BILINGUAL PUBLISHING GROUP

Journal of Psychological Research

https://journals.bilpubgroup.com/index.php/jpr

ARTICLE

Development and Psychometric Assessment of the Dyslexia Awareness Instrument in Teachers

***Hilal Yıldırım*[1*], *Erman Yıldız*[2], *Rukuye Aylaz*[1]**

[1] *Department of Public Health Nursing, Faculty of Nursing, Inonu University, Malatya, 44280, Turkey*

[2] *Department of Psychiatric Nursing, Faculty of Nursing, Inonu University, Malatya, 44280, Turkey*

ABSTRACT

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. Teachers may not be very sure about the definition of dyslexia and generally struggle to tell the difference between dyslexic learners and slow learners. Developing the DyAwI may provide an important psychometric assessment tool in determining the awareness level of the teacher and being able to make this distinction. A descriptive, explorative design was used in this study. The study consisted of two main phases. In the first phase, in order to develop the instrument, a literature review and a pilot study on 20 primary school teachers were carried out, and in line with expert opinions, the content validity index was calculated. In the second stage, exploratory and confirmatory factor analyses were carried out to identify the construct validity and reliability. The study included 182 primary school teachers for the second stage. The KMO and Bartlett test values, which determine the suitability of DyAwI for factor analysis, were found to be 0.77 and 0.000, respectively. The overall Cronbach's alpha value of DyAwI was 0.75. As a result of the assessment of its construct validity, the scale consisted of 2 factors and 14 items. The findings of the study show that the tool is reliable and sufficient. The instrument is easy to understand, and this tool can determine the dyslexia awareness levels of teachers. DyAwI could promote teachers' awareness of dyslexia and support the early identification of primary school students with dyslexia. It is believed that, thanks to the data obtained from the instrument, teachers will be able to decide on an educational assessment of a student with reading difficulties more quickly.

Keywords: Dyslexia; Learning disability; Awareness; Teachers; Psychometric assessment

*CORRESPONDING AUTHOR:

Hilal Yıldırım, Department of Public Health Nursing, Faculty of Nursing, Inonu University, Malatya, 44280, Turkey; Email: firat.hilal@inonu.edu.tr

ARTICLE INFO

Received: 07 June 2023 | Revised: 18 August 2023 | Accepted: 4 September 2023 | Published Online: 11 September 2023

DOI: https://doi.org/10.30564/jpr.v5i4.5770

CITATION

Yıldırım, H., Yıldız, E., Aylaz, R., 2023. Development and Psychometric Assessment of the Dyslexia Awareness Instrument in Teachers. Journal of Psychological Research. 5(4): 1-14. DOI: https://doi.org/10.30564/jpr.v5i4.5770

1. Introduction

Learning to read is essential in early education. Children who have difficulties in reading may experience low levels of education and low employment expectations in their future lives [1-3]. Language-based lifelong reading difficulty is known as dyslexia [4]. Although there are many educational and medical definitions of dyslexia, its acceptance as a learning disability that occurs on the basis of words is common in all definitions [5,6].

Dyslexia primarily results in difficulties in spelling and decoding words [7]. Researchers have shown in recent years that the most fundamental shortcomings of dyslexic children are phonological processing difficulties, which often involve rapid naming in alphabetical linguistics and/or alphabetic languages [8,9]. While dyslexia is defined as a specific learning obstacle on the word level, reading comprehension deficiencies are more common among children who are diagnosed with dyslexia in comparison to the general population [3,10]. Studies show that about 5-13% of school-age children have dyslexia or other reading difficulties [11,12]. According to the Diagnostic and Statistical Manual V (DSM-V), the prevalence of dyslexia in school-age children is around 4%, and there are numerous undiagnosed cases [13]. Individuals experiencing difficulties in learning may face certain difficulties in their lives. The international literature has reported that school unattendance, which results in school dropouts, is present in 40% of cases [14,15]. Lack of confidence and social and behavioral problems at the school related to low academic achievement may be persistent, which may create a serious emotional burden [11,14,15]. Certain findings show that these effects may influence adult life and adversely affect school and career success, leading to significant difficulties in employment and social adaptation [13,16-18]. Thus, it is crucial to identify dyslexia early and ensure adequate intervention to reduce the damage and make sure that the difficulty is properly overcome [11,16,19]. While adverse effects and persistent consequences for academic skill acquisition may be mitigated through early intervention for students with dyslexia at an earlier age [20], the difficulty in learning may persist across the lifespan of the individual beyond the acquisition of academic skills to more complex developmental stages. So, early identification is very crucial to help students with dyslexia. The diagnosis of dyslexia, which is considered a specific learning disability, is made by clinically reviewing the individual's developmental, medical, educational and family history, test scores, teacher observations and response to academic interventions [13].

Determining the awareness levels of teachers in the education system of Turkey on dyslexia seems to be one of the most important steps in terms of overcoming these problems in the early period and increasing the quality of education to be provided to these students. Teachers' awareness of dyslexia is necessary because it will initiate the process of early diagnosis of students with dyslexia. However, as in the international scientific literature, no measurement tools that measure dyslexia awareness in teachers have been found in Turkey. In this regard, the main reason for developing this instrument was to test its psychometric characteristics and provide a practical and useful measurement instrument in studies of improving the dyslexia awareness levels of teachers. Through this measurement instrument, the detection of teachers who show a lack of understanding about dyslexia may be accelerated, and it may be easier for these teachers to be directed towards targeted professional development.

2. Materials and methods

2.1 Design and general procedure

This was a study conducted to develop a measurement instrument for teachers' dyslexia awareness, whereas the exploratory and confirmatory factor analysis methods were used to determine the construct validity and reliability of the study. The study was conducted with primary school teachers at schools in Malatya, Turkey.

In the first stage, a focus group meeting was held with 8 experts for the theoretical framework of the concept of dyslexia, and afterwards, the topic was investigated by in-depth interviews with 20 primary

school teachers in Malatya. As a result of all these examinations and reviewing the literature, an item pool (62 items) regarding awareness of dyslexia was formed, and the theoretical framework was structured [21]. As a result of the modifications of the researchers, the number of items was reduced to 39, and then, the items were sent to experts again in terms of content and face validity. The number of items was reduced to 18 as the experts decided that 14 of the items were not suitable for the purpose of the study, and 7 items were redundant and unnecessary. The last step of the first phase was that the scale consisting of 18 items was applied among 20 primary school teachers randomly selected for the pilot study. In the second stage, exploratory and confirmatory factor analyses were performed with the data of 182 participants. The scale was structured in two dimensions with 14 items (**Figure 1**).

2.2 Sample and participants

The population of the study consisted of 370 teachers teaching at the primary level schools in Malatya. Considering the fact that the data forms could be filled out incompletely and/or incorrectly, to increase the statistical power of the study, it was aimed to reach the entire population. Nevertheless, 151 participants could not be accessed, and 37 participants filled in the data form incompletely, as a result of which the study was completed with the participation of a total of 182 primary school teachers. This number was sufficient to perform factor analysis because the sample size in scale development studies is recommended to be 5-10 times the number of items [22]. Based on this information, approximately 5 times the number of scale items was reached (n = 182). The inclusion criteria were determined as: serving as 1st to 3rd grade primary school teachers, having at least 1 year of professional experience and being teachers who natively speak Turkish and are open to communication.

Table 1 presents the descriptive characteristics of the teachers. The mean age of the teachers was 38.08 ± 7.71 (minimum = 22, maximum = 61). Their mean working experience was 14.63 ± 7.25 years. Of the teachers, 54.4% were female, 77.5% had no education/information on dyslexia during their studies, 85.7% had no education/information on dyslexia after graduation, and 54.4% never met a student with dyslexia during their work lives. There was no spe-

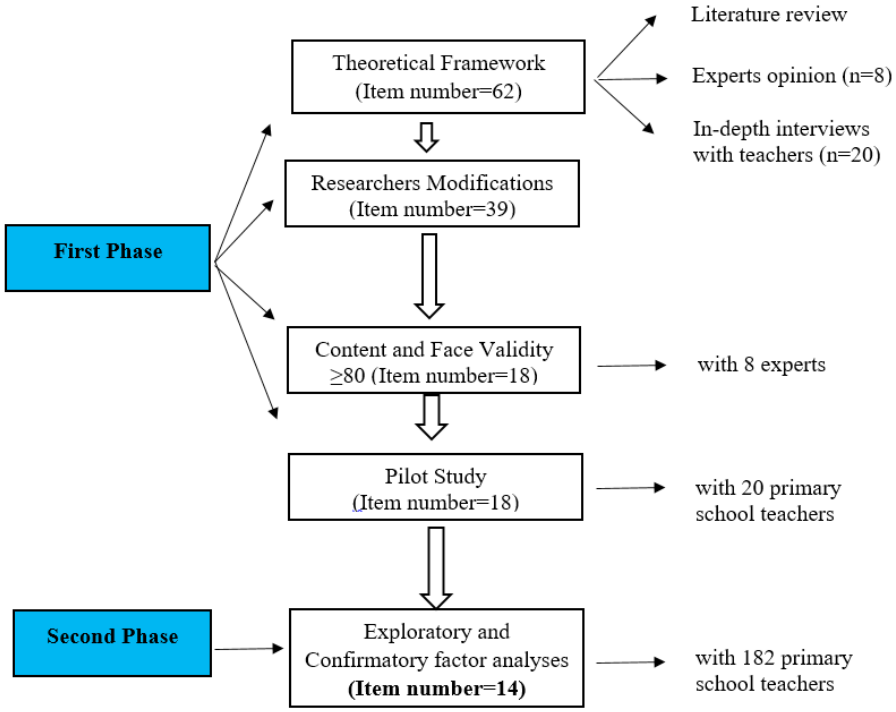

Figure 1. Flow diagram of the dyslexia awareness instrument.

cial procedure/practice for dyslexia at the institutions of 94.5% of the teachers, and 83.5% stated that not every teacher could diagnose dyslexia.

Table 1. Descriptive characteristics of the teachers (n = 182).

Characteristics		**N**	**%**
Gender			
Female		99	54.4
Male		83	45.6
Information about dyslexia in education			
Yes		41	22.5
No		141	77.5
Information about dyslexia in postgraduate education			
Yes		26	14.3
No		156	85.7
Encounter with a dyslexic student			
Yes		83	45.6
No		99	54.4
Special practice for dyslexia at work			
Yes		10	5.5
No		172	94.5
Every teacher can diagnose a dyslexic person			
Yes		30	16.5
No		152	83.5
	Min	**Max**	**Mean ± SD**
Age	22	61	38.08 ± 7.71
Working year	**1**	**40**	**14.63 ± 7.25**

2.3 Item generation and constructing definition

The opinions of experts were obtained for dyslexia problems that emerged as a result of the literature review. The causes of why dyslexia remains in the background in Turkey were discussed with experts. In line with these opinions, it was revealed that, in Turkey, individuals with dyslexia are not noticed in the family and school environment, the student graduates or quits school without being noticed, teachers feel inadequate on this issue, and they cannot distinguish dyslexic students [2,23-25]. Afterwards, in-depth interviews were held with 20 primary school teachers randomly selected by the schools in the city center. The teachers were asked what they thought of students with learning difficulties and what they knew about dyslexia. The teachers stated that they did not notice students with dyslexia, and they did not at all think whether it could be dyslexia for students with learning problems. Studies have determined that early noticing of dyslexic students is associated with "sensitivity" [23,24,26]. When what the teachers heard about dyslexia was examined, it was found that they thought dyslexic individuals read the opposite way, they have inadequate intelligence, they are inattentive, dyslexia is a disease, dyslexic people have superior intelligence, and dyslexia is a disease that is cured with time. These statements revealed that the teachers had different views on dyslexia, and everyone had their own "perceptions" [23,24,27,28]. In-depth interviews with teachers and expert opinion helped form the theoretical framework of the subscales.

Using this proposed definition and framework, items were then generated based on the empirical literature, relevant theories, consultation with experts and the target population, examination of related instruments, and rational deduction, as recommended by Holmbeck and Devine (**Figure 1**) [29].

2.4 Data collection process and tools

A teacher personal information questionnaire and a dyslexia awareness instrument prepared by the researchers were used to collect the data. The data as answers to questions were collected in 10-20 minutes as they were read and recorded by the teachers.

2.5 Information questionnaire

The teacher personal information questionnaire consisted of a total of 9 questions covering the socio-demographic characteristics of the individuals and their knowledge of dyslexia.

2.6 Dyslexia awareness instrument (DyAwI)

This instrument was developed in the local language to measure the level of dyslexia awareness of

teachers and improve its psychometric properties. The instrument was based on a teacher-oriented approach, but it could be administered in different groups after carrying out construct validity studies. The final version of the instrument consisted of 14 items. Each rating on the scale was between 1 and 5, consisting of 5-point Likert-type items where 1 = Strongly Disagree, 2 = Disagree, 3 = Partly Disagree, 4 = Agree, 5 = Strongly Agree. In scale development, while determining the points of Likert-type items, the sample is considered, and the width of the responses is selected based on the levels of the participants to answer the items in detail. As 5-point Likert-type scoring is prevalently used in the literature [30], it was found suitable for the teachers included in this study who had undergraduate-level education. The scale items were asked of the teachers, and the Likert-type scoring was determined according to their level of answering the questions. One can score a minimum of 14 points and a maximum of 70 points on the instrument. A high score shows a high level of awareness about dyslexia. When the instrument was created, opinions about dyslexia were considered, and the items of the instrument were collected in two factors "perception" and "sensitivity". The naming of these factors was influenced by judgments and attitudes about dyslexia. As a matter of fact, people with dyslexia are underestimated, stigmatized and considered as individuals with disabilities in terms of their values and abilities. Such opinions about dyslexia lead to uncertainties in identifying and evaluating cases [28,31]. It is important to create awareness to establish the right terminology.

"Perception" questions commonly known misconceptions, judgments, myths and speculations related to dyslexia. It consists of 6 items. The items are inversely scored. One can score a minimum of 6 points and a maximum of 30 points in the perception dimension. A high score in this factor suggests that there is a positive perception of dyslexia, and a low score suggests that there is a negative perception. "Sensitivity" refers to the approach to the conscious awareness of and the quest for knowledge on dyslexia. The factor consists of 8 items. One can score a minimum of 8 points and a maximum of 40 points in this factor. A high score in this factor shows a high level of sensitivity to dyslexia, whereas a low score shows a low level of sensitivity.

2.7 Development of the questionnaire

While determining the items of DyAwI, firstly, an item pool consisting of 62 items was created by reviewing the literature [23,31-39]. The pool was meticulously examined by the researchers who carried out the study, and after the necessary modifications were made, 39 of the questions were structured in the form of five-point Likert-type items.

2.8 Content and face validity

The Content Validity Index (CVI)—a validity analysis method—was used to assess the content validity of the items of the draft measurement instrument. Of these draft items, the ones that were appropriate and understandable based on expert opinions were taken into consideration. In this context, expressions with a CVI value of equal to or greater than 0.80 are considered to have good content validity [22]. The face validity and content validity of this instrument were determined by eight experts (three of them in child development, one psychologist, two psychiatric nurses and two public health nurses) by assessing each item. Each of the scale items was presented to the experts for their opinion to be expressed in a four-point Likert-type scale (not suitable, slightly suitable, suitable, very suitable) in order to calculate the content validity and measure understandability [30]. As a result of this measurement analysis, CVI was calculated. The items with a CVI value that was smaller than 0.80 were removed, the instrument finally consisted of 18 items, and the overall CVI value was found to be 0.85 [22]. The final form of the scale was administered to 20 teachers. They were asked to judge and quantify the validity of the items individually and as a set to suggest revisions and identify areas that were missing, as recommended by Lynn [40]. After the understandability of the questions was checked in the pilot study, the

Cronbach's alpha coefficient of the instrument was found to be 0.65.

2.9 Psychometric testing and internal consistency of DyAwI

The scale items were administered to 182 teachers. The psychometric test was first assessed by an exploratory factor analysis and then by a confirmatory factor analysis, and the final version of the instrument consisted of 14 items. Cronbach's alpha, item-total correlation and factor analyses were employed to determine the internal consistency of the instrument. The Cronbach's alpha coefficient shows the internal consistency and homogeneity of the items of a scale, and values greater than 0.60 indicate the suitability of the measurement instrument [41]. Item-total correlation indicates the inclusion of each of the items in the scale, which is a fundamental issue in ensuring internal consistency. This value is desired to be at least 0.15 [42]. While carrying out a factor analysis, which is used to test construct validity, first of all, whether the scale is suitable for conducting this analysis is determined by using Bartlett's and Kaiser Meyer Olkin (KMO) tests. The value of Bartlett's test of sphericity is desired to be $p < 0.05$, while the value of the KMO test is desired to be equal to or greater than 0.60 [30]. The overall Cronbach's alpha value of this instrument was found to be 0.75. The minimum value of the item-total correlation coefficients was found to be 0.20, while the value of the KMO test was found to be 0.77, $p = 0.000$. After suitability for factor analysis was confirmed, the scale dimensions were determined by using the maximum likelihood method with varimax rotation. The items with an eigenvalue equal to or greater than 1 had initially been collected under three factors, but the number of items was limited to two factors to prevent confusion due to the fact that some dimensions had only two items remaining in them. As a matter of fact, Kenny recommended that there should be at least three items in each factor [43]. When the number of factors was reduced to two, the ratio of the total variance explained by the factors decreased from 52.8% to 40.7%. Tavşancıl found it sufficient to have a total variance explanation rate between 40% and 60% in factor analyses [30]. When the items of the instrument were formed, the items with a factor load of 0.40 or greater were taken into account. The items which had a score lower than this were excluded from the scale. The test-retest reliability value was found to be 0.90 in the study.

2.10 Confirmatory factor analysis

In scale development studies, it is recommended that an exploratory factor analysis (EFA) is followed by a confirmatory factor analysis (CFA) [44]. CFA is a type of analysis aiming to assess how factors with multiple variables fit real data. Many fit indices are used in the analysis process. In this study, the Normed Fit Index (NFI), Comparative Fit Index (CFI), Tucher Lewis Index (TLI) and Root Mean Square Error of Approximation (RMSEA), some of the most commonly used indices, were calculated using the formula which was presented in the research article of Gignac. To be able to conduct a confirmatory factor analysis, firstly the Extraction Method: Maximum Likelihood method is selected from exploratory factor analysis in SPSS. By using the chi-squared and df values found as a result of the analysis of the Bartlett's Test of Sphericity and Goodness-of-fit Test in the formula developed by Gignac, the goodness of fit indices were calculated. NFI, CFI, and TLI values that are closer to 1 and an RMSEA value that is smaller than 0.05 represent excellent fit [45]. These findings paralleled the indices used in confirmatory factor analysis.

2.11 Data analysis

The data of the study were analyzed using the IBM SPSS 22 software. The Cronbach's alpha coefficient was used to measure internal consistency. Factor analysis—used to test whether a construct is validated as a model—and fit indices (calculated via a formula in Excel) were used to verify this structure. Regression analysis was employed to determine the effects between variables. For other calculations, frequencies, means and percentages were used.

An instrument's possession of internal consistency or homogeneity indicates that all items in the scale are closely intercorrelated on the desired level. In this study, it was observed that the Cronbach's alpha internal consistency coefficient and the adjusted item-total correlation values of scale items were in the appropriate range. The Cronbach's alpha reliability coefficient is an indicator of the internal consistency and homogeneity of the items in a measurement instrument. The Cronbach's alpha reliability coefficient of the instrument developed in this study was found to be high, indicating that the items contained in the instrument are consistent with each other, and they measure the same properties. A Cronbach's alpha coefficient of at least 0.70 is sufficient for the reliability of a newly developed instrument [41]. Item-total score correlation is a criterion for maintaining internal consistency, expressing whether each item in the instrument has an additive feature in the scale and should be at least 0.15 [42]. DyAwI may be stated to be highly reliable in accordance with the literature. This is because the Cronbach's alpha and item-total correlation values of the scale items used in the reliability analysis obtained from this instrument were above the acceptable values [41,42]. Construct validity, which is associated with the theoretical conceptualization of an instrument, is achieved through a factor analysis which reveals the basic dimensions. In this study, an exploratory factor analysis was applied to the data in order to reveal the subscales. Exploratory factor analysis is known as a type of analysis where the researcher has no information about the number of subscales measured by the measurement tool and tries to obtain information about the nature of the subscales measured with the tool instead of testing a certain hypothesis [30]. For a scale to be acceptable, the ratio of the total variance explained by the factors should be at least 30%, and the factor loads of the scale should be equal to or greater than 0.30 [42]. In line with this information, it was revealed that the total variance explanation rate and factor loading values of DyAwI were in the appropriate range. The findings obtained in the confirmatory factor analysis supported the use of the two-factor model for scoring DyAwI.

2.12 Ethical principles of the study

In order to conduct the study, permissions were obtained from the Ethics Committee (No. 2018/7-21) of Malatya Inonu University and from the Directorate of National Education. Moreover, verbal consent was obtained from the teachers who participated in the study. The study was conducted by considering the principles of the Declaration of Helsinki.

3. Results

Kaiser-Meyer Olkin Measure of Sampling Adequacy test was performed to measure the suitability of the scale items for factor analysis (KMO = 0.77, p = 0.000). It was found that the scale was suitable to undergo exploratory factor analysis. Furthermore, as a result of the confirmatory factor analysis, the following values were obtained: NFI = 0.92, CFI = 0.99, TLI = 0.98, and RMSEA = 0.02.

Two dimensions (perception and sensitivity) emerged as a result of the exploratory and confirmatory factor analyses of the dyslexia awareness scale. As a result, the scale consisted of 14 items, 6 of which were inversely scored.

Table 2 shows the validity and reliability analysis results of the dyslexia awareness scale. It was found that the mean scores of the scale items ranged from 2.95 to 4.17, the corrected item-total correlations ranged from 0.20 to 0.50, the factor loadings ranged from 0.44 to 0.77, and the Cronbach's alpha coefficients ranged from 0.75 to 0.73. The overall internal consistency coefficient of the scale was 0.75, its mean score was 51.6, and its explanation rate of the total variance was 40.7%.

Table 3 shows the characteristics of the teachers and their dyslexia awareness levels through a regression analysis. As seen in this table, the characteristics of the teachers were able to explain 13% of the variability on the Dyslexia Awareness Instrument. The teachers' age, years of experience and education received about dyslexia were significantly related to their dyslexia awareness levels.

Table 2. Maximum likelihood analysis followed by varimax rotation, factor loadings and item-total correlations of the items of the scale (n = 182).

Scale items	Mean (SD)	Corrected item-total correlation	Cronbach's alpha if item deleted	Factor loading	Alpha	Variance
Perception	**23.45(3.33)**				**0.68**	**22.3**
If an individual is able to read something, he or she cannot have dyslexia.*	3.70(0.89)	0.200	0.757	0.599		
Dyslexia is a disease.*	3.52(1.09)	0.274	0.753	0.449		
The intelligence levels of individuals with dyslexia are lower than normal.*	3.97(0.93)	0.377	0.739	0.771		
Dyslexia is an incurable learning difficulty.*	4.17(0.80)	0.387	0.739	0.693		
Individuals with dyslexia are lazy.*	4.07(0.78)	0.267	0.749	0.594		
Successful individuals are not likely to have dyslexia.*	3.89(0.81)	0.391	0.738	0.631		
Sensitivity	**28.16(4.37)**				**0.77**	**18.4**
I know how to approach individuals with dyslexia.	2.95(0.88)	0.262	0.751	0.639		
I am more sensitive to individuals with dyslexia than others.	3.91(0.85)	0.485	0.729	0.571		
Individuals with dyslexia are special.	3.86(0.87)	0.408	0.736	0.495		
I investigate what can be done for individuals with dyslexia.	4.14(0.80)	0.413	0.736	0.456		
When I encounter an individual with dyslexia, I can distinguish them.	3.31(0.90)	0.435	0.733	0.699		
I know the rights of individuals with dyslexia.	2.98(0.96)	0.506	0.725	0.781		
I know where a person with dyslexia should present to in order to be diagnosed.	3.31(0.91)	0.422	0.735	0.743		
There are certain therapeutic methods developed for dyslexia.	3.66(0.84)	0.330	0.735	0.477		
Total	**51.60(6.06)**				**0.75**	**40.7**

*Items that are inversely scored.

Table 4 shows the results of the regression analysis on the characteristics of the teachers and the dimensions of their dyslexia awareness, which were perception and sensitivity. No teacher characteristics were significantly related to the perception subscale. However, teacher characteristics explained 16% of the variability in the teachers' levels of sensitivity—like the overall scale, teachers' age, years of experience and education on dyslexia were significantly and positively related to their levels of sensitivity.

Table 3. Explanation of the characteristics of the teachers with the dyslexia awareness instrument by regression analysis (n = 182).

	Dyslexia awareness instrument				
Model	Unstandardized coefficients		Standardized coefficients		
	B	Std Error	Beta	t	Sig
(Constant)	78.68	7.414		10.613	0.001
Age	0.585	0.202	0.744	2.897	0.004
Gender	0.967	0.910	0.080	1.063	0.289
Working year	0.629	0.211	0.754	2.986	0.003
Information about dyslexia in education	3.551	1.121	0.245	3.167	0.002
Information about dyslexia in postgraduate education	1.187	1.250	0.069	0.950	0.343
Encounter with a dyslexic student	0.152	0.913	0.013	0.166	0.868
Special practice for dyslexia at work	1.390	2.014	0.052	0.690	0.491
Every teacher can diagnose a dyslexic individual	0.637	1.236	0.039	0.516	0.607
R = 0.36 R^2 = 0.13 F = 3.31 p = 0.001					

Table 4. Explanation of the characteristics of the teachers with the perception and sensitivity subscales by regression analysis (n = 182).

	Perception subscale					**Sensitivity subscale**				
Model	Unstandardized coefficients		Standardized coefficients			Unstandardized coefficients		Standardized coefficients		
	B	Std Error	Beta	t	Sig	B	Std Error	Beta	t	Sig
(Constant)	28.75	4.202		6.843	0.001	49.92	5.273		9.469	0.001
Age	0.157	0.114	0.363	1.369	0.173	0.428	0.144	0.754	2.983	0.003
Gender	0.518	0.516	0.078	1.005	0.316	0.449	0.647	0.051	0.694	0.488
Working year	0.110	0.119	0.240	0.922	0.358	0.519	0.150	0.861	3.464	0.001
Information about dyslexia in education	0.691	0.635	0.087	1.088	0.278	2.860	0.797	0.274	3.587	0.000
Information about dyslexia in postgraduate education	0.622	0.708	0.066	0.879	0.381	0.565	0.889	0.045	0.636	0.526
Encounter with a dyslexic student	0.030	0.518	0.005	0.058	0.954	0.122	0.650	0.014	0.187	0.852
Special practice for dyslexia at work	0.156	1.141	0.011	0.136	0.892	1.546	1.432	0.081	1.079	0.282
Every teacher can diagnose a dyslexic individual	1.047	0.700	0.117	1.495	0.137	1.685	0.879	0.143	1.917	0.057
R = 0.28 R^2 = 0.07 F = 1.82 p = 0.076						**R = 0.40 R^2 = 0.16 F = 4.091 p = 0.001**				

4. Discussion

The psychometric characteristics of DyAwI developed according to the findings of this study are promising to demonstrate a valid construct. It is practical to use this instrument. It can quickly collect important information about dyslexia awareness. DyAwI is an original scale and fulfils the statistical requirements desired in methodological research. DyAwI may determine teachers' awareness of their sensitivity and perception dimensions of dyslexia. In the instrument, the item "I know how to approach individuals with dyslexia" was the item with the low-

est score, and it was revealed that the teachers saw themselves as inadequate in approaching students with dyslexia. On the other hand, the item "Dyslexia is a curable learning difficulty" had the highest score, and it was observed that the teachers had positive perceptions towards students with dyslexia. Additionally, this study revealed that the teachers' age, years of study and their knowledge of dyslexia during their education were among the dynamics that increased their levels of dyslexia awareness and sensitivity.

This study defines the design and development of DyAwI, which aims to measure awareness of dyslexia. In this process, scale development and validation studies were carried out [22,30,41-45]. The scale was structured to have Likert-type items, which are commonly used in social sciences. The five-point Likert-type items of the scale provided the participants with the opportunity to respond to items presented as statements [42]. After the pilot study, the instrument development process was completed by carrying out usability testing, factor analysis and descriptive analyses, and the instrument was finalized to have 14 items.

The main reason for developing this instrument was to test its psychometric characteristics and provide a practical and useful measurement instrument in studies of improving dyslexia awareness. In general, dyslexia is a phenomenon that is ignored, unnoticed and delayed in terms of its diagnosis [36]. It is thought that this instrument will contribute to the literature by measuring awareness of dyslexia. In this context, the practical and theoretical contributions of the instrument may be mentioned. Practically, as dyslexia awareness levels will be determined using DyAwI, in-service training about dyslexia may be planned for teachers with low awareness levels, and furthermore, the quality of the training may be determined with final tests to be conducted. These practices can make it easier for students with dyslexia to access useful services. The contributions of the instrument in the theoretical field may include: (1) the results of the instrument may be used as new scientific knowledge and guide researchers in this field, (2) new educational models and projects may be created according to the determined level of dyslexia awareness, (3) with the adaptation of the instrument to other languages, the level of dyslexia awareness of educators in countries where this instrument is used could be determined, so that dyslexia awareness can be compared across cultures, (4) the instrument may be a reference study for measurement tools planned to be created in terms of dyslexia awareness in the future. According to Wadlington et al., there is a lack of awareness about dyslexia and a great misunderstanding among educators [31]. The lack of awareness and misunderstanding of the early signs of dyslexia prevent the diagnosis and timely intervention of this problem [31,32]. In line with this knowledge and the needs in the background of this study, the idea that having a tool that measures the dyslexia awareness levels of educators will facilitate the timely intervention of students with dyslexia has been the driving force for the development of this instrument. As this educator-focused instrument would allow evaluation of dyslexia awareness levels, it is believed that it may provide teachers with the opportunity to have more systematic approaches in terms of not being prejudiced against dyslexic students, allowing them time to learn, considering this situation while scoring their examinations and using techniques to increase their academic success. This way, it may be assumed that the adaptation of the student to society will gain speed. This study showed that this assessment instrument could be used by professional development specialists (both pre- and in-service) to understand the perceptions and knowledge of teachers before they participate in professional development so that the professional development process could be tailored to teachers' current levels of awareness about dyslexia.

"Perception" which is a dimension of DyAwI, questions commonly known beliefs, opinions, judgments, myths and speculations related to dyslexia. The other dimension, "sensitivity" shows the approach to, attitudes towards, conscious awareness of and quest for information on dyslexia. The fact that DyAwI discusses dyslexia with its short and com-

pact extent contributes to the finding that the scale is useful, practical and understandable. In this study, the teachers were found to have good levels of mean scores on the overall DyAwI and its dimensions. Moreover, the teachers were found to have a positive perception of individuals with dyslexia and a high level of sensitivity. This positive finding may have been caused by the possibility that the teachers participating in the study were curious about individuals with dyslexia and were open to improvement.

The age of the teachers, their working experience in years and their status of receiving education on dyslexia during their studies showed a direct effect on their dyslexia awareness levels. Only 22.5% of the teachers involved in the study had received information/training on dyslexia in the process of their higher education, which may have helped the teachers become more sensitive to individuals with dyslexia. Although this percentage of the teachers was consistent with the existing literature in terms of proving that some teachers trained in the Turkish education system have low awareness of dyslexia, it also showed that being sensitive about dyslexia is correlated with previously acquired knowledge or education about dyslexia [2,46,47]. Moreover, the teachers' ages and work experiences in years may have influenced their dyslexia awareness levels by increasing their likelihood of encountering students with dyslexia. According to Lyon and Weiser, as teachers specialize in pedagogic knowledge and get experience, their sensitivity to students increases, they are able to diagnose problems quickly, and their students' achievement levels are improved [39]. Similarly, in this study, the teachers' knowledge and experience were observed as an important factor affecting the subscale of "sensitivity" of DyAwI.

In future studies that will use DyAwI, a cutoff point may be added to specify dyslexia awareness levels. There is a need for studies that will increase the validity and reliability levels of the scale by adding items to the dimensions. Nevertheless, the instrument demonstrated its validity based on its content validity analysis results and psychometric properties.

5. Limitation

Although this study meticulously followed the steps recommended in the literature to develop a psychometrically strong instrument, it had some limitations that need to be addressed. The limitations of this study included that it was applied only in one province, teachers who had an experience of less than a year were not included, and the study was conducted with only teachers of 1st to 3rd grade primary school students. This limits the generalizability of the results for other regions in the world where different languages and dialects are used. Therefore, the psychometric properties of DyAwI should be evaluated in a global context in future studies. Since different results may be obtained in other cultures, the results should be analyzed carefully, and further studies should be carried out.

6. Conclusions

In this study, according to the overall scoring of DyAwI, it was observed that the general dyslexia awareness levels of the teachers who were included in the study were above average, their "Perception" subscale scores were on a good level, and their "Sensitivity" subscale scores were moderate. This scale that was developed in Turkey presented a practical and useful instrument that measures the construct of teachers' dyslexia awareness levels. DyAwI is important for ensuring standardization in measuring dyslexia awareness in Turkish society. DyAwI, which was developed and psychometrically tested, offers statistically acceptable levels of reliability and validity.

Conflict of Interest

No conflict of interest has been declared by the author(s).

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgement

We thank all the teachers who participated in the study.

References

[1] Yin, L., Joshi, R.M., Yan, H., 2020. Knowledge about dyslexia among early literacy teachers in China. Dyslexia. 26(3), 247-265.

[2] Balcı, E., 2019. Disleksi Hakkında Öğretmen Görüşleri ve Karşılaştıkları Sorunlar (Turkish) [Teachers' Opinions About Dyslexia and the Challenges They Face]. Ege Eğitim Dergisi. 20, 162-179.

[3] van Setten, E. R. H., Hakvoort, B. E., van der Leij, A., Maurits, N. M., and Maassen, B. A. M., 2018. Predictors for grade 6 reading in children at familial risk of dyslexia. Annals of Dyslexia. 68, 181-202.

[4] Shaywitz, S.E., Morris, R., Shaywitz, B.A., 2008. The education of dyslexic children from childhood to young adulthood. Annual Review of Psychology. 59, 451-475.

[5] Kearns, D.M., Hancock, R., Hoeft, F., et al., 2019. The neurobiology of dyslexia. Teaching Exceptional Children. 51(3), 175-188.

[6] Fletcher, J.M., Lyon, G.R., Fuchs, L.S., et al., 2018. Learning disabilities: From identification to intervention. Guilford Publications: New York.

[7] Lyon, G.R., Shaywitz, S.E., Shaywitz, B.A., 2003. A definition of dyslexia. Annals of Dyslexia. 53, 1-14.

[8] Norton, E.S., Black, J.M., Stanley, L.M., et al., 2014. Functional neuroanatomical evidence for the double-deficit hypothesis of developmental dyslexia. Neuropsychologia. 61, 235-246.

[9] Wolf, M., Bowers, P.G., 2000. Naming-speed processes and developmental reading disabilities: An introduction to the special issue on the double-deficit hypothesis. Journal of Learning Disabilities. 33(4), 322-324.

[10] Ferrer, E., Shaywitz, B.A., Holahan, J.M., et al., 2015. Achievement gap in reading is present as early as first grade and persists through adolescence. The Journal of Pediatrics. 167(5), 1121-1125.

[11] Fortes, I.S., Paula, C.S., Oliveira, M.C., et al., 2016. A cross-sectional study to assess the prevalence of DSM-5 specific learning disorders in representative school samples from the second to sixth grade in Brazil. European Child & Adolescent Psychiatry. 25, 195-207.

[12] Vlachos, F., Avramidis, E., Dedousis, G., et al., 2013. Prevalence and gender ratio of dyslexia in Greek adolescents and its association with parental history and brain injury. American Journal of Educational Research. 1(1), 22-25.

[13] American Psychiatric Association, 2013. Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [Internet]. Available from: http://www.dsm5.org

[14] Alesi, M., Rappo, G., Pepi, A., 2012. Self-esteem at school and self-handicapping in childhood: Comparison of groups with learning disabilities. Psychological Reports. 111(3), 952-962.

[15] Taanila, A., Yliherva, A., Kaakinen, M., et al., 2011. An epidemiological study on Finnish school-aged children with learning difficulties and behavioural problems. International Journal of Circumpolar Health. 70(1), 59-71.

[16] Lyon, G.R., Fletcher, J.M., Shaywitz, S.E., et al., 2001. Rethinking learning disabilities. Rethinking special education for a new century. The Thomas B. Fordham Institute: Washington, D.C. pp. 259-287.

[17] Graziano, A.M., 2002. Developmental disabilities: Introduction to a diverse field. Allyn & Bacon: Boston.

[18] Queirós, F.C., Wehby, G.L., Halpern, C.T., 2015. Developmental disabilities and socioeconomic outcomes in young adulthood. Public Health Reports. 130(3), 213-221.

[19] Specific Learning Disorder [Internet]. American Psychiatric Association; 2013. Available from: https://www.psychiatry.org/File%20Library/Psychiatrists/Practice/DSM/APA_DSM-5-

Specific-Learning-Disorder.pdf

[20] Emergent and Early Literacy Workshop: Current Status and Research Directions [Internet]. National Institutes of Health; 2000. Available from: https://www.nichd.nih.gov/sites/default/files/publications/pubs/documents/EEL_workshop.pdf

[21] Creswell, J.W., Creswell, J.D., 2017. Research design: Qualitative, quantitative, and mixed methods approaches. Sage Publications: New York.

[22] Polit, D.F., Beck, C.T., 2006. The content validity index: Are you sure you know what's being reported? Critique and recommendations. Research in Nursing & Health. 29(5), 489-497.

[23] Balcı, E., 2017. Disleksi Hakkında Gerçekler: Disleksi Nedir ve Ne Değildir? (Turkish) [Facts about dyslexia: What is dyslexia and what is not?]. Trakya Üniversitesi Sosyal Bilimler Dergisi. 19, 1-17.

[24] Balcı, E., 2017. Disleksi: Tanımı, Sınıflandırması ve Belirtileri (Turkish) [Dyslexia: Definition, Classification and Symptoms]. SDU International Journal of Educational Studies. 4, 166-180.

[25] Doğan, B., 2013. Türkçe ve Sınıf Öğretmenlerinin Okuma Güçlüğüne İlişkin Bilgileri ve Okuma Güçlüğü Olan Öğrencileri Belirleyebilme Düzeyleri (Turkish) [Determining Turkish language and elementary classroom teachers' knowledge on dyslexia and their awareness of diagnosing students with dyslexia]. Okuma Yazma Eğitimi Araştırmaları. 1, 20-33.

[26] Poelmans, H., Luts, H., Vandermosten, M., et al., 2011. Reduced sensitivity to slow-rate dynamic auditory information in children with dyslexia. Research in Developmental Disabilities. 32(6), 2810-2819.

[27] Soriano-Ferrer, M., Echegaray-Bengoa, J., Joshi, R.M., 2016. Knowledge and beliefs about developmental dyslexia in pre-service and in-service Spanish-speaking teachers. Annals of Dyslexia. 66, 91-110.

[28] Soriano-Ferrer, M., Echegaray-Bengoa, J.A., 2014. A scale of knowledge and beliefs about developmental dyslexia: Scale development and validation. Procedia-Social and Behavioral Sciences. 132, 203-208.

[29] Holmbeck, G.N., Devine, K.A., 2009. An author's checklist for measure development and validation manuscripts. Journal of Pediatric Psychology. 34(7), 691-696.

[30] Tavsancil, E., 2002. Tutumlarin olculmesi ve SPSS ile veri analizi [Measuring attitudes and data analysis with SPSS. Nobel Yayıncılık, Ankara]. Ankara: Nobel Yayincilik.

[31] Wadlington, E.M., Wadlington, P.L., 2005. What educators really believe about dyslexia. Reading Improvement. 42(1), 16-33.

[32] Lopez-Escribano, C., Suro Sánchez, J., Leal Carretero, F., 2018. Prevalence of developmental dyslexia in Spanish University Students. Brain Sciences. 8(5), 82.

[33] Castillo, A., Gilger, J.W., 2018. Adult perceptions of children with dyslexia in the USA. Annals of Dyslexia. 68, 203-217.

[34] Balci, E., Cayir, A., 2018. Reading performance profile of children with dyslexia in primary and secondary school students. Journal of Education and Learning. 7(1), 80-87.

[35] Reyhan, D., 2017. Action research about development of reading and writing skills of dyslexic student. Journal of Theoretical Educational Science. 10(2), 320-334.

[36] Balcı, E., Çayır, A., 2017. Dyslexia, problems encountered and solution recommendations. Educational Research and Practice. 494-501.

[37] Salman, U., Özdemir, S., Salman, A. B., et al., 2016. Özel öğrenme güçlüğü "Disleksi". (Turkish) ["Dyslexia", the specific learning difficulty]. İstanbul Bilim Üniversitesi Florence Nightingale Tıp Dergisi. 2, 170-176.

[38] Asfuroğlu, B., Fidan, S., 2016. Özgül Öğrenme Güçlüğü/Spesific Learning Disorders (Turkish) [Spesific learning disorders]. Osmangazi Tıp Dergisi. 38, 49-54.

[39] Reid Lyon, G., Weiser, B., 2009. Teacher knowledge, instructional expertise, and the develop-

ment of reading proficiency. Journal of Learning Disabilities. 42(5), 475-480.

[40] Lynn, M.R., 1986. Determination and quantification of content validity. Nursing Research. 35(6), 382-386.

[41] Polit, D.F., Beck, C.T., 2010. Essentials of nursing research: Appraising evidence for nursing practice. Lippincott Williams & Wilkins: Philadelphia.

[42] Çokluk, Ö., Şekercioğlu, G., Büyüköztürk, Ş., 2016. Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları (Turkish) [Multivariate statistics for social sciences: SPSS and LISREL practices]. Pegem Akademi.

[43] Kenny, D.A., 2014. Measuring Model Fit [Internet]. Available from: http://davidakenny.net/cm/fit.htm

[44] Çapık, C., 2014. Use of confirmatory factor analysis in validity and reliability studies. Journal of Anatolia Nursing and Health Sciences. 17(3), 196-205.

[45] Gignac, G.E., 2009. Partial confirmatory factor analysis: Described and illustrated on the NEO-PI-R. Journal of Personality Assessment. 91(1), 40-47.

[46] Çoğaltay, N., Çetin, İ., 2020. Sınıf Öğretmenlerinin Özel Öğrenme Güçlüğüne İlişkin Yeterlilikleri: Nitel Bir Araştırma (Turkish) [The Classroom Teachers' Competencies Regarding to Special Learning Disabilities: A Qualitative Research]. Academia Eğitim Araştırmaları Dergisi. 5, 126-140.

[47] Kuruyer, H. G., Çakıroğlu, A., 2017. Sınıf öğretmenlerinin özel öğrenme güçlüğü olan öğrencilerin eğitsel değerlendirme ve eğitimsel müdahale sürecinde görüş ve uygulamaları (Turkish) [Primary school teachers' opinions and practices in educational evaluation and intervention in process of specific learning difficulties]. International Periodical for the Languages, Literature and History of Turkish or Turkic. 12, 539-555.