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## Persistence of Common Myths and Misconceptions Regarding Dyslexia Among Preservice Teacher Populations

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Persistence of Common Myths and Misconceptions Regarding Dyslexia Among Preservice

Teacher Populations

Grace Barr

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### **Introduction**

According to the International Dyslexia Association (2017), as much as 15-20% of the population is affected by some symptoms of dyslexia, including, but not limited to, slow or inaccurate reading, poor spelling and writing, and mixing up of similar words. However, research has shown that specific, high quality, evidence-based instruction can lead improved performance of these tasks. The earlier the intervention, the better the results, and the less likely that secondary consequences of dyslexia, such as a limited vocabulary and poor self-esteem, will occur (Tunmer & Greaney, 2010).

When it comes to teaching reading to children with dyslexia, research shows that children with dyslexia do not need different instruction, they simply need more in order to train their brains to read efficiently and accurately (Shaywitz, 2003). Because children with dyslexia very rarely are on the caseload of a special education teacher, it is the role of the general education teacher to be knowledgeable about dyslexia to provide the appropriate supports in teaching reading to struggling readers (Shaywitz, 2003).

Several studies have examined teacher and preservice teacher (PST) knowledge of dyslexia, generally finding weaknesses in some areas of knowledge and strength in others (Washburn, Binks-Cantrell, Martin-Chang, Arrow, & Joshi, 2016; Washburn, Binks-Cantrell, & Joshi, 2013; Washburn, Joshi, & Binks-Cantrell, 2011; Washburn, Joshi, & Binks-Cantrell, 2010; Gwernan-Jones & Burden, 2009; Wadlington & Wadlington, 2005). Although many common beliefs about dyslexia have been unfounded, several misconceptions persist among the general education teacher population (Washburn et al., 2016; Washburn, Binks-Cantrell, & Joshi, 2013; Washburn et al., 2010; Washburn et al., 2011; Gwernan-Jones & Burden, 2009; Wadlington & Wadlington, 2005). The goal of the current research is to expand upon the knowledge base by examining knowledge of the underlying etiology of dyslexia and the

misconceptions that persist in the preservice teacher population at a midsize university in the Pacific Northwest.

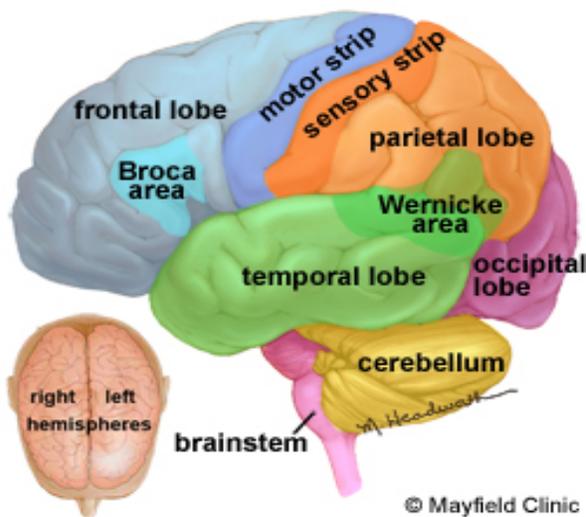
### Defining Dyslexia

Much of what is known about dyslexia is the result of research completed within the past few decades, and the definition of the disorder has been in constant flux to accommodate each new piece of knowledge that is uncovered. The current definition adopted by the International Dyslexia Association (IDA) in 2002 and used also by the National Institute of Child Health and Human Development (NICHD) states:

Dyslexia is a specific learning disability that is neurobiological in origin . . . characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities . . . [that] typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction.

This definition can be broken down into four main components: 1) dyslexia is based in

the brain; 2) it is primarily a phonological processing disorder; 3) there are persistent difficulties with word recognition and spelling; and 4) these difficulties are unexpected in relation to cognitive ability and effective classroom instruction. Understanding the rationale behind each of these pieces of the definition will lead to an accurate



**Fig. 1** The lobes and hemispheres of the brain. Pictured also are Broca's and Wernicke's Areas (Mayfield, 2017).

representation of the nature of dyslexia as it is understood today.

**A Neurological Basis.** Whether for reading or for speaking, different parts of the brain work together to produce and process language. Anatomically, a human brain is separated into four lobes (See Fig. 1): the frontal lobe, which houses personality, planning, and self-awareness; the parietal lobe which interprets language, sensory input, and proprioception; the occipital lobe that is responsible for processing vision; and the temporal lobe that understands language and is responsible for memory, hearing, and sequencing and organization (Mayfield, 2017). These lobes are further divided into the right and left hemispheres, connected primarily by a bundle of fibers known as the corpus callosum. The right hemisphere is most often credited with creativity and artistic skills while the left hemisphere is known for logic, analytical thinking, and, in the majority of people, language. Housed within the left hemisphere of the brain are two specific areas known to be important to language: Broca's Area and Wernicke's Area. Broca's Area, located in the frontal lobe, is relevant to speech production and Wernicke's Area, located in the temporal lobe, is responsible for speech understanding.

One of the first steps in understanding the nature of dyslexia as a disorder is knowing how it is manifested in the brain. The neurological signals that can be mapped as one reads look consistently different in the brain of someone diagnosed with dyslexia than they do in the brain of a typical reader. Habib's (2000) review of relevant findings on the neurological bases of dyslexia confirmed differences in brain anatomy of the brains of dyslexic individuals and the anatomy of typical individuals. Based on studies by Galaburda and colleagues, Habib reported that when studied on a microscopic level, all dyslexic brains showed differences that indicated possible abnormal development when compared to typical brains used as controls. Furthermore, with the advent of functional imaging as a tool for research, it has been observed that patterns of brain activation in people with dyslexia are different than patterns of brain activation in individuals without dyslexia (McCrorry, Mechelli, Frith, & Price, 2005).

The root of the difference between how dyslexic readers and typical readers process the written word lies in differences in the neurologic mapping of the reading process in typically reading brains and the brains of people with dyslexia. According to Shaywitz (2003), in typical readers there are two different pathways for reading in the posterior reading system. The first pathway is in the parieto-temporal region and functions for beginning readers in pulling apart and linking sounds in words; the second is in the occipital-temporal region and stores all relevant information about a word for the purpose of recognizing words immediately on sight. When a reader first encounters a new word, the word needs to be sounded out, letter by letter. This task of phonological awareness is the function served by the parieto-temporal region. As words are seen more than once, they become sight words stored within part of the occipito-temporal region of the brain. The more words that become sight words in a person's reading lexicon, the more quickly and fluently they will be able to read. In the brain of a person with dyslexia, this occipito-temporal region is under-utilized. Thus, the region of the brain that allows readers to store words for immediate recognition is not being appropriately activated.

Compensatory reading pathways used by people with dyslexia employ reading on the right side of the brain in addition to heavier reliance on Broca's area in the front left region, instead of the more efficient occipito-temporal pathway. When people with dyslexia read, they are able to sound out words, but the region that stores familiar words as sight words is not sufficiently activated. The reading system used by people with dyslexia functions, but not as quickly and automatically as the reading areas located in the left posterior areas of the brain (Shaywitz, 2003; Tunmer & Greaney, 2010).

However, knowing that dyslexia is based in the brain does not provide a complete picture of the disorder. It is here that it becomes crucial to understand the next piece of the IDA definition: dyslexia's phonologic roots.

**Phonological in Origin.** The main weakness within the language system for people with dyslexia is within the parts of the brain involved with phonological awareness (Shaywitz, 2003). Phonological awareness is the ability to manipulate phonemes, which are the distinct sounds of language that blend together to create words. Phonological awareness includes being able to perform tasks involving segmenting words into syllables, rhyming words, and recognizing alliteration of initial and final sounds. Further, phonemic awareness is a subset of phonological awareness that includes phoneme-specific abilities such as blending sounds, segmenting sounds in words, and deleting and manipulating individual phonemes (Paul & Norbury, 2012). Studies have shown that “learning to read requires a translation from spoken to visual language and depends upon phonological awareness as a bridging mechanism,” and this is one of the reasons that people with dyslexia struggle when it comes to learning to read (Kovelman et al., 2012, p. 762).

It is these building blocks of language—phonemes—that people with dyslexia most struggle with developing an awareness of (Shaywitz, 2003). Children who have dyslexia perceive a word as a single unit and cannot pull it into its individual parts both out loud and on paper; in reading, this has been seen in alphabetic and non-alphabetic systems (Shaywitz, 2003; Kovelman et al. 2012). Because learning to read involves being able to separate words into individual sounds, in dyslexia the bridge between spoken and written language is impaired. According to Shaywitz (2003), this phonological processing deficit that interferes with word identification is also one of the biggest markers for dyslexia in childhood.

**Persistent Difficulties.** The third piece of the IDA definition for dyslexia indicates that it is a disorder with no perfect cure, meaning that it continues to persist, though potentially in a different form, throughout the lifespan of a person with the disorder. Even with the provision of the best intervention available, as children with dyslexia grow to be adults with dyslexia, parts of

the disorder, specifically as it relates to spelling difficulty, will still be present. According to the Connecticut Longitudinal Study, a landmark study that mapped typical reading development in children from the time they entered kindergarten through high school and beyond, children who experience reading difficulties related to dyslexia early on in schooling do not outgrow those difficulties (Shaywitz, 2003). In fact, the study concluded that “dyslexia is a chronic condition and that it does not represent a temporary lag in reading development” (Shaywitz, 2003, p. 33). The implication of this finding in regards to treatment is that for all people with dyslexia, treatment will be necessary in order to reach their full reading potential. Dyslexia does not represent a reading delay; rather, it is a disturbance in the reading system that, if not addressed, only worsens with time.

Left unchecked, the reading demands of a curriculum can quickly outpace the reading abilities of children struggling with dyslexia, and secondary consequences such as lowered self-esteem and negative self-perception as a result of repeated learning failures are not uncommon (Tunmer & Greaney, 2010). Thus, the poor continue to get poorer as the lack of confidence in learning abilities continues to critically impact the overall learning of the child. It is for this reason, among others, that early, appropriate intervention in dyslexia is critical.

**Unexpected in Relation to Other Cognitive Abilities.** The final piece of the IDA definition for dyslexia is that it is unexpected based on factors such as IQ and the provision of effective, evidence-based classroom instruction. Dyslexia can be identified by poor reading performance despite the presence of quality instruction and otherwise typical mental capabilities. This piece of the definition primarily works to rule out other potential specific learning disabilities that can manifest in the form of poor reading skills. Therefore, if a child is shown to have cognitive capabilities significantly more advanced than what their reading level would suggest, it is likely not their ability to comprehend that is impaired; rather, their ability to pull

meaning from the written word is not functioning in a typical way. Should a child present with this factor, and the three previously discussed above, he or she could be considered as potentially having a diagnosis of dyslexia.

### **Implications of Research**

The modern IDA definition of dyslexia was developed less than 20 years ago; as such, much of what is understood now through research about this disorder is relatively new. This greater understanding of dyslexia has major implications for remediation. In order for children with dyslexia to succeed to their full potential, it is critical that their teachers be armed with the necessary knowledge to help these struggling readers. Upon graduation from a teacher certification program, teachers of reading should have specific knowledge of the stages of reading development, the structure of language, identifying characteristics of dyslexia and other learning disabilities, knowledge of the administration and interpretation of standardized tests used for early identification of reading difficulties, and a strong understanding of the ethical standards for the teaching profession (Fedora, 2014).

The majority of people learn spoken language without any need for explicit instruction. Written language, however, is different, as it requires the knowledge that phonemes correspond to individual written symbols (graphemes) that then blend together to form a word. The ability to realize the segmental nature of language in order to graph it onto the written word is phonological awareness. Furthermore, it is explicit instruction in phonological and phonemic awareness that helps children with dyslexia learn to read effectively. Children are most successful when instruction is tailored to their specific instructional needs; evidence-based practice must take into account each individual before it can be effectively applied (Berninger & May, 2011). More specific to the unique needs of dyslexia, though it initially manifests as issues with phonological decoding, issues in spelling typically persist beyond the issues with

phonological awareness (Berninger & May, 2011). Therefore, although the phonological origins of dyslexia can be remediated through effective instruction, the underlying genetic and neurological basis of the disorder remains, leading to the third part of the definition of dyslexia: persistent difficulties with word recognition and spelling.

The more teachers know and understand about dyslexia, the more prepared they will be to foster the success of the children with dyslexia who enter their classrooms. Current research on both teacher and PST knowledge of the disorder is somewhat sparse, and a direct comparison between study findings is difficult because of variations in survey questions and methods. However, across existing research, consistent myths and misconceptions persist. In several studies, researchers have shown that the majority of respondents falsely believed that dyslexia is identified largely through word reversal, (Wadlington & Wadlington, 2005; Washburn, Joshi, & Binks-Cantrell, 2011), that the presentation of the disorder is homogenous in type and severity, and that dyslexia cannot be passed on through hereditary means (Wadlington & Wadlington, 2005). Similar gaps in knowledge exist regarding dyslexia as a visual rather than a phonological processing deficit. In more than one study, as many as 71% of survey respondents indicated that the use of colored overlays could help children with dyslexia read (Washburn et al., 2011; Washburn, Binks-Cantrell, & Joshi, 2013). Furthermore, despite indicating that dyslexia is not a result of visual deficits, one study found a majority of respondents later incorrectly identified colored overlays and eye-tracking exercises as effective and appropriate means of remediation for children with dyslexia (Washburn et al., 2013). This indicates that, although PSTs recognize that dyslexia is not a result of visual processing deficits, the full implications of that knowledge in how it applies to instructional supports are not fully understood

By way of contrast, several statements were commonly identified as correct by teacher and PST populations. For example, the majority of survey respondents indicated that the

presence of dyslexia does not negatively influence IQ, that people with dyslexia can be smarter than average, that dyslexia is not the result of inadequate home environment or poor past reading instruction, and that dyslexia can have effects on writing and speaking skills (Wadlington & Wadlington, 2005). Furthermore, across several studies, the majority of PSTs responded correctly to statements on the relationship between decoding, spelling, and listening comprehension as well as IQ in people with dyslexia in relation to peers with typical development (Washburn, Binks-Cantrell, & Joshi, 2010; Washburn et al., 2011).

The goal of the present study is to expand current research on PST knowledge of dyslexia. A large number of studies have sampled from a university in the southwestern United States, limiting the generalizability of past results. Specifically, this study aims to examine the knowledge base of PSTs at a university in the Pacific Northwest who are within one year of completing their undergraduate teaching certifications. The research questions posed are: Do PSTs have an accurate understanding of the underlying nature of dyslexia, and what common misconceptions persist in the preservice teacher population?

## **Method**

### **Participants**

The survey link was sent via email to 64 preservice teachers within their final year of study at a midsize university in the Pacific Northwest. This population was chosen because being within one year of completing a degree allowed for a reasonable expectation that knowledge of learning differences such as dyslexia would have been obtained. The survey was completed by 22 people who all reported taking at least one class on reading instruction. Participants were also asked to rate their knowledge of dyslexia, although no statistically significant correlations were later found.

### **Materials**

The survey used in the present study was modelled after the Dyslexia Belief Index (DBI) developed by Wadlington & Wadlington (2005). Select questions from the DBI were excluded that did not target the current research question (i.e., questions not targeting perceived common misconceptions surrounding dyslexia were excluded from this instrument). This kept administration of the survey as short as possible in an attempt to incentivize a higher response rate. Appendix A contains the full survey instrument used. A closed set of answers on a rating scale was presented for each statement that included definitely true, probably true, probably false, and definitely false. In each question presentation, answer choices appeared in the same order.

### **Procedure**

An online survey was used for ease of administration. Because not all surveys were taken at the same time, the researcher was unable to control for environmental variables that may have affected responses obtained. Survey participation was incentivized with a drawing for a \$10 Amazon gift card; respondents had the option to provide their email address upon completion of the survey in a way that kept their responses anonymous. The survey was open over a three-week period, with a reminder email sent out each week to encourage more responses. Twenty-five people responded in total; three responses were incomplete and therefore not included in analyses. Overall, 22 responses were analyzed. Data was analyzed using descriptive analysis of frequency tables.

### **Results**

Of the statements measured, the researcher considered the knowledge to be reasonably generalized throughout the population if 80% or more of respondents answered in a like manner. Statements that were true were counted as being answered correctly if a respondent answered “definitely true” or “probably true.” Accordingly, statements that were false were counted as

correct for answers of both “definitely false” and “probably false.” Table 1 lists the survey statement, correct answer, and percent correct responses.

Among the areas surveyed where an 80% majority or higher of respondents correctly answered “probably false” or “definitely false” are statements such as children can outgrow dyslexia (81.8% correct) and dyslexia can be caused by a literacy-poor home environment (90.9% correct). One hundred percent of respondents correctly answered “probably true” or “definitely true” to the statement that children with dyslexia need more systematic and explicit reading instruction than their peers with typical development. Other statements where the majority correctly responded “probably true” or “definitely true” included statements such as people with dyslexia have difficulty with decoding/word recognition (90.9%), dyslexia is a learning disability that affects language processing (86.4%), and children with dyslexia also have problems with spelling (95.5%).

In the statement probing knowledge of the genetic nature of dyslexia (parents with dyslexia are more likely than parents without dyslexia to have children with dyslexia), 72.7% of respondents correctly identified either “probably true” or “definitely true.” Statements probing the relationship between dyslexia and IQ (72.7%), the main cause of dyslexia being visual problems (68.2%), and the effectiveness of medications in treating dyslexia (68.1%) were identified by the majority as being “definitely false” or “probably false.”

Two statements presented with results that were split with 50% of responses indicating true and 50% of responses indicating false. These statements were that dyslexia occurs more commonly in boys than in girls and dyslexia can be helped by using colored lenses and/or colored overlays. Both of these statements are false.

Statement	Correct Answer	% Correct
Children can outgrow dyslexia	FALSE	81.8%
Dyslexia can be caused by a literacy-poor home environment (for example, parents not reading to their children)	FALSE	90.9%
Children with dyslexia need more systematic and explicit reading instruction than their peers with typical development	TRUE	100%
People with dyslexia have difficulty with decoding/word recognition	TRUE	90.9%
Dyslexia is a learning disability that affects language processing	TRUE	86.4%
Children with dyslexia also have problems with spelling	TRUE	95.5%
Parents with dyslexia are more likely than parents without dyslexia to have children with dyslexia	TRUE	72.7%
Children who have dyslexia tend to have lower IQ scores than children who do not have dyslexia	FALSE	72.7%
One of the major reasons for dyslexia-caused difficulties is due to visual problems	FALSE	68.2%
Certain medications have been found to be effective in treating dyslexia	FALSE	68.1%
Dyslexia occurs more frequently in boys than in girls	FALSE	50.0%
Dyslexia can be helped by using colored lenses and/or colored overlays	FALSE	50.0%
Seeing letters and words backwards is a characteristic of dyslexia	FALSE	9.1%
Eye tracking exercises are effective in remediating dyslexia-caused difficulties	FALSE	13.6%

**Table 1:** Correct answers and percent correct for all statements included in the survey. Percent correct includes both options for each answer (i.e., if the correct answer is true, reported percent correct includes answers of “probably true” and “definitely true”).

Finally, a majority of respondents incorrectly indicated “probably true” or “definitely true” to the statements that seeing letters and words backwards is a characteristic of dyslexia (90.9%) and eye tracking exercises are effective in remediating dyslexia-caused difficulties (86.4%).

### **Discussion**

Several areas of understanding presented as strengths in this sample, particularly relating to concepts surrounding the definition of dyslexia. However, statements relating to the visual vs phonological deficits in dyslexia and subsequent supports indicated an area for improvement. Two trends can be seen in results where an 80% or higher majority responded correctly. Preservice teachers in this population demonstrated a strong understanding of the basic characteristics of dyslexia. Notably, the majority correctly indicated that dyslexia involves difficulty with language processing, word recognition, and spelling. It is promising that 100% of respondents correctly indicated that people with dyslexia will require more systematic and explicit reading instruction; this suggests that the population surveyed is aware of a vital part of teaching reading to children with dyslexia. The second trend in these responses indicated an understanding that dyslexia cannot be caused by an outside source. This is inferred from the majority of respondents correctly indicating that dyslexia does not come from lack of exposure to reading and literacy in the home as well as indicating that dyslexia cannot be outgrown. A similar finding was reported by Wadlington and Wadlington in 2005, in a population of in-service teachers, stating that 97% of respondents indicated a correct understanding of the relationship between literacy instruction, home environment, and the presence of dyslexia.

Statements where a less than 80% majority answered correctly are areas for further research due to the small sample size of the survey. Statements that fit into this category include those on the genetic nature of dyslexia, an impaired IQ as a result of dyslexia, the relationship

between dyslexia and vision problems, and the effectiveness of medications in remediating dyslexia. However, in regards to the statement on the genetic nature of dyslexia, past research has indicated a majority incorrect understanding (Wadlington & Wadlington, 2005). Results with regards to these statements are viewed as inconclusive and have been identified as avenues for further research.

Two statements are notable because results were split halfway between correct and incorrect within the survey population. The first statement, that dyslexia occurs more often in boys than girls, is false. Historically, girls with dyslexia have gone underdiagnosed, contributing to this misconception within the general population (Shaywitz, 2003). A split response here suggests that some misconceptions persist regarding these statements among the population surveyed. The second statement, that dyslexia can be helped by placing colored lenses over a reading passage, is also false. Again, the split response here suggests that, although not widespread, some misconceptions exist.

The researcher found two statements where a strong misunderstanding was present. These statements, that dyslexia can be remediated using eye-tracking exercises and that seeing letters and words backwards is a characteristic of dyslexia, both relate to an implied assumption that dyslexia is a visual processing deficit. Comparably, past research has found as many as 92% percent of teachers and preservice teachers incorrectly respond probably or definitely true to similar statements addressing seeing letters and words backwards in dyslexia (Washburn et al. 2010; Washburn et al. 2011). Furthermore, Washburn and colleagues (2013) found that 90% of US-based PSTs incorrectly indicated that eye-tracking exercises are effective. Taken together, the current study shows that these misconceptions continue to persist.

A trend can be seen throughout these results in regards to separating the underlying cause for dyslexia from visual impairments. Past studies, such as that done by Washburn and

colleagues (2013), have noted similar inaccuracies in understanding the relationship between dyslexia and visual processing. Both questions where the large majority of respondents were incorrect were areas that addressed the visual nature of the disorder. Furthermore, half of the survey population believed that adjusting the visual input, i.e., adding a colored lens overlay to a reading passage, would be an effective support. This is a slightly better finding than the 71% of incorrect responses found by Washburn and colleagues (2011), although it is still not indicative of a general understanding within the PST population surveyed. Finally, 68.2% of respondents correctly indicated that visual problems are not one of the major reasons for dyslexia-caused difficulties. Although this does represent a majority correct, the researcher does not feel that it is a high enough majority to assume general knowledge throughout the population. Therefore, it seems possible that a gap in knowledge concerning the relationship between dyslexia and visual impairments persists throughout the population surveyed. As curriculum is revised based on research, it is imperative that an understanding of this relationship between dyslexia and vision is emphasized to better prepare PSTs to provide supports for the children with dyslexia they will encounter throughout their teaching careers.

### **Implications**

The weaknesses in certain areas of understanding found in this study, particularly the relationship between dyslexia and visual processing, suggest that preservice teachers in the survey population may not have a holistic enough view of dyslexia to appropriately provide supports for readers with dyslexia. Several clear strengths in understanding were shown. However, understanding that deficits in dyslexia do not stem from a visual processing deficit can impact what supports a teacher provides. For example, understanding that colored overlays are ineffective because they alter the visual input but not the words themselves will impact whether or not they are provided to a child with dyslexia. This survey indicates that addressing the nature

of deficits (visual vs phonological) within the curriculum may be a useful revision in preparing the next generation of school teachers.

### **Future Directions and Limitations**

This survey is directly limited by the narrow nature of the sample. Results cannot be generalized past the sample of preservice teachers at the university from which full responses were received. Therefore, to increase the generalizability and confidence levels of the results, immediate future steps would be to distribute the survey to similar populations at other universities. The results are also limited by the inexperience of those sampled. Future research will need to address the research question to teachers of all skill and experience levels to provide more insight into what misconceptions about dyslexia persist. The survey is also limited in that the researcher was unable to control for environmental factors, such as location or the presence of other people, that may have impacted individual response results.

Future research questions will also need to address issues beyond the prevalence of common misconceptions. Questions will probe functional areas of knowledge, such as what could be used to determine PST understanding and application of etiological concepts. Questions could examine types of instructions and the effectiveness of various types of support. Research addressed at determining the prevalence of misconceptions among teacher educators could also provide insights into how well new research findings on dyslexia are being integrated into the public sphere. Learning what teacher educators believe could help pinpoint where misconceptions among preservice teachers arise.

### **Conclusion**

Dyslexia is a brain-based phonological processing disorder that negatively effects word recognition and spelling in a way that is unexpected in relation to both the cognitive abilities of the person with dyslexia and the receipt of effective, evidence-based classroom instruction. In

schools, children with dyslexia may qualify for services, and in the majority of cases providing appropriate instructions and supports will be the responsibility of the general education classroom teacher. Therefore, it is imperative that teacher education programs prepare students to effectively support a child learning to read with dyslexia.

The survey designed for the present research was meant to probe what common misconceptions about dyslexia persist in the preservice teacher population at a midsize university in the Pacific Northwest. Promisingly, responses to statements concerning the nature of the disorder were answered correctly, suggesting a general understanding of the disorder throughout the population surveyed. However, statements relating to the relation between vision and dyslexia, and subsequent supports based on this relation, were not answered in a way that suggested generalized understanding. More research with a larger sample size in the future will help to clarify ambiguity and provide more generalizable results.

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**Appendix A**

Preservice Teacher Knowledge of Dyslexia

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**Start of Block: Demographics/Introductory Information**

How many classes on reading instruction have you completed at the time of taking this survey?

- 1
  - 2
  - 3
  - 4
  - 5+
-

How would you characterize your knowledge of dyslexia?

- Extremely knowledgeable
- Very knowledgeable
- Moderately knowledgeable
- Slightly knowledgeable
- Not knowledgeable at all

**End of Block: Demographics/Introductory Information**

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**Start of Block: Characteristics of Dyslexia**

Seeing letters and words backwards is a characteristic of dyslexia.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
-

Children can outgrow dyslexia.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
- 

Dyslexia can be caused by a literacy-poor home environment (for example, parents not reading to their children).

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
-

Children with dyslexia need more systematic and explicit reading instruction than their peers with typical development.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
- 

Parents with dyslexia are more likely than parents without dyslexia to have children with dyslexia.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
-

People with dyslexia have difficulty with decoding/word recognition

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
- 

Dyslexia occurs more frequently in boys than in girls.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
-

Children who have dyslexia tend to have lower IQ scores than children who do not have dyslexia.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
- 

Dyslexia is a learning disability that affects language processing.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
-

Children with dyslexia also have problems with spelling.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
- 

One of the major reasons for dyslexia-caused difficulties is due to visual problems.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
-

Eye tracking exercises are effective in remediating dyslexia-caused difficulties.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
- 

Certain medications have been found to be effective in treating dyslexia.

- Definitely true
  - Probably true
  - Probably false
  - Definitely false
-

Dyslexia can be helped by using colored lenses and/or colored overlays.

- Definitely true
- Probably true
- Probably false
- Definitely false

**End of Block: Characteristics of Dyslexia**

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**Start of Block: Block 2**