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**Saudi Public Primary School Teachers' Knowledge and Beliefs about  
Developmental Dyslexia**

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**Abstract**

This exploratory research investigates knowledge and beliefs about developmental dyslexia (DD) among public primary school teachers in Saudi Arabia. We explored links between several teacher-related sociodemographic variables (e.g., gender, teaching experience, self-evaluation of teaching children with DD) and knowledge and beliefs about DD. Saudi public primary school teachers ( $n = 136$ ) completed an online survey that included the Knowledge and Beliefs about Developmental Dyslexia Scale (KBDDS). The results indicated that KBDDS scores were significantly associated with teaching experience, DD training, and self-evaluation of teaching children with DD. We address limitations of the current research, note directions for future research, and discuss implications of these results for teacher training and professional development, with special attention to Saudi public primary education.

*Keywords:* developmental dyslexia; Saudi teachers; public primary school teachers; teacher training; professional development

## **Saudi Public Primary School Teachers' Knowledge and Beliefs about Developmental Dyslexia**

Developmental dyslexia (DD) is a learning disability, defined by Washburn, Joshi, and Binks-Cantrell (2011) as a neurologically originating reading disability. According to the most recent edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013, p. 57), a diagnosis of DD is made only after ruling out uncorrected auditory and visual acuity, intellectual disability, inadequate educational instruction, psychosocial adversity, lack of proficiency in academic instruction or language, and other neurological or mental disorders. DD is listed among the diagnostic features of Specific Learning Disorder of Reading in the DSM-5 (American Psychiatric Association, 2013).

Shaywitz, Morris, and Shaywitz (2008) propose that the key diagnostic criterion of DD is unanticipated problems with reading. People with DD often struggle with fluency and accuracy in recognising words and spelling (American Psychiatric Association, 2013). Professional efforts to identify major diagnostic criteria for DD, however, have not translated to effective and sufficient teacher training to support successful instruction of children with DD (e.g., Elliott & Grigorenko, 2014; Lane et al. 2008; Reid Lyon & Weiser, 2009) in Western countries or in the Middle East (Alnaim, 2015). Teachers often do not receive sufficient training to support or improve reading skills for students with special educational needs (Washburn, Joshi, & Binks-Cantrell, 2011), especially students with DD (Ness & Southall, 2010). Moreover, teachers often have misconceptions and misunderstandings about DD, with some questioning whether it is a legitimate disorder (Wadlington & Wadlington, 2005). Stern, Grabner, and Schumacher (2016; see also Snowling, 2013) conclude that research on the diagnosis and treatment of DD is not reaching teachers, and Washburn, Joshi, and Binks-Cantrell (2011) propose that this is

attributable, in part, to limitations in teacher training. Although the majority of this research has been conducted in Western countries, we suspect similar limitations in teacher training in Middle Eastern countries, including Saudi Arabia (see Alnaim, 2015).

Based on an informal review of the relevant literatures, the present authors are unaware of previous research that has specifically investigated the knowledge and beliefs about DD among public primary school teachers in Saudi Arabia. Improving teacher knowledge of the diagnosis and treatment of DD is a key outcome of successful teacher training (Washburn, Joshi, and Binks-Cantrell, 2011). Teachers' misbeliefs and misunderstandings of DD can affect their receptivity to training, which can reduce the effectiveness of training and the likelihood that they will successfully implement intervention strategies for children with DD (Felder & Brent, 2005).

In the current research, we assessed several areas of knowledge and beliefs about DD among public primary school teachers in Saudi Arabia. We explored links between several teacher-related sociodemographic variables (e.g., gender, teaching experience, self-evaluation of teaching children with DD) and knowledge and beliefs about DD. Saudi public primary school teachers ( $n = 136$ ) completed an online survey that included the Knowledge and Beliefs about Developmental Dyslexia Scale (KBDDS) (Soriano-Ferrer & Echegaray-Bengoa, 2014).

There is a dearth of empirical studies on the occurrence and incidence of DD among Arabic speakers. Some of the few existing studies include Abu-Rabia, Share, and Mansour (2003), Abu-Rabia (2004), Elbeheri and Everatt (2007). In an investigation into phonological processing in Arabic, Abu-Rabia et al. conclude that the phonological decoding aptitudes of dyslexic Arabic readers are poor, consistent with their monolingual English-speaking counterparts. Also, dyslexic Arabic readers showed poor phonological awareness compared to

similarly-aged standard readers, and younger matched readers. A study by Mannai and Everatt (2005) concluded that, in both Arabic and English, DD has equivalent underlying causes.

Arabic is spoken over two dozen countries by an estimated half a billion people. The specific manifestation of DD among Arabic children may be attributable, in part, to the character of Arabic script (El Kah & Lakhouaja, 2008). Boumaraf and Macoir (2016) add that Arabic reading fluency may be contingent on global visual word form processing. Moreover, several elements of Arabic, including phonology, morphology, and diglossia, may affect performance in both spelling and reading (Abu-Rabia & Taha, 2016).

Studies of teacher beliefs and knowledge in relation to DD are not common. Even among those who have focused on the area, few compare teacher beliefs and knowledge in relation to DD between countries (Soriano-Ferrer & Echegaray-Bengoa, 2016; Washburn, Binks-Cantrell, & Joshi, 2014). The KBDDS is today the most widely used assessment of teacher beliefs and knowledge about DD (Soriano-Ferrer & Echegaray-Bengoa, 2014). Notwithstanding the varying backgrounds, cultures, and languages studied, the KBDDS providing scholars with an efficient and defensible means of comparing the results of research across countries and languages.

## **Methods**

### **Participants**

Primary school teachers ( $n = 136$ ; 66 female, 70 male) employed at one of several public schools in Jeddah, Saudi Arabia participated in this online research. We secured demographic data from the teachers, including gender, years of teaching experience, educational qualifications, training in DD, exposure to students with DD, and a self-evaluation of effectiveness in teaching children with DD. Table 1 provides a summary of these data.

## Materials

The online survey materials included the Knowledge and Beliefs about Developmental Dyslexia Scale (KBDDS) (Soriano-Ferrer & Echegaray-Bengoa, 2014), which consists of 36 statements referring to the participant's knowledge or beliefs about DD. Response options are “true”, “false”, and “I do not know”. Following Soriano-Ferrer and Echegaray-Bengoa (2014), correct responses receive 1 point, and incorrect responses and “I don't know” responses receive 0 points. A KBDDS total score is obtained by summing points received across the 36 items. The KBDDS was explicitly designed to differentiate what teachers do not know from that which they believe to be true (Soriano-Ferrer & Echegaray-Bengoa, 2014), and provides a valid and reliable assessment of knowledge or beliefs about DD (see Soriano-Ferrer & Echegaray-Bengoa, 2014).

The demographic questionnaire was designed to explore the association of six demographic variables with the KBDDS total score: gender ( $k = 2$ ; male, female); teaching experience (years) divided into three categories ( $k = 3$ ; 1-10 years, 11-20 years, 21-30 years); level of education ( $k = 3$ ; two-year diploma, bachelors, masters); training in DD ( $k = 2$ ; Yes, No); and experience teaching children with DD ( $k = 2$ ; Yes, No).

## Procedures

Links to an online survey were distributed to a convenience sample of Saudi public primary school teachers in Jeddah, Saudi Arabia. This research was reviewed and approved by the Research Ethics Committee at King Abdulaziz University. Following ethical guidelines of the British Psychological Society (2014), the survey was preceded by an informed consent statement, explaining the purpose of the study, participant right to withdraw, that participation was voluntary and not rewarded, and that participant responses would be reported only in aggregate. All participants assented to the statement of informed consent.

## Results

We calculated mean scores for the KBDDS across the 36 constituent items. Table 2 presents descriptive statistics for the 36 items and the total score. Cronbach's alpha (0.95) indicated good reliability for the KBDDS total score. Recalling that response options are coded "0" or "1", mean item-level responses vary from a low of 0.12 (item 27: "Problems in establishing laterality (body schema) are the cause of dyslexia") to a high of 0.88 (item 21: "People with dyslexia are not stupid or lazy. Knowing about the term helps children."). Investigation of item-level standard deviation, skew, and kurtosis suggests that the KBDDS items perform normally. The KBDDS total score is a sum across responses to the 36 individual items. For each participant, this total score could range from 0 to 36. The mean KBDDS total score was 18.68, about midway between the lower and upper bounds of the possible total score. The standard deviation, skew, and kurtosis of the KBDDS total score (see Table 2) indicates that normal parametric analyses are defensible.

We then explored whether KBDDS mean scores differed as a function of several teacher demographic variables. We conducted a *t*-test for independent means for demographic variables with just two categories, and an ANOVA for demographic variables with more than two categories. KBDDS scores were significantly associated with several teacher demographic variables: First, KBDDS scores differed with teaching experience [ $F(2, 133) = 3.64, p < .05$ ; for 1-10 years,  $M (SD) = 18.00 (9.36)$ ; for 11-20 years,  $M (SD) = 21.51 (6.58)$ ; for 21+ years,  $M (SD) = 17.10 (5.97)$ ], and *post-hoc* Scheffe tests indicated that teachers with 11-20 years of experience scored higher than did teachers with less experience and teachers with more experience (both  $ps < .05$ ; analyses available on request). Second, teachers with DD training scored higher on the KBDDS than did those without DD training [ $t (134) = 2.20, p < .05$ ; with

DD training,  $M (SD) = 21.60 (4.47)$ ; without DD training,  $M (SD) = 17.95 (8.30)$ ]. Finally, KBDDS scores differed with self-evaluation of teaching children with DD [ $F(4, 131) = 2.60, p < .05$ ; for poor,  $M (SD) = 17.17 (4.17)$ ; for average,  $M (SD) = 18.66 (9.09)$ ; for very good,  $M (SD) = 19.78 (6.68)$ ; for excellent,  $M (SD) = 23.50 (1.22)$ ], but none of the *post-hoc* Scheffe tests indicated statistically significant mean differences (all  $ps > .05$ ).

Several teacher demographic variables were not significantly associated with KBDDS scores: First, male and female teachers did not differ in KBDDS scores [ $t (134) = 0.28, p > .05$ ; for males,  $M (SD) = 18.86 (6.25)$ ; for females,  $M (SD) = 18.49 (9.23)$ ]. Second, KBDDS scores did not differ with level of education [ $F(2, 133) = 0.92, p > .05$ ; for two-year diploma,  $M (SD) = 16.85 (5.00)$ ; for Bachelors,  $M (SD) = 18.74 (8.11)$ ; for Masters,  $M (SD) = 22.75 (4.92)$ ]. Finally, teachers with vs. without experience teaching children with DD did not differ in KBDDS scores [ $t (134) = 1.64, p > .05$ ; with experience,  $M (SD) = 21.01 (5.08)$ ; without experience,  $M (SD) = 16.20 (9.35)$ ].

### Discussion

We identified a difference in KBDDS scores between more experienced Saudi public primary school teachers and less experienced teachers. This finding is consistent with the results of Wadlington and Wadlington (2005), who used a different measure of knowledge and beliefs about DD to assess a sample of U.S. educators. The relationship between years of teaching experience and KBDDS scores, however, was not linear. In the current research, teachers with 11-20 years of experience scored higher than did those with less experience and those with more experience. Saudi public primary school teachers with more than 20 years of experience completed their education in a time period when much less was known about DD

and this might account for their lower scores relative to teachers with 11-20 years of experience.

We found that Saudi public primary school teachers with specific training in DD scored higher on the KBDDS than did teachers without specific training in DD. This is consistent with the results of previous studies indicating that disorder-specific training increases knowledge about the specific disorder (e.g., Shetty & Rai, 2014; Soriano-Ferrer, Echegaray-Bengoa, & Joshi, 2016). Finally, we found that KBDDS scores differed with teacher self-evaluation of their ability to instruct children with DD. Saudi public primary school teachers who reported a more positive evaluation of these abilities also scored higher on the KBDDS, suggesting that teachers have an accurate sense of their knowledge and beliefs about DD.

We found that Saudi public primary school male and female teachers scored similarly on the KBDDS. This lack of a sex difference corroborates in a Middle Eastern sample results from previous studies of Western teachers showing no differences between the sexes in knowledge and beliefs about DD (Soriano-Ferrer, Echegaray-Bengoa, & Joshi, 2016). On the other hand, the results of the current study were not consistent with two findings of previous research with Western teachers: Saudi public primary school teachers with a higher (vs. lower) level of education and with (vs. without) experience teaching students with DD did not demonstrate greater knowledge or more accurate beliefs about DD (Shetty & Rai, 2014; Soriano-Ferrer, Echegaray-Bengoa, & Joshi, 2016; Wadlington & Wadlington, 2005). It is not clear why these results were not replicated in the Saudi public primary school sample. We concede that our sample of participants was not large, totalling 136 teachers. Alternatively, the nonsignificant results for educational level and experience may reflect the reality that the Arab world still does not widely recognise DD, making academic and educational study of this condition extremely

rare (Aboudan et al., 2011). We recommend that researchers attempt to replicate the results of the current study with a larger sample of Saudi public primary school teachers. A larger sample (e.g., 500 teachers) would afford more robust tests of the current results.

The current research used an existing scale for assessing teacher knowledge and beliefs about DD, the KBDDS. The use of this scale afforded the opportunity to compare for the first time responses of Saudi public primary school teachers with the responses of Western teachers. The results indicate similarities across cultures, especially in the apparent need for more effective teacher training for instructing students with DD. The KBDDS is an inventory of closed-end responses, however, and participants do not have the opportunity to explain in greater detail their intentions or opinions (Creswell & Creswell, 2017). Future research might continue to use the KBDDS, but supplement this scale with an interview of open-ended questions that might afford greater depth in teacher responses, along with interviewer follow-up or clarifying questions. In addition, because the current research is the first investigation of public primary school teachers' knowledge and beliefs about DD in Saudi Arabia, it is imperative that future work replicate and extend this research to other Saudi samples, specifically, but with other Middle Eastern samples, more generally.

The Arabic writing system is made up of 28 letters representing 34 phonemes. However, the system is different from many other alphabetic languages in that Arabic does not have lower or upper case variations. In addition, Arabic is a bi-directional language because writing and reading occur in the right-to-left direction whereas numerals are interpreted in the left- to-right direction (Elbeheri et al., 2006). Previous research has identified several common miscues associated with these distinguishing features of Arabic among dyslexic Arabs, especially with regards to orthography and morphology, which impact the acquisition of

reading and the kind of miscues made by readers, in general (Ibrahim, Eviatar, & Aharon-Peretz, 2002). Consequently, it is important to broaden our educational perspective to dyslexia to consider other languages besides English, including Arabic. Such consciousness of cultural and linguistic factors could together provide a framework for identifying and treating Arabic speakers with dyslexia. More generally, there is a need for diagnostic and treatment guidelines for dyslexia and related disorders that recognize and respond to unique features of a language (see Al Rowais, Wald, & Wills, 2013; 2014).

Finally, we note that additional research is warranted to identify Saudi public primary school teachers' knowledge and beliefs about DD, with the goal of improving teacher preparation and effectiveness for instructing students with DD. Saudi teachers, like their Western counterparts, would benefit from clearer information about DD. Policy-makers in the West and in the Middle East will be better positioned to successfully implement teacher training when they have a clear appreciation for the current knowledge limitations and misconceptions teachers have about students with DD.

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Table 1. Participant demographics ( $n = 136$ ).

Variable	Frequency (%)
<b>Gender</b>	
Male	70 (51.5)
Female	66 (48.5)
<b>Teaching experience (years)</b>	
1-10	55 (40.4)
11-20	37 (27.2)
21-30	44 (32.4)
<b>Qualifications</b>	
Diploma (2-year)	13 (9.6)
Bachelors	119 (87.5)
Masters	4 (2.9)
<b>Training in dyslexia</b>	
Yes	27 (19.9)
No	109 (80.1)
<b>Taught children with dyslexia</b>	
Yes	70 (51.5)
No	66 (48.5)
<b>Self-evaluation for teaching children with dyslexia</b>	
Poor	6 (4.4)
Good	74 (54.4)
Very good	50 (36.8)
Excellent	6 (4.4)

Table 2. Descriptive statistics for the KBDDS individual items and total score ( $n = 136$ ).

Item	<i>M</i> ( <i>SD</i> )	Skew.	Kurt.
1. Dyslexia is the result of a neurologically-based disorder.	0.50 (0.50)	0.00	-2.03
2. Dyslexia is caused by visual-perception deficits, producing the reversal of letters and words.	0.24 (0.43)	1.21	-0.53
3. A child can be dyslexic and gifted.	0.80 (0.40)	-1.53	0.34
4. Dyslexic children often have emotional and social disabilities.	0.57 (0.50)	-0.30	-1.94
5. The brains of individuals with dyslexia are different from those of people without dyslexia.	0.33 (0.47)	0.73	-1.49
6. Dyslexia is hereditary.	0.56 (0.50)	-0.24	-1.97
7. Most studies indicate that about 5% of school-age students have dyslexia.	0.45 (0.50)	0.21	-1.99
8. Dyslexia has a greater occurrence in males than in females.	0.39 (0.49)	0.46	-1.82
9. Children with dyslexia are more consistently impaired in phonemic awareness (i.e ability to hear and manipulate sounds in language) than any other ability.	0.58 (0.50)	-0.33	-1.92
10. Modelling fluent reading is often used as a teaching strategy.	0.65 (0.48)	-0.62	-1.64
11. People with dyslexia have below average intelligence.	0.59 (0.49)	-0.36	-1.90
12. The reading of students with dyslexia is often characterized by inaccuracy and lack of fluency.	0.77 (0.42)	-1.32	-0.28
13. Seeing letters and words backwards is a basic characteristic of dyslexia.	0.31 (0.46)	0.84	-1.32
14. Difficulty with the phonological processing of information is one of the most important deficits in dyslexia.	0.55 (0.50)	-0.21	-1.99
15. Intelligence tests are useful in identifying dyslexia.	0.43 (0.50)	0.27	-1.96
16. All poor readers have dyslexia.	0.42 (0.50)	0.33	-1.92
17. Children with dyslexia can be helped by using coloured lenses/coloured overlays.	0.25 (0.44)	1.17	-0.65
18. Physicians can prescribe medications to help students with dyslexia.	0.38 (0.49)	0.52	-1.75
19. Multisensory instruction is not an effective training method at the moment.	0.50 (0.50)	0.00	-2.03

Table 2 (*Continued*).

Item	<i>M</i> ( <i>SD</i> )	Skew.	Kurt.
20. Students who have reading disabilities without an apparent cause are called dyslexic.	0.48 (0.50)	0.09	-2.02
21. People with dyslexia are not stupid or lazy. Knowing about the term helps children.	0.88 (0.33)	-2.29	3.30
22. Giving students with dyslexia accommodations, such as extra time on tests, shorter spelling lists, special seating, etc., is unfair to other students.	0.46 (0.50)	0.15	-2.01
23. Intervention programs that emphasize the phonological aspects of language with the visual support of letters are effective for students with dyslexia.	0.64 (0.48)	-0.59	-1.68
24. Most teachers receive intensive training in working with dyslexic children.	0.55 (0.50)	-0.21	-1.99
25. I think dyslexia is a myth, a problem that does not exist.	0.77 (0.42)	-1.31	-0.28
26. Repeated reading techniques are useful reading material to improve reading fluency.	0.76 (0.43)	-1.26	-0.41
27. Problems in establishing laterality (body schema) are the cause of dyslexia.	0.12 (0.32)	2.40	3.82
28. Students with dyslexia need structured, sequential, direct instruction in basic skills and learning strategies.	0.74 (0.44)	-1.12	-0.75
29. Dyslexia refers to a relatively chronic condition that is often not completely overcome.	0.25 (0.44)	1.17	0.65
30. Many students with dyslexia continue to have reading problems as adults.	0.40 (0.49)	0.43	-1.85
31. Many students with dyslexia have low self-esteem.	0.30 (0.46)	0.88	-1.25
32. Children with dyslexia have problems with decoding and spelling but not with listening comprehension.	0.55 (0.50)	-0.21	-1.99
33. Applying an individual reading test is essential to diagnosing dyslexia.	0.75 (0.44)	-1.17	-0.65
34. Dyslexics tend to spell words wrong.	0.63 (0.48)	-0.56	-1.72
35. Dyslexia usually lasts for a long time.	0.36 (0.48)	0.59	-1.68

Table 2 (*Continued*).

Item	M (SD)	Skew.	Kurt.
36. Dyslexia is characterized by difficulty with learning to read fluently.	0.76 (0.43)	-1.21	-0.53
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KBBDS total score	18.68 (7.82)	-0.85	-0.14

Notes: *M* = Mean; *SD* = Standard deviation; *Skew.* = Skewness; *Kurt.* = Kurtosis; see text for details.