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Prospective teachers' knowledge and beliefs about dyslexia*[1]

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Abstract

Dyslexia, a neurological learning disability, presents difficulties in accurately pronouncing words, spelling, reading fluently, and comprehending written text. Given that prospective teachers in education faculties will inevitably interact with students who have dyslexia, it becomes crucial for these future educators to possess appropriate knowledge and beliefs about this condition. This study's primary objective was to explore prospective teachers' knowledge and beliefs regarding dyslexia, considering various factors. Employing a quantitative survey design, the research employed convenience sampling to select a sample of 954 prospective teachers enrolled in Niğde province during the fall semester of the 2021-2022 academic year. Data collection involved using a "Personal Information Form" and a "Dyslexia Knowledge and Belief Scale." Gender and the presence of a family member diagnosed with specific learning disabilities were subjected to statistical analysis using t-tests. In contrast, grade level and field of study were evaluated using one-way analysis of variance (ANOVA). Subsequently, the findings were interpreted. The outcomes indicated that female prospective teachers and those with a relative diagnosed with specific learning disabilities exhibited greater knowledge and stronger beliefs about dyslexia. Moreover, prospective teachers at the fourth-grade level and those pursuing special education-related courses demonstrated a higher level of understanding and more positive beliefs concerning dyslexia. The study examined their knowledge and beliefs and concluded that prospective teachers generally displayed insufficient understanding and beliefs about dyslexia.

Keywords: Learning disability, Dyslexia, Neurology, Reading fluency.

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INTRODUCTION

The study of learning has a long history, dating back to Aristotle's definition of learning as an act of association in the 4th century BC. Throughout the centuries, many theorists and researchers have contributed to the understanding of learning. Today, learning is defined as a relatively permanent change in an individual's behavior or behavioral potential resulting from experiences (Brandt, 2010). However, some individuals experience difficulties in the learning process, making translating their potential into performance challenging. This problem is referred to as a learning disability (American Psychiatric Association [APA], 2014, p. 34). Learning disabilities are defined as difficulties in reading, writing, and doing mathematical calculations that occur when one or more psychological processes that are fundamental in understanding and using written and spoken language are affected by faulty brain functioning or problems in the information processing process (International Dyslexia Association [IDA], 2002; Hammill, 1990; Kirk, 1988; Torgesen, 1980). These deficiencies can manifest in different ways and at different times for students with learning disabilities. Some individuals may experience deficits in only one area, such as reading, writing, or mathematics, while others may experience problems in all three areas simultaneously (Bender, 2016; Donovan & Cross, 2002; Glago et al., 2009; Lerner, 2000; Robinson et al., 2002).

Reading is individuals' most common skill to meet their need to know and learn. Reading can be described as generating significance within a typical context, utilizing a suitable approach and objective, and establishing effective communication between the author and the reader. It involves drawing upon prior knowledge, cognitive processes, and psychomotor abilities (Akyol, 2015; Razon, 1982). However, some individuals have great difficulty learning to read even though they do not have any mental, visual, or auditory problems. The difficulty experienced by these individuals is called "dyslexia" (Bender, 2016, p. 184). The word "dyslexia" originates from Greek; dys means "wrong or faulty," and lexia means "word" (Lawrence, 2009). Rudolph Berlin, a German ophthalmologist, described an adult who had lost the ability to read because of brain damage (Shaywitz, 2003); he first used the term dyslexia in 1884. As stated by the International Dyslexia Association (2002), dyslexia is a learning disability that originates from neurological factors. It is characterized by difficulties in accurate word pronunciation, spelling, fluent and precise reading, and reading comprehension.

The developmental characteristics of individuals with dyslexia may vary individually (Mather & Wendling, 2011). Symptoms of dyslexia observed in one student may not be seen in the same way or to the same degree in another student with dyslexia (APA, 2014). Since dyslexia problems of individuals may vary, this situation may affect phonological awareness, rapid naming, print awareness, working memory, morphological awareness, reading fluency, reading comprehension, writing, and speaking skills in different ways (Reid, 2009). Since dyslexia is a cluster of symptoms, although not all individuals have the same symptoms, early clues before primary school and late symptoms that can be observed during the school period can be listed as follows (De Lima, Salgado-Azoni, Dell'Agli, Baptista & Ciasca, 2020; Elliott & Grigorenko, 2014; IDA, 2002; Levinson & Harold, 2019; Rief, & Stern, 2010; Shaywitz, 2003; Sousa, 2016): Recent onset symptoms include delayed speech and speech difficulties, family history of dyslexia, delays and problems in language development, difficulties in perceiving time and space concepts, hyperactive behaviors and attention deficit problems, low self-perception and lack of self-confidence, and coordination problems. Late-onset symptoms include phonological awareness, print awareness, morphological awareness, rapid naming, working memory, reading fluency, and reading comprehension difficulties.

Due to the lack of awareness and knowledge about dyslexia among families and teachers, reading problems experienced by students often go unrecognized in the early years of primary school. Even when students are recognized as having dyslexia, they may not be fully informed about necessary interventions (Bender, 2016; Mather & Wendling, 2011; National Joint Committee on Learning Disabilities [NJCLD], 2017). When students with dyslexia are referred to institutions that diagnose

dyslexia, families, and teachers may also be inadequately informed about how to apply the outcomes for student development (Reid, 2009).

The childhood period is when the human brain undergoes the most rapid development, which decreases as the individual ages (Shaywitz, 2003). Therefore, it is crucial to identify students who have reading difficulties early and provide necessary interventions (Balci, 2015; Hurford et al., 1994; Rief & Stern, 2010; Schatschneider & Torgesen, 2004). Educational activities for students with dyslexia can be planned in a way that reduces or eliminates their reading problems. Studies have shown that early intervention for children with reading difficulties is more effective than interventions for children whose difficulties were identified later (Shaywitz, 2003). In the third grade, 75% of students identified with reading problems continue to read poorly in high school (Francis et al., 1996). Therefore, if a child with problems with reading skills is later found to have dyslexia for neurological reasons, each year of delay will make it more difficult for the individual to acquire reading skills. Torgesen (1998), a reading researcher at Florida State University who has carried out many important studies on the early detection and intervention of dyslexia, concluded in a study on the cost of early detection of children and late intervention that more intensive interventions are required to develop the phonological awareness and word recognition skills that form the basis of reading ability of the child who we allow or turn a blind eye to fall behind in the first years of primary school, and that students who are detected early and receive reading interventions do not achieve the success of students who are identified early.

Since the symptoms of dyslexia and the problems experienced in reading skills differ from individual to individual, it is necessary to create individualized learning environments in order to provide individualized instruction to improve reading skills and to intervene by determining the most effective activities and strategies in the shortest time (Doganay-Bilgi, 2017; Frith, 2017; Shaywitz, 2003). When the literature is examined, it is also stated that the skills of individuals with dyslexia such as (Gibbs, 2005; Layes et al., 2022), print awareness (Georgiou et al., 2016; Rothe et al., 2014), morphological awareness (Diamanti et al., 2017; Mather & Wendling, 2011), rapid naming (Albuquerque, 2017; Norton & Wolf, 2012), working memory (Azizi et al., 2020; Swanson & Howell, 2001), reading fluency (Gedik & Akyol, 2022; Satilmis, 2021) and reading comprehension (Erbasan & Saglam, 2020; Stetter & Hughes, 2017) should be frequently supported with designed activities and developed strategies.

Teachers play an important role in recognizing and intervening in dyslexia at an early age (Reid, 2009). This is because school is where students encounter academically disciplined curricula. Early recognition of children with learning problems by educators and the acceptance that they may require different learning styles can lead to individualized education programs (IEPs) and diverse assessment strategies (Shaywitz, 2003). Teachers should focus on planning instruction aimed at addressing the challenges experienced by individuals with dyslexia in critical skills such as phonological awareness, print awareness, morphological awareness, rapid naming, working memory, word recognition, and vocabulary knowledge, all of which have a significant impact on their ability to comprehend the texts they read (Doganay-Bilgi, 2017; Klingner et al., 2015). Through the important efforts of teachers, many children with dyslexia can be diagnosed and intervened early, and possible negative outcomes can be minimized.

Dyslexia from the Perspective of Prospective Teachers in Turkey

In Turkey, dyslexia is a concept that has attracted the attention of families, teachers, and researchers in recent years (Balci, 2019). Compared to the US and European countries, it can also be stated as a concept studied very late. When the research on dyslexia, a learning disability in Turkey in the last fifty years, is examined, it is seen that it is generally conducted with students and teachers. Results from academic studies conducted with teachers have indicated that their knowledge, awareness, and self-efficacy towards dyslexia are generally low (Gwernan-Jones & Burden, 2010; Ulucinar-Sagir & Bozgun, 2018; Yigiter, 2005; Balci, 2019; Sahin, 2019; Sumer-Dodur & Altindag-Kumas, 2021). One of the most significant reasons is the lack of training teachers provide during their candidate teaching (Arabaci, 2018;

Yangin et al., 2016). This situation has led to the hypothesis of this study, which is that the knowledge and beliefs of prospective teachers, who are the teachers of the future, about dyslexia will significantly affect the lives of students with dyslexia in the future. This study examines prospective teachers' knowledge and beliefs regarding dyslexia. In line with this main purpose, the following questions were sought to be answered:

1. Do prospective teachers' knowledge and beliefs about dyslexia differ significantly based on gender?
2. Is there a significant difference in the dyslexia knowledge and belief levels of prospective teachers with and without a relative diagnosed with learning disabilities?
3. Do prospective teachers' knowledge and beliefs about dyslexia differ significantly based on their grade level?
4. Is there a significant difference in the dyslexia knowledge and belief levels of prospective teachers from different academic departments?
5. What is the overall level of dyslexia knowledge and beliefs among prospective teachers?

METHOD

Research Model

This research was conducted using the survey model, one of the quantitative research methods. The survey model aims to describe general tendencies, attitudes, and opinions in the universe based on quantitative data without changing the sample (Creswell, 2013). One of the reasons for choosing this method in our research is that it allows us to work with larger samples than other research methods when determining participants' characteristics, such as their opinions, knowledge, skills, abilities, talents, and attitudes regarding a subject or event. Additionally, the survey method was preferred because it increases the generalizability of the results by providing the opportunity to work with large samples.

Sample

The study population of the research includes prospective teachers studying at the faculty of education. The study sample consists of prospective teachers studying in Niğde Province during the autumn semester of the 2021-2022 academic year. A convenient sampling method was used to represent the study population. Convenient sampling is frequently used to achieve the desired size and characteristics needed in the research while maximizing savings (Buyukozturk et al., 2018, p. 95). Accordingly, 954 prospective teachers were included in the study sample. Table 1 presents the distribution of prospective teachers in the sample regarding the variables of the department they study, grade level, gender, and having a relative diagnosed with learning disabilities.

Table 1. Distribution of Prospective Teachers in Terms of Various Variables

Department	Level	Gender		Having a Relative with Learning Disabilities		Total
		Female	Male	There is	None	
Primary School Teaching	1	19	11	1	29	30
	2	16	12	1	27	28
	3	27	12	2	37	39
	4	25	14	5	34	39
	Total	87	49	9	127	136
Early Childhood Education	1	20	10	4	26	30
	2	23	7	2	28	30
	3	25	3	3	25	28
	4	29	2	4	27	31
	Total	97	22	13	106	119
Social Sciences Education	1	19	11	3	27	30
	2	28	0	5	23	28
	3	14	12	4	22	26
	4	26	4	4	26	30
	Total	87	27	16	98	114
Turkish Education	1	16	16	3	29	32
	2	12	18	7	23	30

	3	19	10	2	27	29
	4	17	11	2	26	28
	Total	64	55	14	105	119
Science Education	1	24	7	4	27	31
	2	15	15	3	27	30
	3	28	5	2	31	33
	4	9	0	1	8	9
	Total	76	27	10	93	103
Mathematics Education	1	20	11	4	27	31
	2	16	9	0	25	25
	3	16	15	4	27	31
	4	15	15	1	29	30
	Total	67	50	9	108	117
Music Education	1	6	7	0	13	13
	2	11	11	1	21	22
	3	2	5	0	7	7
	4	11	4	1	14	15
	Total	30	27	2	55	57
Arts and Crafts Education	1	9	1	0	10	10
	2	16	9	1	24	25
	3	12	8	2	18	20
	4	9	4	3	10	13
	Total	46	22	6	62	68
Guidance and Psychological Counselling	1	19	11	2	28	30
	2	15	15	1	29	30
	3	12	19	5	26	31
	4	19	11	4	26	30
	Total	65	56	12	109	121
Total		**619**	**335**	**91**	**863**	**954**

As stated in Table 1, 619 prospective teachers in the sample were female, and 335 were male. Regarding the variable of having a relative diagnosed with a learning disability, 91 prospective teachers answered "have," and 863 prospective teachers answered "do not have. " Regarding grade level, 237 were first, 248 were second, 244 were third, and 225 were fourth. In terms of the department variable, 136 of the prospective teachers are studying in the department of primary school teaching, 119 in early childhood education, 114 in social sciences education, 119 in Turkish education, 103 in science education, 117 in mathematics education, 57 in music education, 68 in arts and crafts education, and 121 in guidance and psychological counselling education.

Data Collection Tools

In the research process, data were collected through the "Personal Information Form" created by the researchers and the "Dyslexia Knowledge and Belief Scale" (DBBI) adapted into Turkish by Sumer-Dodur and Altindag-Kumas (2021). The necessary permissions for using the scale in this study were obtained from the researchers who adapted the scale into Turkish.

Personal Information Form: The "Personal Information Form" includes four questions about gender, grade level, having a relative diagnosed with a learning disability, and the department of study of the prospective teachers. After reviewing the literature, the researchers determined these variables to identify factors affecting dyslexia knowledge and belief.

Dyslexia Knowledge and Belief Scale (DBBI): Another tool used to collect data in the study was the "Dyslexia Knowledge and Belief Scale (DBBI)." The DBBI was originally developed by Soriano-Ferrer and Echegaray-Bengoa (2014) as the "Scale of Knowledge and Beliefs about Developmental Dyslexia" to assess the dyslexia knowledge and belief levels of classroom teachers. The scale consists of 36 items divided into three sub-dimensions: "general knowledge," "diagnosis," and "treatment." It utilizes a triple Likert scale with response options of "True," "False," and "Do not know."

For the study, the DBBI was adapted into Turkish by Sumer-Dodur and Altindag-Kumas (2021), resulting in a Turkish scale with 36 items across the same three sub-dimensions. Analyzing the data, it was determined that the scale exhibited a three-factor structure. The model fit indices indicated a good fit (χ^2 /sd=2.80, RMSEA=.080, SRMR=.052, NFI=.90, NNFI=.93, CFI=.93, IFI=.93, AGFI=.90). Reliability analyses demonstrated satisfactory internal consistency, with overall scale and subscale coefficients ranging between .78 and .87 (Sumer-Dodur & Altindag-Kumas, 2021). The discrimination levels of the scale items were above .30, indicating that the scale is a valid and reliable tool.

Data Collection Procedure

The research was conducted using a survey model, which is a quantitative research method. The data collection followed a cross-sectional survey design. In cross-sectional studies, variables are described at a specific time, typically involving a large sample representing a diverse community (Buyukozturk et al., 2018, p. 186). The data were collected from prospective teachers enrolled at Niğde Ömer Halisdemir University Faculty of Education during the autumn semester of the 2021-2022 academic year. Before data collection, the purpose of the research was explained to the prospective teachers, who were asked to complete the forms voluntarily. The study was based on volunteer participation and forms from prospective teachers who did not respond to the data collection tools did not volunteer, or provided multiple identical answers, so they were not included. Ultimately, data from 954 prospective teachers were deemed valid and included in the analysis.

Data Analysis

The data obtained from the scales used in the study were analyzed using the SPSS 24 analysis program. In the personal information form, t-tests were conducted to compare variables such as gender and having a relative diagnosed with learning disabilities. One-way analysis of variance (ANOVA) was performed to analyze the data based on class level and department of study. Mean scores were calculated for the sub-dimensions of the scale and the overall scale. General descriptive statistics were computed to analyze and present prospective teachers' knowledge and beliefs about dyslexia. These findings were summarized and presented in Table 2.

Table 2. Scores That Can Be Taken to Evaluate the Average Dyslexia Knowledge and Beliefs of Prospective Teachers

Sub Dimensions	Max	Min	Average
General Information	51.00	17.00	34.00
Diagnosis	30.00	10.00	20.00
Treatment	27.00	9.00	18.00
Total	108.00	36.00	72.00

Validity and Reliability

To ensure reliability in the data collection process, the researchers first provided detailed information to the prospective teachers regarding the subject and purpose of the research. They also provided clear instructions on how to complete the scales accurately. By informing the participants about the research topic and explaining the proper procedures for filling out the scales, the researchers aimed to enhance the reliability of the collected data.

Ethical Considerations

The research was conducted with the decision of the Ethics Committee of Niğde Ömer Halisdemir University Ethics Committee dated 08.09.2021 and numbered E-86837521-050.99-106586.

FINDINGS

This section presents the research findings through tables, showcasing the results obtained during the data analysis. The tables include the t-test and ANOVA results, which examine the scores obtained by the prospective teachers from the sub-dimensions and overall total of the "Dyslexia Knowledge and

Belief Scale." Additionally, the average scores of the prospective teachers from the scale are provided, along with interpretations regarding the knowledge and beliefs of the prospective teachers regarding dyslexia.

The t-test results of prospective teachers' knowledge and beliefs about dyslexia, based on the gender variable, which is one of the independent variables in the research, are presented in Table 3 below:

Table 3. T-Test Results of the Mean Scores of Prospective Teachers' Knowledge and Beliefs about Dyslexia in terms of Gender Variable

General Information	Gender	N	X	S.s	t	p
General Information	Female	619	37.95	2.93	.416	.677
	Male	335	37.86	2.93		
Diagnosis	Female	619	23.31*	2.38	3.283	.001*
	Male	335	22.78	2.37		
Treatment	Female	619	19.21	1.70	1.754	.080
	Male	335	19.00	1.80		
Total	Female	619	80.48*	4.63	2.538	.013*
	Male	335	79.66	5.00		

*p<.05

According to the findings presented in Table 3, an analysis of the scores from the "Dyslexia Knowledge and Belief Scale" revealed a significant difference (t=3.283, p<.05) in the "Diagnosis" sub-dimension. Female prospective teachers (X=23.31) scored higher than male prospective teachers (X=22.78), indicating a greater level of knowledge and beliefs about dyslexia in favor of female participants. However, no significant differences were observed in the other sub-dimensions of the scale, namely "General Knowledge" and "Treatment." When examining the mean scores for the overall scale, it is evident that female prospective teachers (X=80.48) had significantly higher scores compared to male prospective teachers (X=79.66) (t=2.538, p<.05). Additionally, by comparing the average scores obtained for all sub-dimensions and the overall scale (as shown in Table 2) with the scores obtained based on the gender variable (as presented in Table 3), it can be interpreted that both female and male prospective teachers possess knowledge and beliefs about dyslexia slightly above average in the "General Knowledge" and "Diagnosis" sub-dimensions, as well as the overall total of the scale. Their scores are close to the average in the "Treatment" sub-dimension.

The t-test results of prospective teachers' knowledge and beliefs about dyslexia, based on the variable of having a relative diagnosed with a learning disability (HRDWLD), which is one of the independent variables in the study, are presented in Table 4 below:

Table 4. T-test Results of The Mean Scores of Prospective Teachers' Knowledge and Beliefs about Dyslexia in terms of The Variable of Having a Relative Diagnosed with Specific Learning Disability (SLLD)

Sub Dimensions	HRDWLD	N	X	S.s	t	p
General Information	Yes	91	39.05	3.09	3.901	.000*
	No	863	37.80	2.89		
Diagnosis	Yes	91	23.69	2.59	2.353	.019*
	No	863	23.07	2.36		
Treatment	Yes	91	19.27	1.74	.753	.452
	No	863	19.12	1.74		
Total	Yes	91	82.02	4.68	3.855	.000*
	No	863	80.00	4.75		

*p<.05

According to the findings presented in Table 4, an analysis of the scores from the "Dyslexia Knowledge and Belief Scale" revealed significant differences in favor of prospective teachers who had a relative diagnosed with a learning disability (HRDWLD) in the "General Knowledge" (t=3.907, p<.05) and "Diagnosis" (t=2.353, p<.05) sub-dimensions. This indicates that prospective teachers with a relative diagnosed with a learning disability exhibited higher knowledge and beliefs about dyslexia in these sub-dimensions. However, no significant difference was observed in the "Treatment" sub-dimension. When examining the mean scores for the overall scale, it can be stated that there was a significant difference (t=3.855, p<.05) in favor of prospective teachers who had a relative diagnosed with a learning disability (X=82.02) compared to prospective teachers without such a relative (X=80.00). Additionally, by comparing the average scores obtained for all sub-dimensions and the overall scale (as shown in Table 2) with the scores obtained based on the variable of having a relative diagnosed with a learning disability (as presented in Table 4), it can be interpreted that both prospective teachers with and without a relative diagnosed with a learning disability possess knowledge and beliefs about dyslexia slightly above average in the "General Knowledge" and "Diagnosis" sub-dimensions, as well as the overall total of the scale. Their scores are close to the average in the "Treatment" sub-dimension.

The ANOVA results of prospective teachers' knowledge and beliefs about dyslexia, based on grade level, which is one of the independent variables in the study, are presented in Table 5 below:

Table 5. ANOVA Results of the Mean Scores of Prospective Teachers' Knowledge and Beliefs about Dyslexia in terms of the Grade Level Variable

Sub Dimensions	Level	N	X	S.s.	Sd	F	p	Significant difference
General Information	1	237	37.67	2.76	3/950	.914	.433	---
	2	248	38.04	2.78				
	3	244	37.89	2.89				
	4	225	38.07	3.28				
	Total	954	37.92	2.93				
Diagnosis	1	237	22.69*	2.44	3/950	5.456	.001*	1-2 1-4
	2	248	23.42*	2.19				
	3	244	22.97	2.29				
	4	225	23.43*	2.56				
	Total	954	23.13	2.39				
Treatment	1	237	19.05	1.64	3/950	2.048	.106	---
	2	248	18.98	1.76				
	3	244	19.34	1.58				
	4	225	19.18	1.97				
	Total	954	19.14	1.74				
Total	1	237	79.43*	4.58	3/950	3.113	.026*	1-4
	2	248	80.45	4.51				
	3	244	80.22	4.44				
	4	225	80.69*	5.49				
	Total	954	80.19	4.78				

*p<.05 (1= 1st Grade, 2= 2nd Grade, 3 = 3rd Grade, 4 = 4th Grade)

According to the findings presented in Table 5, an analysis of the scores from the "Dyslexia Knowledge and Belief Scale" revealed a significant difference (F=5.456, p<.05) in favor of prospective teachers studying at the second grade (X=23.42) and fourth grade (X=23.43) levels, compared to those studying at the first-grade level (X=22.69), in the "Diagnosis" sub-dimension. This indicates that prospective teachers at the second and fourth-grade levels have higher knowledge and beliefs about dyslexia regarding diagnosis. However, no significant differences were observed in the "General Knowledge" and "Treatment" sub-dimensions. When examining the mean scores for the overall scale, it can be stated that there was a significant difference (F=3.113, p<.05) in favor of prospective teachers studying at the

fourth-grade level (X=80.69) compared to those studying at the first-grade level (X=79.43). Additionally, by comparing the average scores obtained for all sub-dimensions and the overall scale (as shown in Table 2) with the scores obtained based on the grade level variable (as presented in Table 5), it can be interpreted that prospective teachers at all grade levels possess knowledge and beliefs about dyslexia slightly above average in the "General Knowledge" and "Diagnosis" sub-dimensions, as well as the overall total of the scale. Their scores are close to the average in the "Treatment" sub-dimension.

The ANOVA results of prospective teachers' knowledge and beliefs about dyslexia, based on the variable of the department of study, which is another independent variable in the research, are presented in Table 6 below:

Table 6. ANOVA Results of The Mean Scores of Prospective Teachers' Knowledge and Beliefs about Dyslexia in terms of The Department of Study

Sub Dimensions	Department	N	X	S.s.	Sd	F	p	Significant Difference
General Information	PST	136	38.02	2.69	8/945	2.070	.036*	TE-GPC
	ECE	119	37.68	3.16				
	SSE	114	37.97	3.16				
	TE	119	37.31*	2.97				
	SE	103	38.01	2.87				
	ME	117	38.27	2.85				
	MUE	57	37.24	2.80				
	ACE	68	37.79	2.87				
	GPC	121	38.54*	2.78				
	Total	954	37.92	2.93				
Diagnosis	PST	136	23.26	2.48	8/945	5.162	.000*	ECE-TE ECE-MUE SSE-TE SSE-MUE TE-ME TE-GPC MUE-GPC
	ECE	119	23.59*	2.37				
	SSE	114	23.53*	2.36				
	TE	119	22.36*	2.15				
	SE	103	22.89	2.49				
	ME	117	23.32*	2.41				
	MUE	57	22.19*	2.15				
	ACE	68	22.61	2.17				
	GPC	121	23.65*	2.34				
	Total	954	23.13	2.39				
Treatment	PST	136	19.30	1.79	8/945	2.374	.016*	ECE-MUE
	ECE	119	19.46*	1.86				
	SSE	114	18.96	1.72				
	TE	119	19.00	1.50				
	SE	103	19.06	1.53				
	ME	117	19.17	1.83				
	MUE	57	18.57*	1.61				
	ACE	68	18.83	1.69				
	GPC	121	19.43	1.89				
	Total	954	19.14	1.74				
Total	PST	136	80.59*	4.41	8/945	5.481	.000*	PST-TE PST-MUE ECE-TE ECE-MUE SSE-MUE TE-ME TE-GPC
	ECE	119	80.74*	4.61				
	SSE	114	80.47*	5.06				
	TE	119	78.68*	4.64				
	SE	103	79.98	4.47				
	ME	117	80.76*	4.68				
	MUE	57	78.01*	4.84				

ACE	68	79.25*	4.84	ME-MUE
GPC	121	81.63*	4.78	MUE-GPC
Total	954	80.19	4.78	ACE-GPC

*p<.05 (PST= Primary School Teaching, ECE=Early Childhood Education, SSE=Social Sciences Education, TE=Turkish Education, ME=Mathematics Education, SE=Science Education, MUE=Music Education, ACE=Arts and Crafts Education, GPC=Guidance and Psychological Counselling).

According to the findings presented in Table 6, an analysis of the scores from the "Dyslexia Knowledge and Belief Scale" revealed significant differences among the departments of study in terms of the "General Knowledge" (F=2.070, p<.05), "Diagnosis" (F=5.162, p<.05), and "Treatment" (F=2.374, p<.05) sub-dimensions. Specifically, there was a significant difference in favor of prospective teachers studying in the "Department of Guidance and Psychological Counselling" (X=38.54) compared to those studying in the "Department of Turkish Education" (X=37.31) in the "General Knowledge" dimension.

According to Table 6, when examining the "Diagnosis" sub-dimension, it is evident that there are significant differences among the departments of study. Prospective teachers studying in the "Department of Early Childhood Education" (X=23.59), "Department of Social Sciences Education Teaching" (X=23.53), and "Department of Guidance and Psychological Counselling" (X=23.65) showed significantly higher scores compared to prospective teachers studying in the "Department of Turkish Education" (X=22.36) and "Department of Music Education" (X=22.19). Additionally, it was observed that prospective teachers in the "Department of Mathematics Education" (X=23.32) had significantly higher scores in the "Diagnosis" sub-dimension compared to those in the "Department of Turkish Education" (X=22.36).

According to Table 6, significant differences were observed in the "Diagnosis" sub-dimension among the departments of study. Prospective teachers in the "Department of Early Childhood Education" (X=23.59), "Department of Social Sciences Education" (X=23.53), and "Department of Guidance and Psychological Counselling" (X=23.65) had significantly higher scores compared to prospective teachers in the "Department of Turkish Education" (X=22.36) and "Department of Music Education" (X=22.19). Additionally, it was concluded that there was a significant difference in the "Diagnosis" sub-dimension in favor of prospective teachers in the "Department of Mathematics Education" (X=23.32) compared to those in the "Department of Education" (X=22.36).

In the "Treatment" sub-dimension, which is the third sub-dimension of the scale, a significant difference was observed in favor of prospective teachers studying in the "Department of Early Childhood Education" (X=19.46) compared to those studying in the "Department of Music Education" (X=18.57). However, it is worth noting that the mean scores of prospective teachers in other departments were very close, indicating no significant difference in the "Treatment" sub-dimension.

When the mean scores for the overall scale were analyzed, it was found that prospective teachers studying in the "Department of Turkish Education" (X=78.68) and "Department of Music Education" (X=78.01) had lower scores compared to those studying in the "Department of Primary School Teaching" (X=80.59), "Department of Early Childhood Education" (X=80.74), "Department of Mathematics Education" (X=80.76), and "Department of Guidance and Psychological Counselling" (X=81.63). Similarly, prospective teachers studying in the "Department of Social Sciences Education Teaching" (X=80.47) had higher scores compared to those studying in the "Department of Music Education" (X=78.01). Furthermore, when comparing the average scores for all sub-dimensions and the overall scale from Table 2 with the scores obtained based on the department of study in Table 6, it can be interpreted that prospective teachers from all departments have slightly above-average knowledge and beliefs about dyslexia in terms of the "General Knowledge" and "Diagnosis" sub-dimensions, as well as the "Overall Total of the Scale." Their scores in the "Treatment" sub-dimension are close to the average.

General descriptive statistics results according to the mean scores of prospective teachers' knowledge and beliefs about dyslexia are presented in Table 7 below:

Table 7. General Descriptive Statistics of Prospective Teachers' Knowledge and Beliefs about Dyslexia

Sub Dimensions	N	Min	Max	Mean	S.s.	Skewness	Kurtosis
General Information	954	29.00	48.00	37.92	2.93	.173	.093
Diagnosis	954	16.00	29.00	23.13	2.39	-.065	-.841
Treatment	954	13.00	26.00	19.14	1.74	-.032	.274
Total	954	65.00	94.00	80.19	4.78	.022	-.220

According to Table 7, the data can be considered normally distributed as indicated by the Skewness and Kurtosis values falling within the range of -1.5 and +1.5 (Tabachnick & Fidell, 2013). When comparing the average scores obtained for all sub-dimensions and the overall scale in Table 2 with the average scores of all prospective teachers in Table 7, it can be interpreted that all prospective teachers possess knowledge and beliefs about dyslexia slightly above the average in the "General Knowledge" and "Diagnosis" sub-dimensions, as well as the overall total of the scale, and their scores are close to the average in the "Treatment" sub-dimension.

DISCUSSION AND CONCLUSION

In this study, the researchers investigated the knowledge and beliefs about dyslexia among prospective teachers, considering variables such as gender, having a relative diagnosed with a learning disability, grade level, and department. Previous research conducted by Gwernan-Jones and Burden (2010) suggested that primary school teachers' knowledge and beliefs about dyslexia differed significantly based on gender, with female teachers exhibiting higher levels of knowledge and awareness. This finding prompted the present study to examine the knowledge and beliefs of prospective teachers regarding gender, leading to the conclusion that female prospective teachers demonstrated higher knowledge and beliefs about dyslexia than their male counterparts. Similarly, a study by Yangin et al. (2016), which explored prospective teachers' awareness of various learning difficulties, found that female prospective teachers exhibited significantly higher knowledge and awareness than male prospective teachers. Another study conducted by Seckin-Yilmaz and Erim (2019) focused on adults' knowledge levels about dyslexia and revealed that females possessed higher knowledge about dyslexia than males. Furthermore, Ulucinar-Sagır and Bozgun (2018) examined the competencies of classroom teachers in working with students with learning disabilities. They found that female teachers considered themselves more competent than male teachers. Based on the suggestions and findings from existing studies, it can be concluded that the present study, which investigated dyslexia knowledge and beliefs among prospective teachers, aligns with previous research regarding gender differences.

Regarding the second independent variable examined in the research findings, it was found that prospective teachers who had a relative diagnosed with learning disabilities exhibited a higher level of dyslexia knowledge and beliefs compared to those who did not have a relative diagnosed with learning disabilities. This finding is consistent with the study conducted by Ulutasdemir, Uzun, Kulakac, Sari, and Acar (2021), which aimed to assess the knowledge level of university students about dyslexia. The study revealed that only 7.5% of university students had a relative with dyslexia, indicating insufficient knowledge about dyslexia among the majority (92.5%) of the students. However, Ulucinar-Sagır and Bozgün (2018) conducted a study examining the competencies of classroom teachers for students with learning disabilities. They found no significant difference based on the variables of having a student with learning disabilities in the family or having a student with learning disabilities as the teacher. On the other hand, Yigiter (2005) stated in their study that teachers having a relative with learning disabilities significantly affected their level of knowledge about learning disabilities. Furthermore, in a master's thesis conducted by Tas (2019), it was concluded that prospective teachers who had personal

acquaintance with individuals requiring special education demonstrated higher knowledge and competencies regarding the needs of individuals requiring special education. Drawing upon the literature, it can be inferred that prospective teachers with personal experiences with dyslexia in their daily lives tend to possess higher knowledge and beliefs about dyslexia.

In terms of the third independent variable analyzed in the research findings, it was observed that prospective teachers at the fourth-grade level exhibited a higher level of dyslexia knowledge and beliefs compared to those at the first-grade level. This finding aligns with the results of Taş's (2019) study, which indicated no significant difference in the knowledge and competencies of prospective teachers based on the grade level variable related to the competencies of individuals requiring special education. Notably, the class level variable has not been extensively addressed in dyslexia studies focusing on prospective teachers in our country. However, incorporating this variable in scientific research can provide valuable insights for researchers and educators in higher education institutions, particularly regarding the inclusion of dyslexia content in teacher training programs. The present study found a significant difference between the dyslexia knowledge and beliefs of prospective teachers at the first and fourth-grade levels, favouring the fourth-grade prospective teachers. This difference can be attributed to the impact of the "special education and inclusion" course offered in the seventh and eighth semesters of teacher training programs. Furthermore, when examining the student profiles of those who chose the "attention deficit and hyperactivity disorder" course and "inclusive education" courses among the common elective professional knowledge courses offered across faculties, it was observed that fourth-grade students were predominantly enrolled in these courses. Consequently, it can be inferred that these courses contribute to higher dyslexia knowledge and beliefs among fourth-grade prospective teachers.

Regarding the fourth independent variable, the research findings indicate that prospective teachers studying in the departments of primary school teaching, early childhood education, and mathematics education exhibit higher levels of dyslexia knowledge and beliefs compared to prospective teachers in the departments of Turkish education and music education. Furthermore, prospective teachers in the Department of Guidance and Psychological Counseling demonstrate higher dyslexia knowledge and beliefs than those in the Departments of Turkish Education, Music Education, and Art and Crafts Education. Additionally, it was concluded that prospective teachers in the Department of Social Sciences Education teaching possess a higher level of dyslexia knowledge and beliefs than prospective teachers in the Department of Music Education. Notably, the literature lacks research specifically examining prospective teachers in education faculties based on their departments of study. In the current study, the comparison of departments revealed that the "special education and inclusion" course, offered during the autumn semester when data collection took place, likely influenced prospective teachers to have a higher level of dyslexia knowledge and beliefs. It was also observed that prospective teachers studying guidance and psychological counseling, primary school teaching, early childhood education, and mathematics education were the ones predominantly enrolling in the "attention deficit and hyperactivity disorder" course and "inclusive education" courses, which are common professional knowledge courses in the faculty. Consequently, it can be inferred that the course selection among these departments contributed to higher dyslexia knowledge and beliefs among prospective teachers in those departments. Furthermore, a closer examination of the departments' elective and compulsory course curricula revealed that the Department of Guidance and Psychological Counseling offered the highest number of courses on special education and dyslexia. This finding suggests that the course offerings in the Department of Guidance and Psychological Counseling likely influenced the mean scores of dyslexia knowledge and beliefs among prospective teachers in that department.

The final finding of the research pertains to the general descriptive statistics of prospective teachers' knowledge and beliefs about dyslexia. Upon analyzing the average scores from the total scale, it was determined that prospective teachers had average dyslexia knowledge and beliefs in the general knowledge and diagnosis sub-dimensions and the overall scale. However, their dyslexia knowledge and

beliefs in the treatment and coping dimension were average. In a study conducted by Ulutasdemir et al. (2021) to assess the level of knowledge about dyslexia among university students, it was revealed that 42.6% of the students reported having encountered or heard about dyslexia before, while the remaining participants had no prior knowledge of the concept. Similarly, in a study by Seckin-Yilmaz and Erim (2019) that examined the knowledge levels of adults about dyslexia, it was noted that the knowledge levels of adults regarding dyslexia were generally low, and their education levels did not significantly affect this situation. Furthermore, a study by Yangin et al. (2016) concluded that prospective classroom teachers had insufficient knowledge and awareness about various learning difficulties. Likewise, Kurtulus (2020) found in his master's thesis study on prospective teachers' knowledge about special education and inclusion that their understanding of students with special needs was limited. When comparing the current study's findings with the existing literature, it can be inferred that prospective teachers' knowledge and beliefs about dyslexia tend to be average or low.

Early identification and appropriate education for students with dyslexia rely on teachers having sufficient knowledge and understanding of dyslexia and being familiar with student behaviors associated with dyslexia (Reid, 2009, p. 3; Shaywitz, 2003, p. 237). The research findings indicate that prospective teachers' knowledge and beliefs about dyslexia are generally average or insufficient. This is concerning, as the knowledge and beliefs of prospective teachers, who will become future educators, significantly impact the lives of students with dyslexia. Early diagnosis and intervention are crucial in dyslexia, but many families, teachers, and prospective teachers lack a comprehensive understanding of dyslexia, making it challenging to seek appropriate help (Shaywitz, 2003). Insufficient education on learning difficulties during the teacher training process is one of the main reasons for teachers' low awareness and knowledge levels. The teacher training undergraduate programs of the Council of Higher Education of Turkey (Council of Higher Education [CoHE], 2018) reveal that, apart from the "Special Education and Inclusion" course in one semester, there are no other compulsory courses specifically addressing learning disabilities or dyslexia throughout the eight-semester education of teacher candidates. As a result, when examining studies conducted with teachers in Turkey, it becomes evident that the overall awareness and knowledge levels of teachers regarding learning disabilities and dyslexia are generally low across different branches of education. This finding is consistent with other studies conducted in this area (Ulucinar-Sagır & Bozgun, 2018; Yigiter, 2005; Balci, 2019; Sahin, 2019; Sumer-Dodur & Altindag-Kumas, 2021).

Recommendations

Based on the research findings, it is crucial to encourage prospective teachers, who will become future educators in faculties of education, to enhance their knowledge about dyslexia. This can be achieved by offering courses specifically focusing on dyslexia and providing opportunities for prospective teachers to observe and interact with students with dyslexia. Moreover, engaging prospective teachers in projects and studies that raise awareness about dyslexia can be beneficial. Workshop courses can be implemented to empower prospective teachers in developing technology-supported materials and applications for students with dyslexia. These workshops would enable them to create more effective and engaging learning experiences for students with dyslexia. Furthermore, it is recommended that in-service training for current teachers and administrators be organized to enhance their awareness and knowledge about dyslexia. These trainings would ensure that educators have the necessary skills and understanding to support students with dyslexia effectively. Employing reading specialists who specialize in supporting students with dyslexia can also contribute to providing more professional practices and assistance to students in need.

Statement of Researchers

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Author Biographies

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