

# Preschool Teachers' Knowledge Level of Dyslexia in Turkey

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## ABSTRACT:

This study aimed to determine preschool teachers' dyslexia knowledge. In the study, preschool teachers' knowledge of dyslexia was examined considering three sub-dimensions: general information, symptoms/diagnosis, and treatment of dyslexia. The quantitative study was conducted using the general survey model, and the sample consisted of 153 preschool teachers working in Ankara. The study data were collected using a personal information form and the Knowledge and Beliefs about Developmental Dyslexia Scale (KBDDS). The data were analyzed using descriptive statistics, t-test, ANOVA, and Games-Howell Post Hoc test. The study findings revealed that the preschool teachers' knowledge of dyslexia was low. It was also determined that participants' working experiences or education status did not affect the knowledge and belief levels of dyslexia. However, a significant difference was found only in favor of high-school graduate teachers only in the symptoms/diagnosis sub-dimension. A significant difference was also found in favor of teachers who received training on dyslexia in all sub-dimensions.

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## INTRODUCTION

Dyslexia, as a “Special Learning Disability,” is defined as a brain-based learning difficulty that affects reading skills in Turkey. The American Psychiatric Association (2014) defines dyslexia as a neurodevelopmental disorder characterized by impairment in decoding, spelling, and fluent and correct reading in DSM-V. Additionally, the International Dyslexia Association defines it as follows: “Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and fluent word recognition and poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge” (IDA, 2018). It is also recognized as a special learning difficulty that causes a person to have speaking, reading, and writing problems (Fletcher et al., 2018). It represents individuals at the lower end of a standard curve in word-level reading skills (Shaywitz et al., 1992). The typical disability seen in children with dyslexia is the phonological processing component of language (Lyon et al., 2003).

Dyslexia is often used synonymously with a learning disability and is characterized by a broad range of problems in speaking, listening, and comprehension skills (Salman et al., 2016). Several factors, such as family conditions, communication problems, pervasive developmental disorders, attention deficit, anxiety, depression, or obsessive symptoms, may lead to lower academic performance and learning difficulties and negatively affect academic-cognitive skills. However, it is commonly accepted that neurobiological factors are mainly influential in dyslexia (Salman et al., 2016).

Children at risk of dyslexia or diagnosed with dyslexia share some common features. For example, children at risk of dyslexia have deficits in phonological processing, rapid automatic naming, and spelling (Ozernov-Palchik & Gaab, 2016). When they start school, children with dyslexia lack phonemic awareness and phonetic skills (Vellutino et al., 2004). If they are not appropriately treated, they may suffer from problems regarding fluent reading, comprehension, vocabulary, and content knowledge (Lyon et al., 2003). Studies have shown that children who have reading deficits and cannot learn how to read see themselves as unsuccessful students, feel inadequate, and want to drop out of school (Hernandez, 2012; Daniel et al., 2006). In other words, failure to learn to

read endangers those children's future lives. Thus, reading failure should be considered a public health problem (Lyon, 2001).

The most common problems in dyslexia include the inability to read, slow reading speed, word identification, skipping letter, syllable, or word, phonological (letter-sound) decoding, inability to read quickly, writing, spelling, and comprehension problems. Those problems affect academic performance negatively (Erden et al., 2002). In addition, children with visual perception and short-term memory problems may have difficulty in writing or grasping the sizes, shapes, and distance of objects due to the lack of the perception of distance, depth, and size (Pekel, 2010). In DSM-V (2013), the Diagnostic Criteria for Reading Disability are as follows: (a) When measured by standardized proper reading or comprehension tests, an individual's reading performance is significantly below the expected level according to their chronological age, measured intelligence level, and age-appropriate education. (b) A disorder in A recognition criterion significantly impairs academic performance or everyday activities that require reading skills. (c) Even if there is sensory dysregulation, reading disability is often much more than that.

Early diagnosis of dyslexia in childhood and effective treatment programs and intervention are essential for academic success and performance. In preschool period, the symptoms of dyslexia can be observed in auditory, visual, tactile, spatial-temporal and kinesthetic (balance and motor control) areas: (a) Auditory deficits: Inadequate vocabulary, confusion of basic words such as take-eat-give-go, problems in making sentences, comprehension difficulty, inability to use rhyming words, and to play rhythmic games and activities (Doğan, 2012), (b) Visual deficits: Poor visual memory performance, poor distance, near and depth perception, having difficulty in drawing geometric figures (Özat, 2010), (c) Tactile Deficits: the inability to recognize the shapes drawn on palm with eyes closed (Doğan, 2012), (d) Verbal deficits: Delay in speech and language development (i.e., the most common predictor of dyslexia) infantile speech, inability to express oneself, to understand sentences and sounds (Snowling, 2013), (e) Organizational deficits: Having difficulty in using and planning the time, and classifying the stimulus (Özat, 2010), (f) Spatial deficits: Inability to distinguish right-left, front-back, and having difficulty in catching a ball, jumping rope, and wearing shoes properly (Doğan, 2012), (g) Temporal deficits: Confusing the time such as today, tomorrow, now, later and yesterday (Özat, 2010), (h) Kinesthetic/Motor-coordination Defi-

cits: Poor hand-eye coordination, experiencing difficulty in fastening buttons, tying shoes, using scissors, fork and spoon, and being reluctant to draw (Doğan, 2012), (i) Social-Emotional Behavior Problems: moodiness, poor peer communication, and adaptation problems (Özat, 2010).

In Turkey, only child and adolescent psychiatrists do a formal assessment for dyslexia and specific learning disability, and guidance and research centers, private counseling centers, school counselors, psychologists, and special education specialists work with students diagnosed with dyslexia. The professionals working at guidance and research centers and private counseling centers receive in-service training in “A Training Program for Specific Learning Disability” to increase their knowledge and awareness. The education program for specific learning disabilities (including dyslexia) has three modules and 750 lesson hours (learning, reading, writing, mathematics). A student can join the program twice a year (Istanbul Provincial Directorate of National Education, 2019). There is a project in which the Istanbul Provincial Directorate of National Education (2019) is a stakeholder with five other project partner countries (Bulgaria, Romania, Poland, Italy, and Portugal). The project aims to develop interventions to support those students’ transition from primary to secondary school and address the adaptation issues surrounding the transition to a new educational environment. The project targets children with dyslexia, their parents, and teachers.

Children with dyslexia may have behavioral problems, antisocial behaviors, hyperactivity, and attention problems (Berger et al., 2010), harming their psychosocial development. If behavior problems are not treated, they might affect their emotional and social development, eventually leading to low school achievement and poor self-esteem (Stevenson & Graham, 2011). Besides their parents, teachers are also responsible and concerned about children with dyslexia. Preschool teachers should be educated and trained about dyslexia to recognize children at risk of dyslexia. Insufficient information might lead to even worse antisocial behaviors and stigmatization. According to Ness and Southall (2010), the main reason for teachers’ prejudice against children with dyslexia is the lack of knowledge about dyslexia.

Most of the studies on dyslexia in the literature were conducted with primary school teachers. The findings show a lack of understanding and misconceptions about dyslexia among most primary school teachers (Al Otaiba et al., 2019; Holmes, 2021; Soriano-Ferrer et al. 2016). In their study on kindergarten teachers’ perceptions and

knowledge of dyslexia, Gonzalez and Brown (2019) revealed that overcoming the prejudices against dyslexia was a challenging task and that kindergarten teachers need professional support in early literacy practices and dyslexia. Although most teacher candidates and employed teachers know about dyslexia, they still have some common misconceptions. González-Valenzuela and Martín-Ruiz (2017) analyzed the effects of an early oral and written language intervention program for 5-7 years old children at risk of having dyslexia and found that the classroom-based education program was effective in improving the reading performance of those children. Recent studies on advocacy work suggest that identifying and supporting students with dyslexia is a critical issue for schools (Rice & Gilson, 2023).

According to the Turkish Ministry of National Education (2022) data, the schooling rate for children aged 3-5 is 48%. A total of 1 million 225 thousand 981 children attended preschool education in Turkey in the 2020-2021 academic year. Since preschool teachers can recognize the symptoms of dyslexia at a very early stage and make the necessary interventions, it is important to determine their knowledge levels of dyslexia. Preschool teachers should know the risk factors and characteristics of dyslexia because any lack of knowledge or misunderstanding may negatively impact children’s literacy skills. The findings showed that most preschool teachers had very limited knowledge about dyslexia (Gonzalez & Brown, 2019).

The preschool education institutions in Turkey serve children between three and five years old. In 2022, the preschool enrollment rate is 48%, and in the 2020-2021 academic year, 1 million 225 thousand 981 students attended preschool education (637 435 boys and 588 546 girls.). The number of employed preschool teachers was 52 thousand 461 (Turkish Ministry of National Education, 2022). Therefore, it is essential to identify the at-risk preschoolers and develop intervention programs. Hence, they can be supported to improve attention span, social skills, receptive and expressive language skills, and early literacy skills and establish a solid foundation for primary academic skills. Besides, preschool teachers should have knowledge and awareness of dyslexia so that children can achieve their true potential and be supported in the early period by receiving individualized education.

Identifying children with dyslexia in early childhood depends on pre-school teachers’ knowledge of the early characteristics of dyslexia. However, as mentioned, most of the children with dyslexia cannot be identified in early period, and one of the possible reasons of this situation

is that teachers do not know the symptoms of dyslexia in early childhood period (Gore et al., 2014; Therrien et al., 2011). In their research, Male and Rayner (2007) emphasized that the findings related to pre-school teachers were limited. That's why preschool teachers' knowledge and awareness of dyslexia and effective treatments and interventions play a vital role in recognizing the early symptoms of dyslexia and providing the necessary interventions.

### Study Goal

This study aimed to determine preschool teachers' dyslexia knowledge. We sought answers to the following questions:

- (1) What is preschool teachers' dyslexia knowledge level and do they believe in about children with dyslexia?
- (2) Do preschool teachers' dyslexia knowledge and beliefs differ significantly according to education status, teaching experience, training on dyslexia, and school setting?

## METHOD

### Sample

The study sample consisted of 153 preschool teachers from 18 preschools in Ankara in the 2020-2021 academic year. These preschools were selected by using the proportional probability selection method according to the number of teachers. Simple random sampling method was used in the selection of teachers from the selected schools. In simple random sampling method, every possible combination of elements in the universe has an equal probability of being included in the sample (Karasar, 2010). Table 1 shows the demographic characteristics of preschool teachers.

As can be seen in the table above, most participants were female. In Turkey, teachers who graduated from the child development department in vocational high school can work as preschool teachers in private preschools. In other words, these people work as preschool teachers in these preschools. Most of the participant teachers were university graduates. Teaching experience ranged from 1 and 14+ years. The majority worked in private preschools and did not receive teacher training on dyslexia. Although 117 teachers were university graduates, only 42 received teacher training on dyslexia, and 23 stated that they received education at university. Very few teachers learned about dyslexia during undergraduate education and in-service training. Teachers expressed that they did not work with a child diagnosed or suspected of dyslexia before.

### Research Model

This study was designed on a quantitative research framework using a general survey method. Survey methodology describes a situation as it is. In the general survey model, a study is conducted on a group from a specific universe to make a judgment about participants (Karasar, 2010) and allows single or relational screening. A single survey model is carried out to specify the variables by type or amount. Relational surveys, on the other hand, show the absence, presence, and degree of change between two or more variables. We preferred using the general survey model in this study since we would describe a situation today (Karasar, 2010).

### Data Collection Tools

The study data were collected using a personal information form for demographic data and the *Knowledge and Beliefs About Developmental Dyslexia Scale (KBDDS)*. The answers to the form are presented in table 1 above.

**Knowledge and Beliefs About Developmental Dyslexia Scale (KBDDS):** The tool was developed by Soriano-Ferrer and Echegaray-Bengoa (2014) and adapted to Turkish by Sümer-Dodur and Altındağ Kumaş (2021) in order to determine teachers' knowledge and beliefs about dyslexia. The 36-item scale had three sub-scales: *general information*, *symptoms/ diagnosis*, and *treatment of dyslexia*. Content, structure, discriminant, and predictive validity analyses were performed for validity, and the internal consistency Cronbach Alpha coefficient was measured for reliability. According to the CFA results, the scale had a three-factor structure, and the model fit indices were good ( $\chi^2/sd=2.80$ , RMSEA=.080, SRMR=.052, NFI=.90, NNFI=.93, CFI=.93, IFI=.93, GFI=.93, AGFI=.90). The internal consistency coefficients for the total scale and subscales ranged from .78 to .87. The 3-point Likert-type scale items were used to reveal teachers' misconceptions about dyslexia, and they were scored as *Correct (1)*, *False (2)*, and *I Do not Know (3)*. According to the answer key, if the participant answered correctly, gets 1 point. In scoring, each item is analyzed one by one, and the average is taken. There is no total score in the scale. The variance of the original version of the KBDDS was 76%, and the scale had a three-factor structure: *general information (17 items)*, *symptoms/diagnosis (10 items)*, and *treatment of dyslexia (9 items)*. The internal consistency coefficients for the sub-scales were .87, .85, and .78, respectively. All scale items are shown in appendix 1. Some sample items are: "Dyslexia is the result of a neurologically based disorder" (item1), "Children with dyslexia are more consistently

Table 1. Demographic characteristics of preschool teachers

Demographic Characteristics		
Gender	n	%
Female	132	86.3
Male	21	13.7
Education Status	n	%
High school	36	23.5
University	96	62.7
Master's/PhD	21	13.7
Professional Experience	n	%
1-3 years	24	15.7
4-6 years	45	29.4
7-10 years	21	13.7
11-13 years	18	11.8
14 years and above	45	29.4
School setting	n	%
Public preschool	51	33.3
Private preschool	102	66.7
Training on dyslexia	n	%
Trained	42	27.5
Untrained	111	72.5
Training place	n	%
The Dyslexia Association	10	6.5
Psychologist's seminar	3	2.0
I do not remember.	3	2.0
The school (in-service training)	23	15.0
Working experience with a child diagnosed or suspected of dyslexia	n	%
Yes, I have	45	29.4
No, I do not have.	108	70.6

impaired in phonemic awareness (i.e., ability to hear and manipulate sounds in language) than any other ability” (item 9) and “Children with dyslexia can be helped by using colored lenses/colored overlays” (item 17).

### Data Collection and Analysis

The data were collected in the 2020-2021 academic year. The researcher visited the preschools and informed the teachers about the goal and significance of the study. Volunteer teachers participated in the study.

The data were analyzed using SPSS 22.0 program, and frequency, percentage, and mean were calculated for descriptive statistics and demographic variables. Before the

application, the Kolmogorov-Smirnov Normality Test was performed to determine whether the scores were normally distributed. Since the data had a normal distribution, parametric tests, the t, and ANOVA, were performed. Additionally, the Games-Howell Post Hoc test was used to find the significant differences among groups. The cut-off points (Green & Salkind, 2005) were calculated for effect sizes (.01= small, .06=medium, and .14=large).

### FINDINGS

The percentages and frequencies of preschool teachers' responses to the KBDDS are shown in appendix 1.



The average of the responses is shown in Table 2. Appendix 1 includes the correct/incorrect answer ratios. Table 2 and Appendix 1 suggest that preschool teachers do not have enough knowledge about dyslexia.

Preschool teachers either gave correct answers or marked the option *I do not know*. The correct answer average was 2.61 in the general information sub-scale, which suggested that preschool teachers' general information level about dyslexia was high. They made nine mistakes out of the 17 items in the general information sub-scale. The results were analyzed based on the answers given by the teachers, and the wrong answers were not removed, which yielded the knowledge levels of the teachers. For example, although the correct option was "wrong" 64.7% of preschool teachers chose the "correct" option for the item "*Dyslexia is a visual disability leading to misplacement of letters and words.*" Similarly, although the correct option was "correct" 64.7% rated "I do not know" for the item "*Dyslexia is more common in males*

*than females.*" These two items were the most frequently answered incorrectly in the general information sub-scale.

In the symptoms/diagnosis sub-scale, the average of correct answers was 2.35, which indicated that preschool teachers had a high level of knowledge about the diagnosis of dyslexia. They made three mistakes out of 10 items in the symptoms/diagnosis sub-scale. For example, although the correct option was "wrong" 64.7% marked the "correct" option for the item "*Inverting or reversing letters and words is the main symptom of dyslexia.*" It was the most frequently answered incorrectly in the symptoms/diagnosis sub-scale.

In the treatment of dyslexia sub-scale, the average of correct answers was 2.12, which suggested that preschool teachers had a moderate level of knowledge about dyslexia treatment. They made three mistakes out of 9 items in the treatment of dyslexia sub-scale. For example, although the correct option was "correct" 54.9% of pre-

Table 2. Findings regarding teachers' KBDDS mean scores

	General information	Symptoms/diagnosis	Treatment of dyslexia	Total scale
N	153	153	153	153
$\bar{X}$	2.02	1.91	2.04	1.99
Correct answer $\bar{X}$	2.61	2.35	2.12	1.87
Sd	0.54	0.64	0.57	0.56
Minimum	1.12	1.10	1.11	1.11
Maximum	3.00	3.00	3.00	3.00

Table 3. ANOVA results by education status

Sub-scales		N	X	Sd	F	P	Effect size	Significant difference
General Information	a) High school	36	2.19	.693	2.915	.057	.037	
	b) University	96	1.94	.468				
	c) Master's/PhD	21	2.08	.568				
Symptoms/diagnosis	a) High school	36	2.19	.776	4.558	.012*	.057	a>b
	b) University	96	1.84	.586				
	c) Master's/PhD	21	1.77	.578				
Treatment of dyslexia	a) High school	36	2.18	.659	1.434	.242	.019	
	b) University	96	1.99	.523				
	c) Master's/PhD	21	2.01	.651				
Total	a) High school	36	2.19	.702	2.872	.060	.037	
	b) University	96	1.93	.491				
	c) Master's/PhD	21	1.98	.583				

(\*  $p < 0,05$ )

Table 4. ANOVA results regarding professional experiences

Sub-scales		n	x	sd	f	p	Effect Size
General Information	1-3 years	24	2.11	.657	2.407	.052	.061
	4-6 years	45	1.98	.511			
	7-10 years	21	1.73	.417			
	11-13 years	18	2.02	.390			
	14 years+	45	2.15	.594			
Symptoms/diagnosis	1-3 years	24	2.02	.807	1.969	.102	.051
	4-6 years	45	1.79	.550			
	7-10 years	21	1.77	.515			
	11-13 years	18	1.78	.532			
	14 years+	45	2.10	.714			
Treatment of dyslexia	1-3 years	24	2.16	.713	.925	.451	.024
	4-6 years	45	1.96	.508			
	7-10 years	21	1.93	.490			
	11-13 years	18	2.00	.452			
	14 years+	45	2.12	.640			
Total Scale	1-3 years	24	2.10	.706	1.747	.143	.045
	4-6 years	45	1.92	.493			
	7-10 years	21	1.79	.434			
	11-13 years	18	1.95	.439			
	14 years+	45	2.13	.627			

(\*  $p < 0,05$ )

school teachers answered, “I do not know” for the item “*Fluent reading strategy is generally used for children with dyslexia*” It was the most frequently answered incorrectly in the treatment of dyslexia sub-scale.

Preschool teachers’ average correct answer in the KBDDS was 1.87, which suggested that preschool teachers’ dyslexia knowledge levels were low. In this sense, it can be assumed that preschool teachers did not have enough information about dyslexia.

ANOVA test was performed to determine whether education status affected preschool teachers’ knowledge and belief levels of dyslexia. As seen in Table 3, there was no significant difference in the total scale. However, there was a significant difference in the symptoms/diagnosis sub-scale. The Games-Howell Post Hoc test results revealed a significant difference in favor of high school graduates. There was no significant difference in the results, and the effect sizes were also small.

ANOVA test was conducted to determine whether experiences in working with students with dyslexia af-

fected participants’ knowledge and belief levels of dyslexia. The results showed no significant difference in the total scale and sub-scales. Although there was no significant difference in the results, the effect sizes were medium in the general information sub-scale and small in the others.

A t-test was performed to see if receiving training on dyslexia played a role in preschool teachers’ knowledge and belief. As seen in table 5, there was a significant difference in the total scale and sub-scales. There was a significant difference in favor of those who did not receive dyslexia training in all sub-scales. The effect size was medium in the treatment of dyslexia sub-scale and large in the other sub-scales. Twenty-three preschool teachers stated that they received training on dyslexia in their university education. While three preschool teachers demanded information from a psychologist, ten teachers received information from a dyslexia association. Nevertheless, three teachers did not remember the source of information. Since 23 preschool teachers received training on dyslexia very long ago, they might not remember

Table 5. Independent t-test results by receiving training

Sub-scales	Training experience	N	X	Sd	t	df	p	Effect Size
General Information	Trained	42	1.68	.345	-6.30	118.5	.000*	.149
	Untrained	111	2.15	.556				
Symptoms/diagnosis	Trained	42	1.47	.375	-7.21	126.6	.000*	.178
	Untrained	111	2.08	.653				
Treatment of dyslexia	Trained	42	1.73	.418	-5.07	103.4	.000*	.112
	Untrained	111	2.16	.586				
Total Scale	Trained	42	1.63	.338	-6.63	124.2	.000*	.157
	Untrained	111	2.13	.575				

(\*  $p < 0,05$ )

Table 6. Independent t-test results by school setting

Sub-scales	School setting	N	X	Sd	t	df	p	Effect Size
General Information	Public	51	2.19	.632	2.75	151	.007*	.048
	Private	102	1.93	.483				
Symptoms/diagnosis	Public	51	2.04	.685	1.70	151	.091	.019
	Private	102	1.85	.624				
Treatment of dyslexia	Public	51	2.15	.657	1.62	151	.106	.017
	Private	102	1.99	.528				
Total Scale	Public	51	2.14	.643	2.21	151	.028*	.031
	Private	102	1.92	.512				

(\*  $p < 0,05$ )

the content, which can be the reason for the significant difference in favor of teachers who did not receive any training.

A t-test was performed to determine whether the school setting affected preschool teachers' knowledge and belief levels of dyslexia. As shown in Table 6, no significant difference was found in the symptoms/diagnosis and treatment of dyslexia sub-scales. However, there was a significant difference in favor of preschool teachers working in public preschools in the total scale and general information sub-scale. The effect sizes were also calculated and found medium in the general information sub-scale and small in the other sub-scales.

## DISCUSSION

The study results showed that preschool teachers need professional development and support for dyslexia. Identifying and supporting preschoolers with dyslexia is im-

portant for their future academic life. We suggest that preschool teachers must receive preservice and in-service training to support students with dyslexia. It is essential for preschool teachers to have knowledge about dyslexia and to increase their awareness of the risk factors. Thus, appropriate intervention programs can be prepared for those children.

We examined preschool teachers' dyslexia knowledge levels under three sub-dimensions: *general information*, *symptoms/diagnosis*, and *treatment of dyslexia*. Although most participants were undergraduates, their dyslexia knowledge and belief levels were low and not different from high school graduates, which suggested that regardless of academic proficiency, most preschool teachers were highly informed in the general information and symptoms/diagnosis sub-dimensions, and moderately knowledgeable in the treatment of dyslexia sub-dimension. However, they did not have sufficient knowledge of the general information about dyslexia. Therefore, it



can be stated that preschool teachers' academic qualifications did not influence their knowledge of dyslexia, which overlaps with the findings of Abercrombie (2009), pointing out no meaningful relationship between teachers' knowledge levels, academic qualifications, and school setting. Similarly, Ramli with coauthors (2019) revealed no correlation between preschool teachers' knowledge of dyslexia and academic background. In light of the findings, it can be foreseen that more knowledge of dyslexia would increase teachers' recognition of early symptoms. It is believed that it is essential for teachers to know about dyslexia to support those children's academic life and prepare educational programs that can meet their needs. The study results showed the scarcity of preschool teachers trained in dyslexia. The findings showed that few preschool teachers learned about dyslexia in undergraduate education and in-service training. The majority of preschool teachers admitted that they did not work with a child with dyslexia before. However, it can be argued that preschool teachers might not have recognized children suspected of dyslexia. Undergraduate education programs are within the scope core education curriculum to ensure that all teachers who graduate from preschool education departments have the same qualifications. Thus, all universities in Turkey have similar curricular content. When we examined the undergraduate education curriculum, we found two courses: "Learning Disability" (selective, 2 hours a week, in the first grade) and "Special Education and Inclusion Education" (compulsory, 2 hours a week, in the fourth grade). Although the "Learning Disability" course is not offered every semester, students can take it. However, the "Learning Disability" course might be pretty early and challenging for first-year students because it requires them to learn about children with learning disabilities in addition to typically developing children. Besides, the scope of the "Special Education and Inclusive Education" course is broad, which makes it challenging to get informed about all disabilities in a limited time.

Similarly, we found that, regardless of academic proficiency, most preschool teachers' general information about dyslexia was low, and academic background did not affect their knowledge of dyslexia. Preschool teacher candidates did not receive training on dyslexia during their undergraduate education. Regardless of grade level, teachers play an important role in an education system, and specifically, preschool teachers are expected to identify children with learning difficulties. An adequate level of knowledge allows preschool teachers to recognize those children early (Sahari & Johari, 2012). Gonzalez

and Brown (2019) found that preschool teachers believed that dyslexia was diagnosed by reading difficulties in primary school, and preschool was too early to define those at risk of dyslexia. Therefore, they did not feel an urge to improve their knowledge of dyslexia. Similarly, Gonzalez and Brown (2019) observed that preschool teachers had limited professional competence and training on dyslexia.

We found that preschool teachers' teaching experience did not affect their knowledge and belief levels of dyslexia, which overlapped with the finding suggesting that preschool teachers' academic status did not affect their dyslexia knowledge either. Similarly, in a study by Kantor (2011), teachers' experience was not sufficient for dyslexia. Adebowale and Moye (2013) found that age or teaching experience did not play a role in the knowledge of dyslexia. Early diagnosis, early intervention, and suitable training are only possible with being informed about dyslexia. Teachers who cannot recognize children with dyslexia may lead them feel incompetent and stigmatize themselves retarded and reluctant to learn. In short, preschool teachers may have negative attitudes and perceptions toward children at risk of dyslexia. Ness and Southall (2010) emphasized that teachers' misconceptions about the students with dyslexia stemmed from their inadequate knowledge about dyslexia. Similarly, Ramli and coauthors (2020) found that preschool teachers had little dyslexia knowledge; they needed additional specific information and training on dyslexia to identify students at risk.

We also examined the role of having received training on preschool teachers' knowledge about dyslexia and found a significant difference in favor of those who did not receive any training. The effect sizes were mainly large. Of the participants, only 23 preschool teachers received a course on dyslexia during their undergraduate education, suggesting they might have difficulty remembering and applying what they had learned about dyslexia. It might be the reason for the significant difference in favor of teachers who did not receive any training. Three preschool teachers received training from a psychologist and ten from the Dyslexia Association. Three preschool teachers did not remember where they received training on dyslexia.

The findings highlighted the importance and requirement of improving preschool teachers' knowledge in all three sub-dimensions (i.e., general information, symptoms/diagnosis, and treatment of dyslexia). The number of trained preschool teachers was very few, and their general information level was low. There were still weak points that should be supported, considering the high

number of answers to "I do not know" (see appendix 1). Accordingly, informative intervention programs should improve preschool teachers' knowledge and awareness of dyslexia. Allen (2010) found that such programs positively affected teachers' awareness of the symptoms of a preschooler with dyslexia. Hasiana (2017) emphasized that the early preventive intervention programs are effective. In the literature, it is seen that pre-school teachers are expected to have knowledge and skills in terms of key features of children with learning difficulties who are at risk in early period (Arslantaş & Koçak, 2020; Konuk Er & Okur, 2020; Namkung & Peng, 2018). However, the study results showed that preschool teachers need professional development and support for dyslexia. Identifying and supporting preschoolers with dyslexia is important for their future academic life. Therefore, in the presenting early intervention, it is necessary to increase the knowledge and skills of preschool teachers.

## CONCLUSION

This study concluded that preschool teachers did not have enough knowledge about dyslexia, most did not receive training on dyslexia, and the undergraduate curriculum was insufficient. Thus, undergraduate programs should provide teacher candidates with theoretical and applied education, knowledge, and practical experience. As understood, not all preschool teachers were undergraduates, and high school graduates could work in private preschools. Therefore, they should be supported with short-term courses, seminars, meetings, workshops, and case studies to improve their knowledge of dyslexia, help

them identify children with dyslexia early in preschool, and reduce the harmful effects of dyslexia with effective interventions. There is also a need for studies examining the role of teacher education programs on undergraduate students' knowledge of dyslexia. The content of preschool education curriculums should be evaluated in detail.

Educational programs should be prepared to identify students with dyslexia early and make effective interventions for children at risk. In addition to intervention programs, supportive training programs should be organized for families. Besides, awareness-raising activities can be planned with the cooperation of the school and family.

Future research may conduct this study with a larger sample. Additionally, comparison studies can be carried out on the knowledge levels of public and private teachers from all grades, teacher candidates, and parents.

## LIMITATIONS

This study was conducted with a narrow sample due to the COVID-19 pandemic, and the study group consisted of teachers from both public and private preschools in only one province. Future studies can work with more teachers and schools in other provinces.

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## Appendix 1. Descriptive statistics on results of the KBDDS

KBDDS	Item no	Items	Correct		False		Do Not Know		Correct Answer	Correct answer mean
			n	%	n	%	n	%		
General Information	1	Dyslexia is the result of a neurologically based disorder.	72	47.1	42	27.5	39	25.5	True	2.61
	2	Dyslexia is caused by visual perception deficits. producing the reversal of letters and words.	99	64.7	27	17.6	27	17.6	False	
	3	A child can be both gifted and have dyslexia.	96	62.7	18	11.8	39	25.5	True	
	4	Children with dyslexia often have emotional and social disabilities	78	51.0	30	19.6	45	29.4	True	
	5	The brains of those with dyslexia are different from those of people without dyslexia	36	23.5	63	41.2	54	35.3	True	
	6	Dyslexia is hereditary.	21	13.7	69	45.1	63	41.2	True	
	7	Most studies indicate that about 5% of school-age students have dyslexia	54	35.3	18	11.8	81	52.9	True	
	8	Dyslexia has a greater occurrence in males than in females.	33	21.6	21	13.7	99	64.7	True	
	16	All poor readers have dyslexia.	0	0.0	108	70.6	45	29.4	False	
	20	Students who have reading disabilities without an apparent cause are called dyslexic.	24	15.7	81	52.9	48	31.4	True	
	21	People with dyslexia are not stupid or lazy. Knowing about the term helps children.	99	64.7	18	11.8	36	23.5	True	
	25	I think dyslexia is a myth. a problem that does not exist.	3	2.0	120	78.4	30	19.6	False	
	27	Problems in establishing laterality (body schema) are the cause of dyslexia	45	29.4	27	17.6	81	52.9	True	
	29	Dyslexia refers to a relatively chronic condition that is often not completely overcome	30	19.6	75	49.0	48	31.4	True	
	30	Many students with dyslexia continue to have reading problems as adults	27	17.6	69	45.1	57	37.3	True	
	31	Many students with dyslexia have low self-esteem.	66	43.1	45	29.4	42	27.5	True	
	35	Dyslexia usually lasts for a long time.	60	39.2	21	13.7	72	47.1	True	



KBDDS	Item no	Items	Correct		False		Do Not Know		Correct Answer	Correct answer mean
			n	%	n	%	n	%		
Diagnosis	9	Children with dyslexia are more consistently impaired in phonemic awareness (i.e., ability to hear and manipulate sounds in language) than any other ability.	75	49.0	27	17.6	51	33.3	True	2.35
	11	People with dyslexia have below-average intelligence	3	2.0	108	70.6	42	27.5	False	
	12	The reading of students with dyslexia is often characterised by inaccuracy and lack of fluency	78	51.0	36	23.5	39	25.5	True	
	13	Seeing letters and words backward is a fundamental characteristic of dyslexia	99	64.7	18	11.8	36	23.5	False	
	14	Difficulty with the phonological processing of information is one of the most critical deficits in dyslexia.	78	51.0	24	15.7	51	33.3	True	
	15	Intelligence tests are useful in identifying dyslexia	27	17.6	63	41.2	63	41.2	True	
	32	Children with dyslexia have problems with decoding and spelling but not with listening comprehension	81	52.9	30	19.6	42	27.5	True	
	33	Applying an individual reading test is essential to diagnosing dyslexia.	51	33.3	27	17.6	75	49.0	True	
	34	Those with dyslexia tend to spell words wrong.	69	45.1	27	17.6	57	37.3	True	
	36	Dyslexia is characterized by difficulty with learning to read fluently	66	43.1	45	29.4	42	27.5	True	
Treatment	10	Modeling fluent reading is often used as a teaching strategy	27	17.6	42	27.5	84	54.9	True	2.12
	17	Children with dyslexia can be helped by using coloured lenses/coloured overlays	54	35.3	21	13.7	78	51.0	True	
	18	Physicians can prescribe medications to help students with dyslexia	6	3.9	81	52.9	66	43.1	False	
	19	Multisensory instruction is not an effective training method at the moment	33	21.6	63	41.2	57	37.3	False	
	22	Giving students with dyslexia accommodations, such as extra time on tests, shorter spelling lists, or special seating, is unfair to other students	6	3.9	111	72.5	36	23.5	False	
	23	Intervention programs that emphasise the phonological aspects of language with the visual support of letters are effective for students with dyslexia.	93	60.8	15	9.8	45	29.4	True	

KBDDS	Item no	Items	Correct		False		Do Not Know		Correct Answer	Correct answer mean
			n	%	n	%	n	%		
Treatment	23	Intervention programs that emphasise the phonological aspects of language with the visual support of letters are effective for students with dyslexia.	93	60.8	15	9.8	45	29.4	True	2.12
	24	Most teachers receive intensive training in working with children with dyslexia.	54	35.3	51	33.3	48	31.4	False	
	26	Repeated reading techniques are useful reading material to improve reading fluency	78	51.0	30	19.6	45	29.4	True	
	28	Students with dyslexia need structured, sequential, direct instruction in basic skills and learning strategies.	90	58.8	21	13.7	42	27.5	True	