	95.00	19	95.00	
Theme/Topic	T1	2	10.00	0	0.00	< 0.001*
	T2	8	40.00	0	0.00	
	T3	10	50.00	20	100.00	
Event/Plot	E1	3	15.00	0	0.00	0.006*
	E2	13	55.00	7	35.00	
	E3	4	20.00	13	65.00	
Outcome	D1	1	5.00	0	0.00	0.001*
	D2	18	90.00	7	35.00	
	D3	1	5.00	13	65.00	

*Significant values ($p<0.05$) – Likelihood-Ratio Test
Caption: ADHD = Attention Deficit Hyperactivity Disorder; TD = Typical Development; Freq. = Frequency of individuals; Perc. = Percentage of individuals

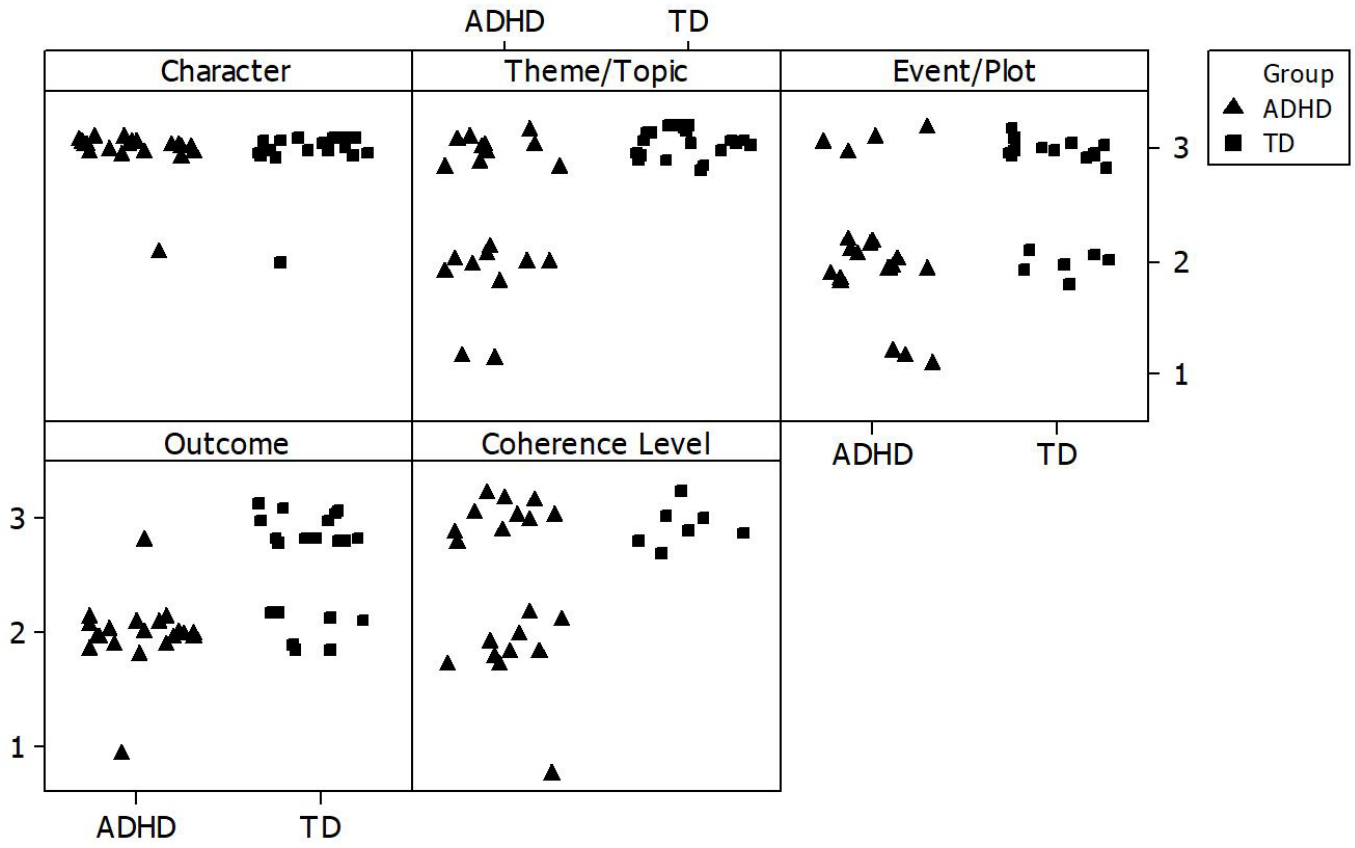

Figure 2. Distribution of children per group (ADHD and TD) in the classification categories analyzed for the typical story elements and global coherence level of the narrative

Table 3. Comparison between the ADHD and TD groups regarding the global coherence level of the story narrative

	Category	Groups				p
		ADHD		TD		
		Freq.	Perc. %	Freq.	Perc. %	
Coherence Level	1	1	5.00	0	0.00	< 0.001*
	2	09	45.00	0	0.00	
	3	10	50.00	7	35.00	
	4	0	0.00	13	65.00	

*Significant values (p<0.05) – Likelihood Ratio Test
Caption: ADHD = Attention Deficit Hyperactivity Disorder; TD = Typical Development; Freq. = Frequency of individuals; Perc. = Percentage of individuals

Figure 2 shows a more detailed distribution of children per group (ADHD and TD) into the classification categories analyzed for the typical story elements and global coherence level of the narrative. It was observed that the lowest level of global coherence (level 1) was not found in the TD Group, as the most complex level of narrative organization (level 4) was not found in the ADHD Group.

Regarding classification of the global coherence level, a statistically significant difference was found between the ADHD and TD groups (Table 3). It is observed that 45% of the sample of participants with ADHD presented coherence level 2, and 50% coherence level 3, while the narratives of the TD Group received classification 3 and 4 (35 and 65%, respectively).

DISCUSSION

This study aimed to characterize and compare the use of typical elements of story grammar and the global coherence level in the oral narrative of children with Attention Deficit Hyperactivity Disorder to the narrative of children without the disorder and with typical development (absence of motor, cognitive and language development complaints).

The results obtained indicate similarities and differences between the ADHD and TD groups regarding the use of typical story structural elements and the global coherence level of the narrative.

With regard to the categories of typical story elements, the performance of the groups was similar for the element

"character"—i.e. the children in both the ADHD Group and the TD Group were able to identify and maintain the characters of the story proposed in the picture book throughout the narration. This is the reason why they showed the most complex level for this category (C3). This performance was expected for the age and education level of the children with ADHD and TD participating in this study[22].

In relation to the "theme/topic" element, it was observed that the children of the ADHD Group were mostly distributed between classification levels T1 and T2, while the children of the TD Group all scored at the most complex level (T3).

To analyze the item "theme/topic", the coherence analysis system used in this study takes into account whether the story maintains the same theme throughout the entire narration. The analysis of the performance of children with ADHD showed that they inserted comments unrelated to the task and the theme of the story, with difficulties to resume the event they had been narrating, which in turn broke the semantic-contextual chain of the story. This finding corroborates previous studies that indicate the existence of pragmatic impairments in ADHD for language tasks requiring high demand for information, such as oral narrative[4,6-8].

Although there are other indicators of narrative coherence, the maintenance of the theme is undoubtedly a fundamental element, as its absence causes significant losses in the story interpretation[22,25].

In turn, differences between groups were also found for the elements "event/plot" and "outcome". The less complex categories were more used by the individuals with ADHD (Table 2 and Figure 2), where the category with intermediate classification (level 2) predominated in the narration—55 and 90%, respectively.

Although most children in the TD Group presented a more complex level of classification in the element "event/plot", the intermediate level (level 2) was also found in the narration of younger children (6 and 7 years old). At around 6 years old, children are still expected to present an action that suggests the beginning of a plot without making the problem situation of the story explicit in the narration[22], which was the explicit mention of the frog's escape in the case of the picture book used in the study. At around 9 years old—the predominant age group among the children in the ADHD and TD groups—the problem situation is expected to appear in the narration in a defined manner[22,26], as observed in most of the children in the TD Group, unlike the ADHD Group.

Regarding the story outcome, it was observed that the children with ADHD, despite using linguistic markers that denote the story end, often presented outcomes with poorly elaborated contents, frequently culminating in an unexpected closure of the story (e.g. "The boy caught the frog. The end.") The story outcome did not clarify whether the problem of the story had been resolved (e.g. if the frog found was the one that had ran away or a frog that replaced the one that had ran away).

According to Spinillo and Martins[22], the ability of children to report an outcome closely related to the events narrated in the story, so as to make the resolution of the problem explicit, is one of the most difficult aspects to establish in narrative schema development. Therefore, this is one of the most important developmental indicators, which shows the level of complexity of this schema as well as its global coherence. Among other factors, the emergence of more elaborate narrative structures is related to the resolution of the problem situation and to the mention of objectives and consequences associated with the problem[22]. These aspects differed between the groups (ADHD and TD), which justifies the lower levels of global coherence found in children with ADHD.

Another aspect that may have contributed to the lower levels of global story coherence of the ADHD Group was the difficulty that these children (even the older ones) presented in narrating the challenges and obstacles experienced by the characters. In the scenes of the picture book referring to the challenges and obstacles, both the children of the ADHD Group and the youngest children in the TD Group (6 and 7 years old) presented a predominantly descriptive structure (e.g. "The boy climbed the tree.") They did not elucidate the causality between the actions narrated (obstacles) in an attempt to solve the problem (e.g. "The boy decided to climb the tree to see if the escaping frog was there.")

The narrative of the challenges or obstacles faced by the main character in an attempt to solve the story problem is one of the factors that contribute to the construction of more complex narrative schemas. Narrating the events linked to the challenges allows the narrator to build sub-episodes within the narrative[27], which is expected from the age of 8-9 years[28].

From the results obtained, it is understood that the difficulty presented by individuals with ADHD in maintaining the theme, narrating the obstacles experienced by the characters and building an outcome can justify the lower level of story coherence of children with ADHD compared to their peers (Table 3). This finding confirmed the initial hypothesis of the study, corroborating previous studies[5,10-16], and allowed for the identification of which structural elements contributed to the lower coherence levels of the ADHD Group.

It is known that a successful narrative production depends on cognitive, linguistic and social functions[29]. Thus, it is a complex ability that requires the activation of different brain areas, especially of frontotemporal neural networks, which are particularly impaired in individuals with ADHD[7,14-19] and where the areas involved in language processing and executive functions are[30].

Because it is a complex ability dependent on neurobiological and social factors, narrating changes considerably throughout children's development. It is influenced by their exposure to the story schema in the different experiences lived in the family and school environment, in addition to the cerebral maturation that occurs mainly after 3 years old, when changes on executive function development are also observed[26,30]. It would be interesting, therefore, to carry out a systematic evaluation of narrative language in diagnosed cases and with predictive signs of ADHD.

The implications of this type of study are found in the importance of evaluating the performance of individuals with ADHD in oral narrative tasks to allow for the early identification of difficulties occurring at this complex level of spoken language organization—the narrative—and, ultimately, to provide

intervention strategies with emphasis on the macrostructural aspects, in order to favor more complex and coherent levels of story schema organization.

This study has limitations, thus the need for caution in interpreting and generalizing the data presented. Among the limitations, it may be pointed out that the children with ADHD who participated in the study did not undergo a formal evaluation to investigate their academic skills with a view to discuss potential associations with narrative performance. In addition, an analysis of the children's performance in the narrative was not carried out with a view to investigate associations or identification of potential similarities or differences according to the subtype and severity of ADHD, considering that the number of participants did not allow subgroup analysis. Future studies may explore narration differences according to the subtype and severity of the disorder.

In addition, the method used in this study to investigate oral narrative focused on production—it did not measure comprehension, which would be important, given the evidence of loss in this dimension as well, as pointed out in previous studies[13,14,20,21]. Finally, coherence was analyzed from a specific set of structural elements that constitute part of the global story coherence, assuming an understanding that these are a few among several other aspects (e.g. cohesive elements) to be investigated in addressing story narrative coherence. It is worth noting that this study did not address the microstructural aspects of the narrative (e.g. syntax and semantics), since the focus of the investigation was on the typical structural components of the story narrative schema involved in the global coherence of the narrative.

CONCLUSION

Children with ADHD in this study presented difficulties in the use of typical elements of story grammar, especially related to the maintenance of the central theme and outcome of the story, which contributed to lower levels of global coherence compared to their peers with typical development.

Although structural elements are not the only factors responsible for narrative coherence, it is known that such elements are important to build its meaning, mostly for thematic maintenance and, consequently, to present a coherent outcome closely related to the story problem situation that evidences the relation among the events narrated.

The results reported here suggest the need for interventions with emphasis on macrostructural aspects, in order to promote more complex levels of organization and coherence of story narratives of individuals with ADHD.

Future studies may investigate microstructural aspects of the narrative, with a view to the semantic and syntactic aspects of the language of children with ADHD and to contribute to a better understanding of the impact of behavioral manifestations and neurocognitive disorders of ADHD, taking into account the subtypes of this disorder and its effects on oral narration and potential associations with performance in reading and writing.

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Authors contributions

MPZ was responsible for data acquisition, data analysis and writing the article; CMG and NFR were responsible for the design and conception of the study, data acquisition, data analysis, writing the article and, the orientation and co-orientation of the study, respectively; ALDMS was responsible for data acquisition and data analysis.