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School-age children with specific language impairment produce more speech disfluencies than their peers

Escolares com distúrbio específico de linguagem utilizam mais rupturas de fala que seus pares

ABSTRACT

Purpose: To compare the occurrence of speech disfluencies during narrative production in children with specific language impairment (SLI) and their age-matched peers. **Methods:** The study included 60 children aged between 7 and 10 years, 40 with typical language development and 20 with SLI. For data collection, a series of 15 stories was used, each one represented by pictures composed of four scenes. Narratives were transcribed and the speech disfluencies presented on them were classified as stuttering-like disfluencies (part-word repetition, single-syllable word repetition, and dysrhythmic phonation — prolongations, blocks and broken words) or other disfluencies (interjection, revision/abandoned utterances, and multisyllable/phrase repetition). The disfluency categories were compared in each group and its occurrence was also compared between groups. **Results:** The occurrence of stuttering-like and other disfluencies did not differ among children with typical language development, whereas children with SLI produced other disfluencies. Between-group comparison showed that children with SLI produced more disfluencies of both types than their age-matched peers. **Conclusion:** Children with SLI showed more speech disfluencies during narrative production than their age-matched peers, and the most common disfluencies used by them were not typical of people who stutter (interjection, revision/abandoned utterances, and multisyllable/phrase repetition).

RESUMO

Objetivo: Comparar a ocorrência de rupturas de fala durante a produção de narrativas em escolares com distúrbio específico de linguagem (DEL) e seus pares cronológicos. **Métodos:** Participaram do estudo 60 crianças com idade entre 7 e 10 anos, sendo 40 em desenvolvimento típico de linguagem e 20 com DEL. Para a coleta de dados, foi utilizada uma série de 15 histórias, representadas por figuras, compostas por quatro cenas cada. As histórias foram transcritas e as rupturas de fala presentes nessas narrativas foram classificadas em gegas (repetição de parte da palavra, repetição de uma sílaba da palavra e fonação disrítica — prolongamentos, bloqueios e palavras rompidas) ou outras (interjeição, revisão/abandono de segmentos e repetição de frases ou multissilábica). O tipo de ruptura foi comparado em cada grupo, e a ocorrência de cada tipo de ruptura foi comparada entre os grupos. **Resultados:** Enquanto a ocorrência dos tipos de rupturas não diferiu nos escolares em desenvolvimento típico de linguagem, os escolares com DEL tiveram maior ocorrência de outras rupturas. A comparação entre os grupos revelou que os escolares com DEL produzem mais rupturas de ambos os tipos do que seus pares. **Conclusão:** A ocorrência de rupturas de fala durante a produção de narrativas foi maior em escolares com DEL do que seus pares cronológicos, sendo que as rupturas classificadas como não gegas (interjeição, revisão/abandono de segmentos e repetição de frases ou multissilábica) foram mais frequentes para essa população.

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INTRODUCTION

Fluent speech production depends on the activation of semantic, phonological, and syntactic information, influenced by contextual information⁽¹⁾. The soft and accurate movement of several parts of the vocal tract is essential in this process, which requires that motor planning can occur without interferences⁽²⁾. Therefore, when this process presents flaws, the fluency in speech production is interrupted, thus generating ruptures or disfluencies^(2,3).

In normal language development, several studies have shown that speech disfluencies are more frequent when linguistic representations are still developing, especially in lexical and syntactic aspects⁽³⁻⁵⁾. From the lexical point of view, the initial representation of unknown words is limited^(6,7), and this representation is reinforced by the experience with the word that, up to that point, is unknown. This allows the children to make fewer efforts to access that word in memory and, consequently, produce less disfluencies⁽⁷⁻⁹⁾. From the syntactic point of view, a similar process exists in which a higher level of experience with the language enables better fluency of speech⁽³⁾.

The occurrence of speech disfluencies during normal language development can also be related to the speech mismatch between lexical and syntactic skills during specific periods of development, thus determining asynchronies in speech production that trigger flaws in speech planning⁽⁸⁾. Besides, speech disfluencies can be used as strategies to buy some time or fix errors during sentence production⁽³⁾.

In the case of children with specific language impairment (SLI), who normally present difficulties in lexical acquisition, delay in the appearance of first words and limitations in lexical access, as well as important morphosyntactic deficit⁽¹⁾, it is usually necessary to reinforce language-related experiences, so that their linguistic representations can be efficiently established⁽⁶⁾.

This disorder is diagnosed with the presence of significant changes in the processes of language acquisition and development that do not result from broader changes, such as hearing loss, neurological damage, intellectual disabilities, or pervasive developmental disorders^(10,11).

Therefore, it is reasonable to state that children with SLI may present disfluencies in speech production when presenting weak linguistic representations^(8,12). Besides, these children need to work hard to learn the language, and they constitute a risk group for fluency changes during speech production activities that overload their linguistic system⁽¹²⁾.

Effectively, a higher rate of speech disfluencies is associated with children with SLI, because they would require more time to plan and formulate sentences. A low level of automaticity to formulate the language is also attributed to them as a result of the delay to domain certain grammatical forms, which would also lead to the higher incidence of word repetition in their discourse^(13,14).

The inclusion of the assessment of speech fluency is pointed out as being essential in the process of diagnosing specific language changes, because it enables us to verify the effective use

of language. Besides, children suspected of having SLI aged between 3 and 4 years showed reduced speech rate measured in syllables and words per minute⁽¹⁵⁾.

An essential aspect to be considered is that speech disfluencies tend to reduce with age in children with typical development, because they only occur in longer and syntactically more complex segments⁽¹⁶⁾. However, because children with SLI present strong difficulties in more complex linguistic tasks, such as narratives, there may be an increasing occurrence of speech disfluencies in this type of linguistic activity, even if they produce shorter, less cohesive narratives, with semantic, morphological, and syntactic errors^(14,17).

There is still evidence that the pattern of disfluencies used by the population with SLI is different than that of children with typical language development because fluency is associated with the effective use of language. Although children with history of language disorder significantly presented more stuttering-like disfluencies (part-word repetition, prolongations, blocks, and broken words) than their peers, the use of common disfluencies (word repetition and revisions) was similar in both groups⁽¹²⁾.

Other studies did not find significant differences between the use of common disfluencies when comparing children with SLI and their peers^(3,15). According to the authors, this result was unexpected, but it can be explained by the fact that the speech sample is based on narratives, which does not require a shift change, and, therefore, does not favor the use of resources to elaborate the message during speech⁽³⁾.

Considering that morphosyntax also interferes in fluency, and because we did not find studies about the use of disfluency by Portuguese-speaking school-age children with SLI in the literature, this analysis aimed at comparing the occurrence of speech disfluencies during the production of narratives among school-age children with SLI and their age-matched peers.

METHODS

The project was approved by the Research Ethics Committee of the School of Medicine of the University of São Paulo (number 1150/09), and people in charge of the children signed the informed consent.

The study included 60 children aged between 7 and 10 years, being 40 with typical language development (18 male participants) and 20 with SLI (14 male participants). Individuals were paired by age group, in a ratio of two participants with typical development to one in the SLI group. All individuals lived in the city of São Paulo and studied in a regular public school.

Individuals with typical language development were selected from a state school located in the west zone of the City of São Paulo. At first, all subjects were individually screened during the regular classroom period in a room reserved for this study. Inclusion criteria for the typical development group were as follows: absence of complaints regarding language development; attending regular classrooms, compatible with the age group; not presenting any productive phonological process or idiosyncratic changes in

imitation and naming tests of phonology⁽¹⁸⁾, besides having a compatible performance according to the expectations in tasks involving phonological awareness, reading and writing skills⁽¹⁹⁾.

Members of the SLI group were undergoing weekly speech and language treatment, and had been previously diagnosed based on international criteria — exclusive linguistic deficit and nonverbal intelligence quotient within normal standards⁽¹¹⁾. For that diagnosis, the child should have preserved hearing and results below expected in at least two standardized language tests, from the child language assessment ABFW⁽²⁰⁾ and the evaluation of the mean length utterance⁽²¹⁾. The minimum time of speech and language therapy for these individuals was 6 months, and the average period was 3 years.

For data collection, a series of 15 stories was used, represented by figures, composed of four scenes each^(22,23). During data collection, participants were told that the sequence of four figures composed a story. The first figure was presented to the child, who was asked to organize the others and narrate the respective story. In case the figures were not ordered in the usual manner, the researcher wrote down the adopted order, however, the child was not advised to rearrange or narrate according to the usual order; therefore, all the children elaborated stories that were compatible with their understanding of the sequence. To eliminate possible variables, such as short-term memory deficit, figures were visible for the child during the entire narrative.

After data collection, two graduate students of speech language pathology transcribed each story narrated by all the subjects. After the transcriptions, the same speech language pathologists analyzed the disfluencies according to the following classification: stuttering-like disfluencies (part-word repetition, single-syllable word repetition, and dysrhythmic phonation — prolongations, blocks, and broken words) and other disfluencies (interjection, revision/abandoned utterances, and multisyllable/phrase repetition)⁽²⁴⁾.

After that stage, the reliability calculation of the analyses was performed using the Pearson correlation coefficient, *r*, and the intraclass correlation coefficient (ICC). For the average stuttering-like disfluencies, rates were *r*=89.9 and ICC=87.9, both with *p*<0.001; and for the average of other disfluencies, rates were *r*=80.9 and ICC=80.8, both with *p*<0.001. Therefore, it was possible to observe that the minimum agreement was 80.8%, which is in accordance with literature.

To respond to the objective, descriptive and inferential statistical analysis was performed using the software Statistical Package for the Social Sciences, version 18. For intragroup comparison, the Wilcoxon test was used, and for between-group comparison in each type of disfluency, the Mann–Whitney test was adopted. The initial significance level was 5%.

RESULTS

Descriptive analysis indicates that the mean and median occurrence of stuttering-like disfluencies and other disfluencies are lower in the group of typical language development.

The intragroup comparison between disfluencies did not differ among school-age children with typical language development, however, the group with SLI had higher occurrence of other disfluencies (Table 1).

The between-group comparison showed that school-age children with SLI produced more stuttering-like disfluencies and other disfluencies than those with typical language development (Table 2).

Table 1. Descriptive statistics and intragroup comparison of disfluencies

Grupo	Mean (SD)	Median	Min	Max	Z	p-value
TLD (n=40)						
Stuttering-like	8.33 (6.41)	7	0	24	-1.771	0.076
Others	10.53 (7.14)	8	2	30		
SLI (n=20)						
Stuttering-like	17.8 (19.07)	10.5	2	74	-2.700	0.007*
Others	31.8 (30.45)	16.5	2	99		

*Significant result (*p*<0.05) – Wilcoxon test

Caption: TLD = typical language development; SLI = specific language impairment; SD = standard deviation; Min = minimum; Max = maximum

Table 2. Between-group comparison of the occurrence of each type of disfluency

Disfluencies	Median	U	Z	p-value
Stuttering-like				
TLD (n=40)	7	234	-2.608	0.009*
SLI (n=20)	10.5			
Others				
TLD (n=40)	8	187	-3.345	0.001*
SLI (n=20)	16.5			

*Significant result (*p*<0.05) – Mann–Whitney test

Caption: TLD = typical language development; SLI = specific language impairment

DISCUSSION

To compare the occurrence of speech disfluencies during the production of narratives among school-age students with SLI and their age-matched peers, it was first necessary to establish the profile of stuttering-like disfluencies and other disfluencies for both analyzed groups, and then verify if the use of each type of disfluency was different between groups.

With regard to the profile of the occurrence of each type of disfluency, in the group with typical language development there was not a prevalent type of disfluency, however, in the group with SLI, the other disfluencies were more common. Interestingly, disfluencies that were prevalent in that group were interjection, utterance revision, and sentence or word repetition, because these are more associated with linguistic content than with motor planning in the act of speaking⁽²⁾.

The difficulty related to content would really be more expected in the population with SLI, because it presents lower domain of language rules in its several linguistic aspects^(12–14).

However, even if this finding confirms that the pattern of disfluencies used by the population with SLI is different from its peers, it is different from previous studies that found no significant differences concerning the use of disfluencies considered as non-stuttering-like^(3,12,15).

This difference can be a result of the type of used material, because, in this sample, students were asked to elaborate narratives based on logical-temporal sequences. In this type of task, the linguistic demand is higher than when static figures are presented⁽¹⁵⁾, a book with no words⁽¹²⁾.

However, other methodological aspects may have interfered in this result. Whereas in this study the classification of disfluencies divides them into stuttering-like (part-word repetition, prolongations, blocks, and broken words) and others (interjection, revision, and phrase repetition)⁽²⁴⁾, in the other mentioned studies disfluencies were classified as silent pauses and vocal hesitation (filled-in pauses, interjections, word or part-word repetition, revision)⁽³⁾, as normal (word/phrase repetition, revision, and interjection) and stuttering-like disfluencies (part-word repetition, prolongation, and block)⁽¹²⁾, or as common disfluencies (hesitation, word repetition, revision, interjection, unfinished word, segment repetition, and phrase repetition) and stuttering-like disfluencies (syllable repetition, blocks, prolongation, sound repetition, pause, and intrusion)⁽¹⁵⁾. Therefore, it is possible that differences between these classifications, even if subtle, led to different results. So, for further analyses, it would be interesting to compare the occurrence of each type of disfluency in these groups, because then it would be possible to identify which one of them, common or stuttering-like, distinguishes the groups.

Another aspect that could explain such a divergence is the age group, which was different between studies and could justify the difference in the linguistic domain of these subjects, therefore interfering in the occurrence of disfluencies. In this study, students were aged between 7 and 10 years; in another national study, the analyzed age group ranged between 3 and 7 years⁽¹⁵⁾ and, in international analyses, individuals were students aged 9 years^(3,12).

Besides, while in this study the participants had been diagnosed and were undergoing speech language and audiology therapy, in the other national study they were still being diagnosed⁽¹⁵⁾ and, in the international one, they kept a linguistic performance that was inferior to that of their peers, however, they were not undergoing therapy⁽¹²⁾. So, the linguistic strategies learned in therapy may favor changes in the pattern of speech fluency.

When disfluencies were compared in the groups, students with SLI showed to use more disfluencies of both types. This finding confirms that the linguistic difficulty of this population is also clear in the pattern of speech fluency, because even stuttering-like disfluencies are more frequent.

The use of syllable or part-word repetition, prolongations, blocks, and broken words is more associated with speech motor planning⁽²⁾, which indicates that the linguistic damage in the case of SLI can affect the language process, thus leading to imbalance that generates these disfluencies⁽³⁾.

In situations when demand overcomes the linguistic capacity of these individuals, as is the case of elaborating narratives

from logical-temporal sequences⁽²⁵⁾, speech disfluencies can also be used as processing strategies to buy some time for planning and formulating phrases, or fixing errors during the production of phrases^(3,13).

The occurrence of disfluencies in complex linguistic tasks is predicted for individuals without language changes⁽¹⁶⁾; however, if we consider that for individuals with SLI the elaboration of narratives is experienced as a complex linguistic task, it would be justified due to the difficulty to integrate lexical, morphosyntactic, and contextual aspects^(14,17). Recent national studies pointed out that the population with SLI faces difficulties related to fluency exactly because of the difficulty to functionally use closed class words, and to elaborate narratives that require knowledge of the world and pragmatic skills⁽²⁶⁻²⁸⁾.

Therefore, the findings in this study reinforce the importance of assessing the fluency in situations of language disorder, because the profile of fluency of these individuals distinguishes them from speakers who do not have such a disorder. This aspect also needs to be considered in the therapeutic process, because this awareness shows the need to improve the fluency of speech of these individuals. Without strategies that help them elaborate speech more efficiently, it is very likely that these individuals will no longer be interested in speech, considering to be insecure or with little domain about the subject they approach.

So, it is interesting that new studies be developed to verify other fluency-related aspects of this population, such as speech rate, and also to propose clear and scientifically based forms to intervene in such cases, thus contributing with the improvement in the communication of these individuals, and, consequently, to strengthen Speech Language Pathology and Audiology.

CONCLUSION

By comparing the occurrence of speech disfluencies during the production of narratives, it was possible to observe that school-age children with SLI produced more disfluencies than their age-matched peers, and disfluencies classified as non-stuttering-like (interjection/revision/abandoned utterance and phrase/multisyllable repetition) were more common for this population.

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