Original Article

Artigo Original

Fluency and reading comprehension in students with reading difficulties

Fluência e compreensão leitora em escolares com dificuldades de leitura

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Keywords

Reading
Comprehension
Learning
Public sector
Students

ABSTRACT

Purpose: To characterize the performance of students with reading difficulties in decoding and reading comprehension tasks as well as to investigate the possible correlations between them. **Methods:** Sixty students (29 girls) from 3rd to 5th grades of public Elementary Schools were evaluated. Thirty students (Research Group – RG), ten from each grade, were nominated by their teachers as presenting evidences of learning disabilities. The other thirty students were indicated as good readers, and were matched by gender, age and grade to the RG, composing the Comparison Group (CG). All subjects were assessed regarding the parameters of reading fluency (rate and accuracy in words, pseudowords and text reading) and reading comprehension (reading level, number and type of ideas identified, and correct responses on multiple choice questions). **Results:** The RG presented significantly lower scores than the CG in fluency and reading comprehension. Different patterns of positive and negative correlations, from weak to excellent, among the decoding and comprehension parameters were found in both groups. In the RG, low values of reading rate and accuracy were observed, which were correlated to low scores in comprehension and improvement in decoding, but not in comprehension, with grade increase. In CG, correlation was found between different fluency parameters, but none of them was correlated to the reading comprehension variables. **Conclusion:** Students with reading and writing difficulties show lower values of reading fluency and comprehension than good readers. Fluency and comprehension are correlated in the group with difficulties, showing that deficits in decoding influence reading comprehension, which does not improve with age increase.

Descritores

Leitura
Compreensão
Aprendizagem
Setor público
Estudantes

RESUMO

Objetivo: Caracterizar o desempenho de escolares com dificuldade de leitura, em tarefas de decodificação e compreensão leitora e buscar correlações entre ambas. **Métodos:** Foram avaliados 60 escolares (29 meninas) que cursavam do 3º ao 5º ano do Ensino Fundamental na rede pública do município de São Paulo. Trinta escolares (Grupo Pesquisa - GP), dez de cada ano, foram indicados por seus professores por apresentarem queixas ou indícios de dificuldades de leitura. Outros trinta, indicados como bons leitores, pareados por gênero, idade e escolaridade ao GP, compuseram o Grupo de Comparação (GC). Todos os escolares foram avaliados quanto aos parâmetros de fluência de leitura de itens isolados (palavras e pseudopalavras) e texto, e de compreensão leitora de texto narrativo (nível de leitura, número e tipo de ideias identificadas, acertos às questões de múltipla escolha). **Resultados:** O GP apresentou valores de fluência e compreensão leitoras mais baixos que o GC. Diferentes padrões de correlações positivas e negativas, de fracas a ótimas, entre os parâmetros de decodificação e compreensão foram encontradas nos dois grupos. No GP foram observados baixos valores de taxa e acurácia de leitura correlacionados a baixos valores de compreensão e melhora da decodificação, mas não da compreensão, conforme avançaram os anos escolares. No GC, observou-se correlação entre os diferentes parâmetros de fluência avaliados, mas nenhum desses parâmetros correlacionou-se com as variáveis de compreensão leitora. **Conclusão:** Os escolares com dificuldades de leitura e de escrita apresentam baixos valores de parâmetros da fluência e da compreensão leitora. Fluência e compreensão correlacionam-se no grupo com dificuldades, mostrando que as alterações da decodificação influenciam a compreensão leitora, a qual não melhora com a escolaridade.

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Received: 2/9/2011

Accepted: 6/8/2011

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INTRODUCTION

Reading deficits and alterations are subject of study on different areas of knowledge concerning cognitive, psychoemotional, and social development. Several studies indicate the need for elaboration of educational policy plans to encourage early language stimulation, since they believe in the language influence on the development of the alphabetic principle and on the conquest of reading with comprehension and writing with property[1-3].

Most studies investigating the processes involved in reading recognize two main components: word recognition and comprehension[4-6]. It is known that in a typical development path, there is a dissociation between these components, which becomes each time more distinct with the improvement of reading[7-9]. Specific skills related to each component of the reading process are investigated to understand the differences in performance in text comprehension.

Not all students have the readiness to learn to use the alphabetic code on reading and writing. The international literature has shown that 10 to 18% of students may have some difficulty learning to read and write[3]. The problems manifested by children with reading and writing difficulties can result from failures at different stages of linguistic information processing. The latest studies on reading comprehension deficits investigate possible causes and predictive components of these manifestations[1,10-15]; longitudinal and interventional methods of ability pairing are used on this type of investigation. Thus, researchers are able to characterize the performance of distinct populations (children with specific comprehension or specific decoding deficits) and, separately, the skills developed in along reading acquisition.

In Brazil, students who present some reading or writing difficulty, especially in the Public Educational System, do not receive adequate learning process support. This occurs due to an innumerable series of factors related to the literacy condition of parents, unprepared teachers, as well as inadequate health equipment. It is imperative that the characterization of the reading condition provides information on the decoding and comprehension ability as well as on the correlations between the abilities of these two instances of cognitive processes that lead to the purpose of reading, which is comprehension of the text read.

Given the above mentioned, the purpose of this study was to characterize the performance of students with reading difficulties in tasks of reading decoding and comprehension and to investigate the possible correlations between them. The purpose arouse from the hypothesis that it would not be possible to observe the typical development path of reading in this group, in which the growing dissociation between the components of decoding and comprehension are expressed. Therefore, the results could indicate the presence of decoding alterations that, to some extent, would influence the observed difficulties in reading comprehension.

METHODS

This study was approved by the Research Ethics Committee of Universidade Federal de São Paulo, under protocol number 1499/08. The procedures were conducted after the signing of the participation agreement of the schools, and the Informed Consent Form of parents of students.

Sixty children (29 girls) regularly enrolled in the 3rd, 4th or 5th grade of Elementary School (mean age: 8 years and 3 months, 9 years and 5 months and 10 years and 8 months, respectively) of five different schools from the Public State School System located in the central and southern areas of the city of Sao Paulo participated. Thirty children (ten of each grade) were referred by their teachers as having reading and writing difficulties and, therefore, composed the Research Group (RG). The remaining 30 students, matched to the RG by age and education at a 1:1 ratio, were referred by their teachers as good readers, and composed the comparison group (CG). The regular enrollment in Elementary School was defined as inclusion criterion in both groups. Students who presented complaints or indicators related to auditory and visual (uncorrected) or speech and language alterations, neurological or cognitive disorders, or retention were excluded from the sample. Importantly, for the composition of the RG teachers were instructed about the inclusion and exclusion criteria – i.e. they were asked to indicate the students who showed difficulties to read and/or write, but that did not manifest the above mentioned alterations.

The 60 students were assessed for the components of decoding (by obtaining the parameters of fluency) and reading comprehension. The fluency analysis was conducted through the oral reading of single items (38 words and 29 pseudowords, balanced on the extent, frequency and orthography) and text (a different text for each grade) selected from appropriate educational materials[16,17]. The written material presented was printed in Arial 12 font with 1.5 spacing. The readings were individually conducted and recorded for later transcription and analysis. No time limit was established and the monitoring with digital support during reading was not restricted.

A specific protocol[18] was used to assess reading comprehension. Each student was instructed to silently read a second text – appropriate to his/her age and grade – presented on a printed sheet of paper with Arial 11 font and double spacing. Prior to the reading task, the students were informed of the possibility of reading the text more than once and the lack of time limit for completion of reading. They also received the instruction that immediately after reading they would be asked to retell the story and read and answer six multiple choice questions related to the text. The retelling was oral and was recorded in a MP4 digital recorder for later transcription and canonical analysis.

Participants were individually assessed in a room granted by the school. The sessions always occurred during class schedule previously established by the coordination and teaching staff. The presence of noise at levels that would not interfere on voice detection and comprehension of the orally presented message was adopted as a condition. In the absence of such conditions, the session was interrupted and resumed later.

Measurements of total reading duration were made from listening to the recordings. To evaluate fluency parameters, the reading rate (number of words or pseudowords read per minute)

and the accuracy values (number of words and pseudowords correctly read per minute) were calculated in the oral reading of single items and text. Correct and incorret items were identified. An item was considered correct when it was correctly and fluently read. Hesitations, review strategies for corrections or errors in orthographic decoding were considered errors.

The evaluation of text comprehension through retelling was conducted by the identification of ideas[18], and by the identification of the number of ideas presented[17]. The identification of central ideas revealed three possible patterns of retelling, corresponding to three different levels of comprehension achieved: Level 0 (zero) – when the retelling expressed only secondary ideas; Level 1 – when retelling expressed the presence of central ideas, however with the absence of at least one of those considered essential; Level 2 – when the retelling expressed a pattern of central ideas expression with or without the presence of other ideas considered secondary. The classification of retelling canonically transcribed – according to established standards – allowed the attribution of specific scores, as follows: level 0 – received no score; level 1 – one point; level 2 – two points.

For the second retelling evaluation, a specific parameter was used to identify ideas. The parameter was defined a priori by a panel of three judges who identified the propositions and elaborative inferences that are important for understanding the stories of each of the texts used[17]. From this analysis, the categories of narrative events in each of these tales were selected by consensus[19]. The transcriptions of the retellings were analyzed to identify each of the proposed ideas presented on the parameters[17]. One point was attributed to each identified and completely expressed idea. The possibility of the total score varied according to the text read: 27, 25 and 41 ideas for texts offered to the third, fourth and fifth grades, respectively. The sum of scores obtained on the retelling task by each student was computed. The number of correct responses was considered to evaluate the performance of students on the multiple choice questions[16]. After the completion of all assessments, orientation and guidelines were provided to the coordination of each school in order to refer students identified with reading and writing difficulties for special services in Speech and Language Pathology.

All data obtained in the analysis of the performance of students who composed the RG were tabulated and entered into a spreadsheet along with the CG data. Data from the CG, collected from research records, had been previously analyzed using the same criteria. Data from both groups were subjected to statistical analysis.

The Mann-Whitney test was applied to compare the same variables and the Spearman correlation test was applied to measure how the parameters and variables of fluency and reading comprehension were correlated. A significance level of 5% (0.05) was adopted for this study.

RESULTS

Between-group differences were found for fluency and comprehension (Table 1). Children from the RG spent more time reading and had lower reading rates and accuracy in reading isolated words, pseudowords, and text. Poorer RG performance was also observed when comparing the variables related to reading comprehension. The students who exhibited reading and writing difficulty complains presented fewer ideas of the text read on the retelling task. In addition, they more frequently exhibited lower levels of reading comprehension and a smaller number of correct answers to multiple choice questions.

The statistical analysis of the RG (Table 2) revealed positive and negative correlations ranging from weak to excellent. Only results that showed statistical significance are highlighted in this study.

Weak to moderate positive correlations were found between educational level and reading rates of single items and text, and the accuracy of pseudoword and text reading. The total time of individual items reading was negatively correlated with the reading average rate and accuracy obtained in all tests. The total duration of text reading also showed moderate to good negative correlations with rate and accuracy of single item reading, rate and accuracy in text reading.

There were good positive correlations between the total reading time of words, pseudowords, and text. In addition, good to great positive correlations were obtained between word reading rate and accuracy in pseudowords and text reading, and between word reading accuracy and speed and accuracy in reading pseudowords and text.

The reading rate of pseudowords showed good positive correlations with pseudoword and text accuracy and with the text reading rate. The accuracy in reading pseudowords showed good positive correlation with rate and accuracy of text reading.

Reading comprehension revealed weak to moderate positive correlations between the total number of ideas in retelling and the other comprehension variables. Weak to moderate positive correlations were also observed between the reading rate of single items and text and accuracy of words and text. There were weak negative correlations between the total time of reading words and text, and the total ideas presented in retelling. Moderate positive correlations between speed and accuracy of pseudoword reading, and between text and total number of ideas in retelling were also found. Still in this group, weak positive correlations were obtained between rate and accuracy of text reading.

The CG results revealed weak to moderate positive correlations between education, text reading time, and all reading comprehension variables. There were also good to moderate positive correlations between reading time for pseudowords, words and text and moderate to excellent negative correlations between word reading time and reading rate and accuracy of single items and text. The reading time for pseudowords showed moderate to excellent negative correlations with rate and accuracy in reading pseudowords and text. The reading time of texts revealed good negative correlation with text rate and accuracy (Table 3).

Correlations were also identified between: the reading rate of words and word accuracy; rate and accuracy of pseudowords and text; reading rate of pseudowords and text reading rate; pseudoword accuracy and text; text reading speed and text accuracy.

Table 1. Between-group (RG and CG) comparison on the fluency parameters and reading comprehension

Variable	Group	Mean	Median	SD	Q1	Q3	CI	p-value
Word reading time	GP	93.8	89	35.8	65	121	12.8	<0.001*
	GC	53.4	48	17.8	42	60	6.4	
Word reading rate	GP	27.7	26	9.6	19	35	3.4	<0.001*
	GC	46.9	48	14.0	38	54	5.0	
Word reading accuracy	GP	15.5	15	8.5	9	22	3.0	<0.001*
	GC	39.9	39	15.0	29	48	5.4	
Pseudoword reading time	GP	74.2	67	25.8	57	81	9.2	<0.001*
	GC	52.6	49	13.8	41	64	4.9	
Pseudoword reading rate	GP	25.6	26	6.7	22	30	2.4	<0.001*
	GC	35.3	36	9.1	27	42	3.3	
Pseudoword reading accuracy	GP	14.2	14	6.8	10	18	2.4	<0.001*
	GC	23.5	21	8.9	17	30	3.2	
Text reading time	GP	243.5	215	93.5	181	289	33.5	<0.001*
	GC	119.0	114	46.4	91	136	16.6	
Text reading rate	GP	50.5	50	17.3	39	61	6.2	<0.001*
	GC	107.4	107	32.6	87	129	11.7	
Text reading accuracy	GP	45.0	41	18.5	33	58	6.6	<0.001*
	GC	104.7	104	32.3	84	125	11.6	
Total number of ideas in retelling	GP	5.33	5	5.11	2	8	1.83	<0.001*
	GC	11.77	13	5.20	9	16	1.86	
Reading comprehension level	GP	0.13	0	0.43	0	0	0.16	<0.001*
	GC	1.40	2	0.72	1	2	0.26	
Accuracy on multiple choice questions	GP	2.83	3	1.72	2	5	0.62	0.001*
	GC	4.37	5	1.30	4	5	0.46	

* Significant values (p<0.05) – Mann-Whitney test

Note: Q1 = 1st quartile; Q2 = 2nd quartile; CI = confidence interval; SD = standard deviation; RG = research group; CG = control group

The correlations among accuracy parameters of the three types of stimuli (words, pseudowords, and text) were also evident.

On the reading comprehension analyses, the results revealed weak to moderate correlations between the total number of ideas in retelling and other variables as well as between comprehension level and the number of correct responses to the questions. Finally, the variables of fluency and reading comprehension were not correlated in the RG.

DISCUSSION

This study, unlike most studies in the area, sought to evaluate the performance of a heterogeneous group composed of students with supposed reading and writing difficulties. Despite the fact that the students had been previously screened, they effectively showed poorer performance on the different reading tests. The assumption on the heterogeneity of the sample rises because the students were not clinically assessed and, therefore, do not present diagnosis from Speech-Language Pathology or any other professional. In Brazil, there are several Elementary School students in this condition.

The low values of rate and accuracy in word reading exhibited by the RG are mainly caused by phonological processing deficits commonly found in children with reading and writing disorders. Similarly, poorer performance in pseudoword reading is generally associated with this deficit[20].

It is of common knowledge that deficits in decoding influence comprehension. In general, the differences between the two groups – with poorer performance of the RG – might confirm indications from the literature that laborious reading overloads the cognitive resources that could be directed to comprehend the text[8,21].

Table 2. Correlation between fluency parameter and reading comprehension variables on the RG

Variable	Correlation index	Grade	W time	W rate	W accur	Pseudo time	Pseudo rate	Pseudo accur	Text time	Text rate	Text accur	Ideias	Compr level
W time	Corr	-38.2%											
	p-value	0.037*											
W rate	Corr	38.2%	-100%										
	p-value	0.037*	<0.001**										
W accur	Corr	14.9%	-85.2%	85.2%									
	p-value	0.433	<0.001**	<0.001**									
Pseudo time	Corr	-39.7%	75.6%	-75.6%	-58.7%								
	p-value	0.030*	<0.001**	<0.001**	0.001**								
Pseudo rate	Corr	39.7%	-75.6%	75.6%	58.7%	-100%							
	p-value	0.030*	<0.001**	<0.001**	0.001**	<0.001**							
Pseudo accur	Corr	44.3%	-83.1%	83.1%	85.9%	-70.2%	70.2%						
	p-value	0.014*	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**						
Text time	Corr	-6.4%	78.3%	-78.3%	-64.3%	57.0%	-57.0%	-65.4%					
	p-value	0.738	<0.001**	<0.001**	<0.001**	0.001**	0.001**	<0.001**					
Text rate	Corr	40.6%	-93.9%	93.9%	82.9%	-71.0%	71.0%	83.6%	-84.3%				
	p-value	0.026*	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**				
Text accur	Corr	44.3%	-95.3%	95.3%	87.6%	-70.6%	70.6%	87.5%	-78.1%	97.0%			
	p-value	0.014*	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**			
Ideias	Corr	36.5%	-38.6%	38.6%	34.1%	-48.6%	48.6%	40.1%	-37.2%	43.0%	49.7%		
	p-value	0.047*	0.035*	0.035*	0.065	0.006*	0.006*	0.028*	0.043*	0.018*	0.005*		
Compr level	Corr	27.6%	-1.7%	1.7%	-1.3%	-1.0%	1.0%	7.5%	8.3%	-2.4%	11.9%	37.2%	
	p-value	0.139	0.929	0.929	0.946	0.959	0.959	0.693	0.664	0.898	0.532	0.043*	
Questions	Corr	30.9%	-30.5%	30.5%	25.2%	-32.8%	32.8%	35.1%	-35.9%	36.2%	37.6%	48.8%	24.3%
	p-value	0.097	0.101	0.101	0.179	0.077	0.077	0.057	0.051	0.050*	0.040*	0.006*	0.197

* Significant values (p<0.05) – Spearman Correlation test

** Significant values (p<0.001) – Spearman Correlation test

Note: W time = word reading time; W rate = word reading speed; W accur = word reading accuracy; Pseudo time = pseudoword reading time; Pseudo rate = pseudoword reading speed; Pseudo accur = pseudoword reading accuracy; Text time = text reading time; Text rate = text reading speed; Text accur = text reading accuracy; Ideas = total number of ideas in retelling; Compr level = reading comprehension level; Questions = question accuracy

It was also noted that the students from the RG (with lower rate and accuracy in word recognition – isolated or included in the text) exhibited fewer recollections and retellings of ideas identified in the texts. In a way, these results agree with the findings of studies which revealed that students with learning disabilities exhibit poorer performance in reading[22].

A study investigated whether textual memory is influenced by problems evidenced in the reading of words, by comparing the number of central and peripheral ideas retold by children with laborious reading (with adequate listening comprehension) and by typical readers. The authors found that the former are often hampered by the difficulty in decoding. Due to the effort and attention demanded in decoding words, they are not able to identify and recognize the essential information contained in the text and, therefore, the most important units are not returned on the retelling of what was read[21].

On the other hand, the literature also indicates that there might be readers who, even with difficulties in word recognition, use certain linguistic strategies to comprehend what they read, exhibiting good results. These readers exhibit alterations related to the phonological subsystem of language[1,6]. However, these changes are compensated by the fitness of other subsystems of language. Thus, the processes that lead to comprehension satisfactorily operate.

Table 3. Correlation between fluency parameters and reading comprehension variables on the CG

Variable	Correlation index	Grade	W time	W rate	W accur	Pseudo time	Pseudo rate	Pseudo accur	Text time	Text rate	Text accur	Ideias	Compr level
W time	Corr	0.5%											
	p-value	0.980											
W rate	Corr	-0.5%	-100%										
	p-value	0.980	<0.001**										
W accur	Corr	-5.0%	-91.7%	91.7%									
	p-value	0.795	<0.001**	<0.001**									
Pseudo time	Corr	8.7%	70.3%	-70.3%	-74.6%								
	p-value	0.646	<0.001**	<0.001**	<0.001**								
Pseudo rate	Corr	-8.7%	-70.3%	70.3%	74.6%	-100%							
	p-value	0.646	<0.001**	<0.001**	<0.001**	<0.001**							
Pseudo accur	Corr	-26.4%	-52.4%	52.4%	51.4%	-66.0%	66.0%						
	p-value	0.158	0.003*	0.003*	0.004*	<0.001**	<0.001**						
Text time	Corr	42.0%	70.4%	-70.4%	-66.3%	59.7%	-59.7%	-68.0%					
	p-value	0.021*	<0.001**	<0.001**	<0.001**	0.001**	0.001**	<0.001**					
Text rate	Corr	-14.9%	-67.3%	67.3%	65.1%	-62.0%	62.0%	78.1%	-77.5%				
	p-value	0.433	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**				
Text accur	Corr	-16.5%	-67.4%	67.4%	63.9%	-63.5%	63.5%	79.1%	-81.6%	99.3%			
	p-value	0.383	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**			
Ideias	Corr	53.4%	-14.0%	14.0%	8.1%	-16.3%	16.3%	22.7%	7.9%	31.8%	28.3%		
	p-value	0.002*	0.460	0.460	0.672	0.390	0.390	0.229	0.677	0.087	0.129		
Compr level	Corr	38.3%	3.9%	-3.9%	-12.5%	-17.4%	17.4%	19.9%	14.7%	11.9%	11.5%	44.1%	
	p-value	0.037*	0.836	0.836	0.511	0.358	0.358	0.293	0.438	0.530	0.546	0.015*	
Questions	Corr	39.0%	-19.8%	19.8%	9.2%	0.7%	-0.7%	12.3%	-0.8%	15.6%	13.6%	36.9%	44.2%
	p-value	0.033*	0.293	0.293	0.631	0.970	0.970	0.516	0.966	0.411	0.473	0.045*	0.014*

* Significant values (p<0.05) – Spearman Correlation test

** Significant values (p<0.001) – Spearman Correlation test

Note: W time = word reading time; W rate = word reading speed; W accur = word reading accuracy; Pseudo time = pseudoword reading time; Pseudo rate = pseudoword reading speed; Pseudo accur = pseudoword reading accuracy; Text time = text reading time; Text rate = text reading speed; Text accur = text reading accuracy; Ideas = total number of ideas in retelling; Compr level = reading comprehension level; Questions = question accuracy

Considering the sample inclusion and exclusion criteria, the RG is a representative group of children with reading difficulties in Brazil. Thus, given the differences in decoding and comprehension observed between the two groups, the fact that the RG is a heterogeneous group (despite the conditions dictated by the a priori established criteria), and the consistency on the profile of responses presented, led to the investigation of correlations between the parameters of fluency and comprehension in each group separately.

From the analysis of correlation between the parameters of fluency and reading comprehension levels investigated in the RG, it was observed that grade advancing was correlated with all variables of reading fluency, except to accuracy in reading words and the total time spent in text reading. The negative and positive correlations ranged from weak to moderate. Education was related to the increased rate and accuracy of reading pseudowords presented in isolation and along the text. Thus, education proved to be important for the development of the skills involved in word recognition of children with learning difficulties. The literature states that exposure to writing is directly related to the improvement of word recognition, which is then decoded faster and more accurately[20,23-26].

The findings indicated that appropriation of the rules of decoding also occurs in children with reading difficulties.

Previous research found similar reading progression rate in students with good academic performance[26].

However, despite the existence of a linear relationship among most of the parameters that assessed decoding and education, the accuracy in reading single words did not correlate with educational progress. This finding characterizes the group with reading difficulties – which certainly presents problems in information processing related to learning and mastery of orthographic rules.

Regarding the comprehension parameters of the RG, no differences were obtained in the correlation between reading comprehension level or answers to multiple choice questions and educational progress. The literature states that the competence to comprehend texts is primarily driven by language skills[1,11,17,27,28]. These skills, due to the complexity of factors involved in their development and function, when restricted or altered might be more dependent on specific therapeutic intervention than to educational level to provide the expected development and at the appropriate age group. Although the inclusion and exclusion criteria were considered, language assessment tests were not conducted. Besides the comparisons with the CG, this fact somewhat limited the discussion on the poor performance observed on the comprehension assessment. The knowledge on the actual characteristics of linguistic and metalinguistic skills development of students from the sample would be of great importance to explain the correlations found and also those that were not identified. Specific assessments on tasks that evaluate working memory, comprehension monitoring, distinction between different types of inferences and listening comprehension would certainly elucidate the basis of these correlations.

Only the analysis through the computation of the number of ideas in retelling showed several correlations with the parameters of fluency and with educational progress. It was observed that the shorter the total time required for reading the text or isolated items, and the higher the values of rate and accuracy, the greater the number of ideas recollected and presented in retelling by the students of the RG. Similarly, when analyzing reading comprehension of this group, it was observed that the higher the grade, the higher the number of ideas in retelling.

However, another study found that the difference in the assessment of reading comprehension among laborious readers and typical readers through retelling may not be related to the number of ideas involved, but to the difference between the central and peripheral ideas that compose the retelling[21]. This reaffirms the importance of qualitative analysis[21].

Some aspects should be considered when analyzing the correlation between education and the number of ideas. Initially, it is important to remember that the high or low number of recollected ideas can be determined or influenced by a higher or lower memory capacity, without the text being in fact comprehended. This memory capacity improves with age, thus explaining the results found[29]. Therefore, the lack of correlation between education and reading comprehension may be a characteristic of this group identified with reading and writing difficulties. Thus, in general, it can be argued that education did not necessarily facilitate the improvement of comprehension mechanisms of children who had reading and writing difficulty, contrary to what was observed in relation to the decoding capabilities. More narrowly, weak correlations were observed between the number of correct responses to multiple choice questions and the rate and accuracy of text reading. The comparison with groups of students enrolled in Private Schools could enrich this discussion.

From these observations, as even the students referred as having reading and writing difficulties might show improvement in decoding throughout the school year, it was expected that this gradual improvement would implicate in an increased accuracy in reading comprehension tasks. These children should have already been forwarded to appropriate language assessments. A longitudinal study[13] that compared three groups of children attending the eighth grade reported that one group presented poor comprehension performance and adequate decoding (characterized as "poor comprehension"), another presented poor decoding performance and adequate comprehension (characterized as "poor decoding") and, finally, a group of typical readers. The authors found that the two groups with reading difficulties did not differ on reading comprehension when evaluated during the second and fourth grades, differently from what was observed during the eighth grade. In addition, students with poor comprehension presented better performance in one of the subtests used when compared to those with decoding difficulties. The authors suggested that these results are due to natural comprehension changes that occur with development and progress in school. In the early years, reading comprehension is highly dependent on the decoding and less dependent on the comprehension of language. Thus, it is expected that the students who have difficulty decoding written material also experience difficulties in reading comprehension in early grades.

Although not related to the parameters of fluency, comprehension level and responses to multiple choice questions positively correlated with the number of ideas presented on retelling. This showed that the higher the number of ideas retold, the better the comprehension level of both groups, even if the RG has not reached the deepest level of comprehension (which in this study covers all the essential ideas of the text).

The investigation of possible correlations between the variables related to education and fluency parameters in the RG revealed that students with longer educational experience employed more time in reading texts. Certainly this was due to the difference in length of texts used, considering that for each year a specific text was presented according to grade progression. The other variables of fluency did not correlate with education. On the other hand, unlike the pattern observed in the RG, students from the CG showed a higher number of ideas, better reading comprehension level, and a higher number of correct responses to reading comprehension assessment questions with grade increase. Thus, as expected, all activities that assessed reading comprehension correlated positively with educational progression in the CG. These results indicated that, in this group, comprehension abilities improve with advancing grade. However, it is important to highlight that comprehension skills also improve with age given mechanisms of the

cognitive development. Findings from another study showed that the ability to construct inferences – such as those involved in the tasks that assessed comprehension in the current study – improve with time[30]. Likewise, the literature indicates that working memory also improves with age[29], although this aspect was not evaluated in the current study. Students from the CG showed a higher number of ideas in retelling, better reading comprehension level and a higher number of correct responses to questions of reading comprehension assessment with the advancing grade.

Aspects such as the extent of the different texts used in the assessments, together with the difference in cognitive demand imposed by the characteristics (literal and inferential) and amount of information conveyed in each of the texts, may have influenced decoding and reading comprehension, explaining the absence of educational level influence on the comprehension performance presented by students from RG. A study conducted with students who were considered good readers by their teachers, found that the linguistic material influences the performance of students[18]. Although the hypothesis of the influence of text characteristics on the performance of students cannot be disregarded, we must emphasize that some studies have reported the absence of an underlying source of comprehension difficulties and that this is also related to the nature of the test[11,13].

The importance of characterization of linguistic and metalinguistic development on the elucidation of the correlations found in the RG has already been reported. This could indicate the network of processes underlying the difficulties experienced in students with reading difficulties. Thus, specific evaluations with tasks that assess working memory, monitoring of comprehension and the distinction among different types of inferences and listening comprehension skills would certainly made these correlations clearer.

Finally, none of the fluency parameters correlated with the variables of reading comprehension in the CG. This result, together with the comprehension improvement according to grades, is in agreement with the literature that points to a dissociation between decoding and comprehension[6-8]. The results of the RG showed a different pattern of correlations from that presented by the CG. The different correlations between fluency and comprehension and the lack of comprehension development according to grade could indicate that the presence of decoding alterations influenced the observed difficulties in reading comprehension. Considering the importance of the participation of teachers in the sample selection – as they could identify struggling students – educational strategies for these students must also include the stimulation of linguistic, metalinguistic and comprehension skills. The concern should not only lie on the fluent and automatic recognition of words.

CONCLUSION

The students who exhibited reading and writing difficulties showed lower fluency parameters and poorer reading comprehension performance. Fluency and comprehension were correlated in the group with reading and writing difficulties. Decoding alterations affect reading comprehension which, in turn, does not improve with advancing grade.

ACKOWLEDGEMENTS

We are thankful to the Foundation for Research Support of São Paulo (Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP) for their support for this research under protocol number 2008/57186-0.

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