Original Article

Narrative and Reading Comprehension Performance in Dyslexic Persian Students

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ABSTRACT

Background: Through research on the role of storytelling skills in building learning and writing elements, little attention has been paid to assessing strengths and weaknesses in story structure, especially microstructure, in dyslexic students. The purpose of this study is to assess the role of this structure as a manifestation of the verbal and cognitive performance of these students.

Methods: This is a descriptive analysis study. To identify dyslexic students, the Screening test for dyslexia diagnosis by Shafii et al. and Shirazi-Nilipour's reading diagnostic test were used. A total of 31 dyslexic students at secondary elementary school were identified during testing, and the remaining subjects (n=35 students) were assigned to the control group. The story retelling test was used to assess students' storytelling skills. A parametric test (independent-samples t-test) was used to compare normally distributed data. A nonparametric test (Mann-Whitney U test) was used for non-normal data. Pearson's correlation test was also used to examine correlations for normally distributed data, and Spearman's correlation test was used for non-normal data.

Results: Students with dyslexia had significantly lower mean scores in all substructures of the macrostructure, including topic maintenance, sequence of events, and the main information. They also had significantly lower microstructure scores, including mean length of utterance, conjunction use, and syntactic complexity, compared to their normal counterparts (P<0.05).

Conclusion: Dyslexic students perform worse than their peers on most micro- and macrostructures of the retelling test. In other words, these students have poor linguistic and cognitive prerequisites for understanding and mastering reading skills. On the other hand, the results show that there is a meaningful association between storytelling skills and subsequent reading and comprehension acquisition.

Introduction

Dyslexia is one of the most common problems in elementary school. This disorder accounts for approximately 80% of learning disabilities and affects 5-15% of school-age children and 4% of adults

worldwide. According to the DSM-IV criteria, this disorder is classified as a type of specific learning disability. People with dyslexia have problems with skills such as word accuracy, reading speed and fluency, and reading comprehension [1].

Identifying the role and relationship between learning disabilities and developmental language disorders (DLD) has been constantly discussed and studied by researchers in various fields. Numerous longitudinal studies have shown that the decline in oral language

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skills associated with DLD leads to dyslexia and reading comprehension problems during the primary school [2-4]. DLD is known to be a type of persistent disability that persists into primary school and affects literacy, academic performance, and career opportunities [5, 6]. However, research shows that most children with DLD either do not be identified at all or are perceived to have poor reading skills in late elementary and middle school [7, 8]. The view that dyslexia and DLD are separate problems is supported by a wide variety of studies, although some studies show that even in the absence of DLD symptoms, some dyslexic children may have worse linguistic skills than their normal peers. These results, in turn, demonstrate the undeniable impact of language skills on the development and learning of reading and comprehension skills [9, 10].

Since storytelling is one of the most important skills in children's language and speech development, the acquisition of this skill requires the acquisition of high levels of linguistic and cognitive skills. Such abilities demonstrate that children can use language skills in areas beyond grammar [11]. This skill plays an essential role in the development of functional communication with peers, teachers, and family [12, 13]. This skill always plays a constant role not only in the preschool age but also in the discourse of students and teachers during the school period. Teachers use stories to illustrate historical events and to tell fictional stories. Students also use this skill during the day to communicate with others and talk about various topics. These themes may include exciting events at home, classroom presentations, or descriptions of school events for parents [14]. While storytelling skills appear to develop separately from other skills, other language skills, reading, and writing, are affected simultaneously [15-17]. The ability to tell a narrative speech displays the linguistic and communicative proficiencies of a child. The telling of stories relies on the integration of multiple competencies, including general knowledge, working memory, and linguistic skills. Furthermore, the utilization of these skills provides insight into the child's ability to perform oral communication in social contexts, reading comprehension, and early academic achievement [14]. It is possible to infer that the narrative constructs a bridge connecting a child's fundamental cognitive-linguistic skills with their high-order social communication skills [15]. Narrative skills are generally evaluated on two structural levels: the macrostructure and the microstructure. At the macrostructure level, the story is evaluated based on its casual relationship (the relationships between characters and story events), as well as the time sequence, Explicitness, and story grammar, including the setting, characterization, problem-solving, conclusion, and ending [18]. In fact, by evaluating these components, the level of child semantic context integrity of their story can be measured. Also, the oral language skills and syntactic coherence of the story are evaluated at the microstructure level. The purpose of evaluating the microstructure features of the story-retelling task is to evaluate grammatical and phonological knowledge, and basic linguistic structures (morphological, semantic, etc.). In other words, this component primarily focuses on linguistic structures, including word and sentence numbers, conjunctions, and the complexity of the syntactic structures used during the story retelling. Evaluating these substructures can help us better understand how a story is formed through the combination of different words, sentences, and components [19]. Because storytelling ability plays an important role in school-age literacy acquisition, this skill has been used as a valid clinical diagnostic and therapeutic tool [20]. This skill allows for the evaluation of an area of children's language knowledge that goes beyond the linguistic circumstances and characteristics of a particular language [21]. While reading a text, students are merging their decoding skills with narrative skills in the form of encoding written letters. Research shows that as children develop storytelling skills, they create a more suitable environment for further learning opportunities. Kindergarten and preschool children who had higher storytelling skills in preschool have been shown to have better ideas and more consistent writing than their 3rd-grade peers [22].

Various studies have examined the relationship between story elements and reading comprehension. Based on the results of these studies, several other studies have examined the impact of enhancing students' storytelling skills on improved reading and comprehension skills. Nevertheless, just a few studies have investigated the storytelling skills of students with reading comprehension and reading difficulties [15, 23, 24]. A study of storytelling skills in dyslexic students by Alexander Kornev et al. found that these students were weak in two aspects of language and cognitive skills that are prerequisites for storytelling. They found that the first aspect was the inadequate development of these students' reasoning skills (causal-temporal), resulting in their inability to understand and explain the relationships between events. The second aspect was the inability of these students to form a general structure to describe each part of the story. According to researchers of the present study, the inability of dyslexic students to flexibly and dynamically change the structures within each part of the story predicts their poor performance in story-retelling skills, especially due to their inability to use the systems of executive and procedural functions in the brain rather than primary language deficiency. However, the researchers have noted that linguistic deficits were also quite evident in these students during the storytelling process [25]. The storytelling skills of students with learning and reading problems were also examined in a study by Seçkin Yılmaz. They found that students with poor learning skills performed worse than their normal peers in all language parameters examined, including syntactic complexity, mean length of utterances, diversity, and the number of words used. [26]. A review of the literature indicates that very few studies have examined the storytelling skills of dyslexic students. Even though a few studies have specifically examined the interactive impact of storytelling skills and literacy components, there are different opinions about that which feature has a greater impact on these students' storytelling skills and the role of each ability is not well defined [27-29]. A gap

exists in this regard as it is important to consider the role of these factors in determining the nature of treatment protocols and achieving desired outcomes. Also, most of the studies used the story generation task, which extracts fewer speech samples from the child than story retelling, and also imposes less cognitive and verbal demands on the student;

Therefore, by considering the deficiencies and shortcomings of other studies and the importance of evaluating and treating these students, there is a need to take a closer look at the storytelling ability of dyslexic students and investigate the relationship between this ability and reading comprehension. This causes therapists, teachers, and other cognitive experts to have a better understanding of the different aspects of the learning problems of dyslexic students. In fact, by doing this study we can answer the following questions: Is the performance of dyslexic students similar to that of normal students in applying narrative micro- and macrostructures? If not, in which structure these differences are more prominent? And how the differences in story-retelling skills are associated with poor reading comprehension performance?

Methods

It is a descriptive-analytic study. According to the statistical data from G-power, a software for sample size computing (version 10.0.3) and due to the objective of this study (descriptive-analytical- comparing two independent groups), by assigning the effect size value of (0.8), type one error value (0.05), and test power (0.9), the total sample size was estimated to be about 66 people. The participants were selected by using a non-probability purposive sampling method from five primary schools, including 2 boys' schools, 2 girls' schools, and also 2 learning disability centers in Districts 1 and 5 of Mashhad City. First, to verify the inclusion criteria, the historical data of elementary school second-grade students and eligible students were gathered (normal IQ, monolingual Persian speaking, no significant hearing problems, no use of psychiatric drugs, no history of epilepsy or seizures, no brain injuries or obvious neurological disorders, no visible movement problems in the speech articulators, no speech disorders, including non-fluency speech disorders or speech sound disorder). We chose primary school second-grade students because according to the instructions for the basic diagnostic test (Shirazi-Nilipour Reading Test), the students under study had to reach the level of reading and writing skills to pass the test. That is why 7-8-year-old students (second-grade students) were chosen. First, to monitor the reading performance of selected second graders (with no history of repeating grades), Shafii et al. ' s Screening Test of Dyslexia was conducted to diagnose dyslexic students. The test consists of five 100-word essays, each consisting of two comprehension questions. The test is conducted in such a way that students are required to read all five texts separately and answer related comprehension questions.According to this test, students of each grade are classified into three groups on the base of their

reading ability level. The internal validity of this test is good. The test total scores correlated strongly with the word reading accuracy and reading speed scores, and the test reliability was also calculated to be 0.77, indicating acceptable reliability [30]. If students were diagnosed with dyslexia according to this screening test (reading <90% of the words in each text correctly and reading comprehension <50%), they entered the second stage of sample selection. In the second phase, a reading comprehension diagnostic test (Shirazi-Nilipour) was administered to identify dyslexic students. This test consists of an equivalent reading comprehension subtest and some additional tasks. Of the three equivalent reading texts (collaborative text, chicken story text, and bird story text), only the chicken and bird texts have diagnostic value, and the collaborative texts are given only for familiarization with the test After explaining to the students, the examiner asked the students to start reading the "birds" text. First, reading errors for each student were identified. Based on the test's diagnostic criteria, reading errors including substitution, rejection, mispronunciation, deletion, addition, and corrective restatement, were counted, and reading accuracy scores were assessed based on a criterion-related score of 20. The content validity of reading accuracy test forms was reported to be 0.87.The text "Bird" was used as a criterion to identify dyslexic students in this study, as well as students whose text reading accuracy score was less than 10 percent or equivalent to an average score of 14.4 or less based on the diagnostic criteria, was included in the group of students with poor reading comprehension [31]. Subsequently, 31 students were identified as having dyslexia (16 boys, 15 girls), and 35 students who had not been diagnosed with dyslexia according to the testing criteria were placed in the control or normal group (17 boys and 18 girls). After a sample of candidates was identified, and assigned to a dyslexic group and a normal group. After that, all samples were given a story-retelling task to compare them according to their storytelling ability. To this end, all students underwent a story-retelling test from Jafari et al. that includes two main features of a story: microstructural and macrostructural. This test has a content validity index (CVR) of 89%, an Intraclass Correlation Coefficient (ICC) of 93%, and an internal consistency or Cronbach's alpha of 77%, demonstrating high content validity, reliability. This test consists of two parts, the trial, and the main test. According to the test instructions, the original story was played to the child along with the pictures, and then the child retells the story while looking at the pictures. Then the narrated story is recorded, and transcribed, and finally, the student's performance in each of the micro-structural domains, including, references (10 points), conjunctions (8 points), complex sentences (10 points), the average of five long utterances (15 points) (a total of 43 points) as well as the macrostructural domains, i.e. the topic maintenance (5 points), main information (18 points) sequence (10 points) were scored using the scoring guidelines [32]. It should be noted that parents saw and signed informed consent before their children participated in the study. This study was also first approved by the

Ethics Committee of the Varestegan Institute of Higher Education (Mashhad). After obtaining the "bird" "reading accuracy" and "reading comprehension" scores in the "corresponding text" subtest, the "non-word naming" subtest scores, and the performance scores of each student on the "narrative task", to assess the normality or non-normality of the data distribution, all scores were entered into SPSS software and the Kolmogorov-Smirnov test was applied. A parametric independent samples t-test was used to compare normal data. The non-parametric Mann-Whitney U test was used for non-normal data. Pearson correlation tests and Spearman correlation tests were used to checking the correlation between normal and non-normal data.

Results

As previously described, based on diagnostic reading tests, 66 subjects were selected and divided into two groups, dyslexic subjects, and normal subjects. Students were divided into two groups based on comparing their mean scores for the "word reading accuracy" subtest in the text "Birds" with scores on the criterion-referenced test. A total of 16 boys and 15 girls were included in the dyslexia group and the remaining subjects (17 boys and 18 girls) were assigned to the normal group (Table 1). As can be observed, there is a significant difference between the two groups in terms of the reading accuracy score (P<0.001).

After identifying dyslexic and normal students,

comparing their reading comprehension results showed a significant difference between the two groups in reading comprehension scores with a 95% confidence interval (P<0.05) (Table 2).

According to the performance scores of the two dyslexic groups and the normal group in the macrostructure of the story (Table 3), the difference between the highest and lowest average scores between the two groups was in "main information" and "topic maintenance". Also, the normal group outperformed the dyslexic group in mean scores of all macrostructure sub-components.

Results showed significant differences between dyslexic and normal students concerning mean scores of all microstructure sub-components, except for the "referencing" sub-component (Table 4).

As already mentioned, the relationship between reading comprehension and storytelling is particularly important. Table 5 shows the correlation between the reading comprehension variable in the diagnostic reading test with each of the storytelling variables.

Correlation tests showed significant associations between all story variables and reading comprehension (P<0.05). Furthermore, the highest and lowest correlation coefficients belonged to the variables 'main information' (0.46) and 'syntactic complexity' (0.30), respectively. All the correlation coefficients are positive, so there is a direct relationship between all story variables and reading comprehension. In other words, students with higher reading scores are likely to have better storytelling skills.

Table 1: Comparing the reading accuracy performance of dyslexic and normal students using the reading diagnostic test

Skill	Statistical index / subject	Mean	Standard deviation	P value
Reading accuracy	Dyslexic	7.98	4.32	0.001
	Normal	18.65	1.21	

Table 2: Comparing the reading comprehension skills of dyslexic and normal students using the reading diagnostic test

Statistical index/subject	Mean	Standard deviation	P value
Dyslexic	3.51	1.31	0.001
Normal	4.57	0.65	

Table 3: Determination and comparison of subject performance outcomes in macrostructures features of the story

Variable	Statistical index/subject	Mean	Statistic value	Standard deviation	P value
Topic maintenance	Dyslexic	4.51		0.67	0.037
	Normal	4.82		0.38	
Event Sequencing	Dyslexic	6.77		1.3	0.002
	Normal	7.54		1.14	
Main information	Dyslexic	10.48		1.87	0.002
	Normal	12.02		1.96	

Table 4: Determining and comparing the performance of dyslexic and normal students in the components of the story-retelling microstructure skills

Variable	Statistical index/subject	Mean	Standard deviation	Statistics	P value
Reference	Dyslexic	2.74	1.54		0.21
	Normal	3.17	1.2		
Conjunction	Dyslexic	2.45	1.26		0.003
	Normal	3.51	1.48		
Syntactic complexity	Dyslexic	1.32	1.16		0.037
	Normal	2.02	1.48		
Mean Length of Five long utterances	Dyslexic	6.46	1.22		0.012
	Normal	7.28	1.34		

Table 5: To examine the correlation coefficients between reading comprehension in a reading diagnostic test and the performance of dyslexic and normal subjects in the narrative microstructure and macrostructure, respectively, in the story-retelling test

		Reading comprehension	Topic maintenance	Story sequence	Main information	Reference	Conjunction	Syntactic complexity	Five longest utterances mean
Reading comprehension	Correlation	1.000	0.321[1]	0.426[1]	0.466[1]	0.377[1]	0.446[1]	0.309[2]	0.428[1]
	Significance	.	0.009	0.000	0.000	0.002	0.000	0.012	0.000
	Number	66	66	66	66	66	66	66	66

[1]Correlation at 0.99 confidence interval; [2]Correlation at 0.95 confidence interval

Discussion

The purpose of this study was to compare the use of narrative micro- and macrostructural elements and their relationship to reading comprehension in dyslexic and normal second-graders. Results showed that dyslexic students performed poorly on narrative micro- and macro-structures compared to normal groups, and their poor storytelling skills were attributed to poor reading comprehension. It is important to note that story retelling skill plays a direct role in the formation of linguistic and meta-linguistic foundations, which is somehow the most important verbal knowledge prerequisite for the development and learning of reading and comprehension skills. This skill also plays a very important role in classroom conversations and everyday conversations between teachers and students and between students. All educations and course materials are influenced by this skill and its components, which can explain the results obtained in this regard [14, 33, 34].

Dyslexic students performed worse than normal students in using story macrostructural elements such as topic maintenance, main information, and story sequencing. The poor topic maintenance skills of dyslexic students likely reflect an inability to refer to information in the general title of a story to retain the story's subject. According to the researchers, this poor performance was due to an inefficient processing and cognitive system that failed to update information in verbal working memory and verbal integration systems. This deficiency also led to an inability to use the necessary verbal and cognitive elements that help express a coherent and continuous narrative in order to achieve a perception and mental model of the whole story. This ability allows a person to draw inferences about the actions and behaviors of story characters and their goals and intentions beyond the story's accessible information [35]. The results of the present study also revealed anomalous scores in the narrative sequencing component of dyslexic students. According to researchers such as Ying Hao and Ianthi-Maria Tsimpli, the poor performance of low-skilled students in this component is due to their difficulty in interpreting the narrative setting, the context of events, and the connections between different parts of the narrative. Dyslexic students, on the other hand, performed worse than normal students on the general information component, pointing out information in the story necessary for the listener to fully understand each part of the story. This deficit is due to the poor performance of these students in the use of verbal and cognitive self-assessment tools used to describe the various emotional, mental and behavioral states of story characters and events [36, 37].

According to the results of the microstructural component, there were significant differences between dyslexic and normal students in terms of conjunction frequency, syntactic knowledge, and mean length of five long utterances of the subcomponents of the storytelling test. To explain the poor performance of this group when using conjunctions, the results of a study by Cain et al. and Heilmann et al. can be quoted. They said that the use of conjunctions builds a consistent logical structure between different parts of the story and supports the relational coherence of the story [38, 39]. Studies of dyslexic students' levels of linguistic knowledge and listening comprehension suggest that these students may not have developed the linguistic elements necessary to maintain speech continuity throughout the discourse context due to their low levels of linguistic knowledge. On the other hand, the weak cognitive abilities of these students, especially their ability to correctly interpret information and understand the meaning of the story, prevent them from correctly understanding different parts of the story and the whole concept. As a result, they are unable to use the linguistic elements that connect phrases and sentences in retelling [26, 36, 40]. In addition, dyslexic students performed lower in syntactic knowledge than their normal peers. Syntactic knowledge manages word combinations, enabling a person to form well-structured sentences and understand complex linguistic relationships [41]. The results of the current study, which are consistent with those of researchers such as Scott and Westby, show that dyslexic students are unable to pick up and reuse complex syntactic structures from stories due to their low knowledge of syntax [42, 43]. Because of expressive language developmental deficits, these students are still unable to create complex and creative grammatical structures to form well-structured, structured sentences as normal students do. Consequently, the poor performance in this component is attributed to basic linguistic skills that help form grammatically well-constructed phrases and sentences [36, 40]. Similarly, poor grammar, syntax, and semantic skills lead to a short, incomplete speech during the storytelling process. The dyslexic students in our study were not exempt from this rule and scored lower than their normal classmates on the average length of five long utterances. This skill suggests a variety of reasons for poor performance in students with learning and reading difficulties. According to researchers such as Snowling and Owens, these problems may be due to these students' lack of verbal creativity in using different words in telling stories. According to these researchers, their problems may also be due to poor vocabulary and memory (word searching) abilities [40, 44].

However, there were no significant differences between dyslexic and normal students in the referencing component. Based on the results achieved by regular students, they seem to have performed similarly poorly in this component. Although the role of using reference words in story tasks has not been directly studied, from the point of view of researchers such as Gillam & Owens, the ability to use words such as pronouns, conjunctions, and demonstratives, depends on the level of the child's linguistic knowledge about these words and their usage, provide a better understanding of the relationship between different parts of the story. On the other hand, children must be able to identify each word or phrase in a story individually and retain the setting and semantic information necessary to understand and recognize the role of each word or phrase in the story to other elements in the story [23, 29]. Owens attributes the poor storytelling skills of speech-impaired students to the inability to organize information within stories, resulting in inconsistent and redundant use of that information [44]. In Tomasello's view, poor storytelling skills may also be due to weak metalinguistic and metacognitive skills that prevent children from understanding the meaning of the text and the speaker's point of view [45]. Therefore, the poor reading comprehension and aberrant use of reference words such as pronouns in these students may result from poor reading comprehension and underdeveloped language structures that connect and integrate words. However, the reason for the poor performance of normal Persian-speaking students on this part is itself a questionable finding, and further research is needed in this regard. Examination of the relationships and correlations between storytelling skills and reading comprehension revealed significant relationships between this skill and all subcomponents of the storytelling test. However, as mentioned, this relationship has not been mentioned in other studies, and the results of this study confirm the existence of a close relationship between these two skills. In other words, the relationship between these two skills can be explained by the fact that reading comprehension is a continuous and cognitively complex process, and the reader must have an initial representation of the relationship between the meanings of the words and the integrated understanding of the whole text. To achieve this representation, the reader must use lexical and morphological knowledge and reasoning skills to arrive at a structured mental model of the information in the text. To form this model or mental representation, one must arrive at a general framework of textual content. This framework creates patterns that are organized and structured in the human mind, similar to those proposed in the "story grammar" model. This structure helps people understand the text as they read it and make sense of it [43]. In other words, the linguistic and cognitive structures of reading comprehension and the mental requirements for story comprehension are all based on similar mental and cognitive frameworks.

It should be noted that the main limitation of our study is due to the non-normal distribution of some subcomponents of the story retelling test. It was not possible to determine a total score for microstructural and macrostructural elements. In another world, total points for story retelling could not be determined. It's necessary that future research also study the role of each language structure individually in the formation of reading comprehension, and use assessment tests assigned to each language structure to provide a more comprehensive mapping of each of these subcomponents in the formation and development of reading comprehension.

Conclusion

In conclusion, it can be said that dyslexic students had a significantly weaker performance in almost all. By comparing the performance of dyslexic and normal students in this study, we were able to better understand the direct impact of language skills on reading comprehension. Thus, in addition to problems with phonological awareness, students who perform poorly in reading are likely to perform poorly in other language components.Therefore, more attention should be paid to children's linguistic and supra-linguistic skills such as storytelling and discourse skills during preschool and school periods to strengthen all the basic requirements for the acquisition of literacy and reading comprehension.

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