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Knowledge and Perceptions of Dyslexia in Pre-service Educators  
in the Mountain West: A Survey Study

by  
Isabella Beard

A thesis  
submitted in partial fulfillment  
of the requirements for the degree of  
Master of Science in the Department of Communication Sciences and Disorders  
Idaho State University  
Spring 2023

## **Committee Approval**

To the Graduate Faculty:

The members of the committee appointed to examine the thesis of ISABELLA BEARD find it satisfactory and recommend that it be accepted.

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October 31, 2022

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RE: Study Number IRB-FY2023-70: Knowledge and Perceptions of Dyslexia in Pre-service Educators in the Mountain West: A Survey Study

Dear Ms. Beard:

Thank you for your responses to a previous review of the study listed above. I agree that this study qualifies as exempt from review under the following guideline: Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).

The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

This letter is your approval, please, keep this document in a safe place.

Notify the HSC of any adverse events. Serious, unexpected adverse events must be reported in writing within 10 business days.

You are granted permission to conduct your study effective immediately. The study is not subject to renewal.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Tom Bailey (208-282-2179; fax 208-282-4723; email: [humsbj@isu.edu](mailto:humsbj@isu.edu)) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP

Human Subjects Chair

## **Dedication**

This thesis is dedicated to my husband. Your journey with dyslexia, academically and beyond, is what ignited my interest in and passion for this topic. Your determination, persistence, and resilience, despite challenges and lack of support from school and university systems, never cease to impress and inspire me. I hope this research will help future students, including perhaps our own future children, to receive proper instruction and assistance with this disability that you did not.

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### **List of Abbreviations**

ADHD	Attention Deficit Hyperactivity Disorder
APA	American Psychiatric Association
DLD	Developmental Language Disorder
DSM-5	Diagnostic and Statistical Methods Manual of Mental Health, 5th Edition
IDA	International Dyslexia Association
IDEA	Individuals with Disabilities Education Act
IQ	Intelligence Quotient
NICHHD	National Institute of Child Health and Human Development
NRP	National Reading Panel
SLD	Specific Learning Disability
SLI	Specific Language Impairment
SLP	Speech-Language Pathology

# Knowledge and Perceptions of Dyslexia in Pre-service Educators in the Mountain West: A Survey Study

Thesis Abstract—Idaho State University (2023)

This study explored university students in relevant areas of study (general and special education, psychology, counseling, educational administration, and speech-language pathology) in the mountain west region of the United States for their knowledge of, attitudes towards, and perceived preparedness to work with individuals who have dyslexia. A survey was adapted from two existing surveys and distributed by email to professors in relevant programs, who distributed it to their students. 242 responses were received. Demographic data is reported, and associations made between respondents' program of study and self-reported knowledge, attitudes, and preparedness. Overall, knowledge of dyslexia was lacking, with educational administration, general education, and counseling students often displaying less knowledge than other pre-professionals. Attitudes towards dyslexia were mostly positive. Additionally, most respondents felt that both they and other pre-service educators lack knowledge, are underprepared, and are under-trained to work with those who have dyslexia. Implications, limitations, and future directions are examined.

Key Words: dyslexia, reading, knowledge, attitudes, preparedness, university, students, educators

## Introduction

Dyslexia is the most common learning disability (White et al., 2020), yet knowledge of and positive attitudes towards it are strikingly inadequate among many professionals who work with children who have this diagnosis. Although there are varying definitions of dyslexia, the current definition accepted by and created in collaboration with the International Dyslexia Association (Lyon et al., 2003) is as follows:

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. These difficulties 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. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge (p. 2).

We can further break down this definition by looking at the important terminology within. A specific learning disability is a neurodevelopmental disorder that impacts the learning and use of reading, math, writing, or other academic skills, without requiring the presence of other developmental disorders or delays. Examples include difficulties with decoding words or reading fluency (accurate decoding, appropriate expression, and rate). Dyslexia is typically diagnosed in the school-age years, although it can be detected earlier (IDA, 2012).

Neurobiological in origin means that the cause of the disability has to do with the brain. Word recognition is the ability to identify a word and comprehend its meaning when it is presented through spoken or written language. Spelling is the use of letters to form words. Decoding is “knowledge of letter-sound correspondences... to convert print into words” (Roth &

Worthington, 2021, p. 227). This essentially refers to the alphabetic principle; letters of the alphabet represent sounds. Therefore, decoding involves looking at written language and mentally converting the letters into their corresponding sounds in order to identify words. The phonological component of language is the sound structure of language. It involves the combinations of sounds, and the rules that govern those combinations, to create words. For example, the letters “p”, “i”, and “g” correspond to the sounds, /p/, /i/, and /g/, and when combined in that order, represent a mid-sized animal with a snout and a curly tail that stereotypically likes to roll in mud. Other cognitive abilities refer to the fact that those with dyslexia typically do not have other cognitive deficits. In fact, one aspect often considered in the diagnosis of dyslexia is that the person has an average to high intelligence quotient (IQ). Effective classroom instruction addresses the idea that dyslexia does not result from a lack of, or improper reading instruction. Reading comprehension is the ability to understand and interpret written language (Roth & Worthington, 2021). This might involve areas such as comprehending the basic concept of a passage or understanding details and how they relate. Reading experience is the breadth and depth of reading, as well as the positive or negative feelings associated with reading. Vocabulary is the repertoire of words that an individual understands. And finally, background knowledge is the knowledge that a person has as a result of their learning and experiences, which can be applied to current situations.

Dyslexia is prevalent in 5 to 20% of individuals (Wagner et al., 2020), which means that up to one in five students in a classroom could have dyslexia. By the time a child is 8 to 10 years old, they are beginning to receive more input from written sources than from oral sources, making reading abilities, that are often negatively impacted in those with dyslexia, vital for academic success. However, many teachers and other professionals who work with students feel

unprepared to teach those with dyslexia. In one study, teachers and providers were surveyed to assess their attitudes and beliefs regarding dyslexia. The results showed “doubt, uncertainty and confusion about dyslexia and considerable misgiving as a consequence. A marked degree of learned helplessness was apparently induced in respondents when faced with a student with a diagnosis of dyslexia...[and] expectations [were] lowered” (Kerr, 2001, p. 82).

While federal laws in the United States have required identification and appropriate education of children with dyslexia for more than 40 years, accountability and funding to follow through on these requirements is lacking, and these failings are more prevalent in some states than others (Hanford, 2017). Dyslexia is increasingly being defined, assessed, diagnosed, and treated in educational systems. As federal and state laws mandate assessment and treatment of dyslexia in the school setting, there has been varied and inequitable implementation of services. For example, Idaho passed its first legislation regarding dyslexia on February 16, 2022, Senate Bill 1280 (Hadley, 2022; S. 1280, 2022).

### **A Note on Terminology**

For the purposes of this paper, we use the term dyslexia exclusively, but recognize inconsistencies and confusion in terminology across professions. While reading and reading difficulties are probably the most studied aspect of human psychology, lack of student learning in reading nationally could be considered a public health crisis. At least part of the crisis stems from inconsistent use of terminology across professions. The term dyslexia is, most simply, a descriptive label for a word reading and spelling problem that originates with specific language processes, most often those involving the brain’s system for identifying, remembering, thinking about, and manipulating elements of speech (phonemes). These terms are used in the formal definition of dyslexia adopted by the International Dyslexia Association (IDA) above. However,

there are professions who do not formally recognize the term dyslexia, given disorder definitions put forth by other governing bodies such as that printed in the Diagnostic and Statistical Methods Manual of Mental Health, 5th Edition (DSM-5; American Psychiatric Association - APA, 2013), that instead uses the term specific learning disability (SLD) “with impairment in reading.” It defines SLD as “a pattern of learning difficulties characterized by problems with accurate or fluent word recognition, poor decoding, and poor spelling abilities” (p.67). Specific learning disabilities are the most common disability that plague school children. It is estimated that 5-15% of school-age children struggle with a learning disability (APA, 2013), with as many as 80% of those children having an impairment in reading (dyslexia; Shaywitz et al., 2021).

To further complicate the issue, there is the debate/misuse of the related and relevant terms developmental language disorder (DLD) and specific language impairment (SLI). A DLD is a lifelong neurodevelopmental condition affecting understanding and use of language, with the absence of brain damage, hearing impairment, or intellectual disability (McGregor et al., 2020). As with most disorders, DLD presents variably across individuals and can be identified by difficulties in word learning, morphosyntactic skills, vocabulary, and discourse-level language (Lancaster & Camarata, 2019). Similar to SLD, DLD is one of the most common developmental disorders, occurring in around 7.5% of the population (e.g., Norbury et al., 2016). And relevant to the topic of dyslexia, children with DLD are at greater risk for having reading difficulties (Catts et al., 2002). Conversely to DLD, SLI is a more widely used, more narrowly defined term that generally refers to an impairment specific to language that cannot be attributed to hearing loss, neurological damage, or intellectual disability (Leonard, 2014, 2020).

Adding to the confusion, although dyslexia, SLD, DLD, and SLI, among other terms, are used, sometimes interchangeably throughout the literature, these research-oriented terms, are not

always the terms used by clinicians, insurance providers, educational policymakers, and stakeholders at large, all of whom operate under different labeling systems (Georgan et al., 2023). In the United States, while clinicians across settings may refer to the DSM-5 (language disorder and specific learning disorder), insurance providers more often use codes outlined in the World Health Organization's International Classification of Diseases (F80.1 Expressive language disorder and F80.2 Expressive and receptive language disorder). Still alternate, educational policymakers and speech-language pathologists working in school settings are likely to use broader disorder categories defined in the Individuals with Disabilities Education Act (IDEA). These inconsistencies add to the confusion and make it difficult for researchers across professions to work together. Further, it quickly becomes clear that such terminological barriers are going to prevent people in different sectors from efficiently/effectively communicating with one another, from generating awareness, and from making unified progress toward reading success in school children (Georgan & Hogan, 2019; Leonard, 2020; Schuele & Hadley, 1999).

### **Reading Instruction**

For all children, whether they have dyslexia or not, there are methods of reading instruction that have been proven to be most effective. The National Reading Panel suggests five essential components of literacy instruction: phonemic awareness, phonics, reading fluency (rate, accurate decoding, and appropriate expression), vocabulary, and reading comprehension (Joshi et al., 2009). Phonemic awareness and phonics were not previously directly described. Accordingly, phonemic awareness is the awareness of the individual sounds in words or syllables. It includes skills such as phoneme blending (the sounds /k/, /æ/, /t/ equal "cat"), segmentation ("cat" is made of the sounds /k/, /æ/, /t/), phoneme counting ("cat" has three



sounds), and phoneme manipulation (if you take the word “tac” and move the first sound to the end, you get “act”). Phonics is the relationship between sounds/phonemes and spelling. More specifically, it is how patterns or sets of letters/graphemes are converted to sounds, and vice versa. For example, in English, the letters “ph” together make the sound /f/, and an “e” after a vowel and a consonant usually makes the word-medial vowel long, such as in the word “made” (Roth & Worthington, 2021). In order to have the best possible results, those learning to read need lessons in all five components. Spelling practice is also essential to reading and writing, as it has been found to facilitate reading improvement more than reading practice alone (Graham & Hebert, 2011; Graham & Santangelo, 2014; Oulette, 2010). Further, intervention must be implemented by a well-trained and linguistically informed therapist/teacher (Blachman et al., 2003; Blachman et al., 2004; Seidenberg, 2017; Torgesen, 2004a).

### **The Importance of Reading**

Reading is important for innumerable reasons. It influences many factors, including academic success, prevention of juvenile delinquency and later imprisonment, psychosocial well-being, and full participation in society. Therefore, those who have reading difficulties may experience obstacles far removed from the problem itself (Morken et al., 2021).

Learning is often acquired through written material, and many assignments rely on reading and writing, especially as a child progresses through school. Therefore, reading is essential to academic success. According to Snow (2021), research shows that only 5% of children cannot learn to read, but in western nations, approximately 30% of children do not learn. Children who have dyslexia, regardless of intelligence level, may struggle with many aspects of reading and writing important to academia, including difficulty understanding abstract concepts, recalling words or passages, reading fluently, comprehending what is read, retelling stories, and

spelling (Al-Lamki, 2012). This can result in a student having to work extra hard, often to no avail, which leads to frustration and an abundance of secondary negative outcomes (Al-Lamki, 2012). Additionally, students with dyslexia are more likely to drop out of school, with incidences up to 35%, which is double the national average in the United States (Al-Lamki, 2012).

Secondary negative outcomes of having dyslexia can greatly impact a person's psychosocial well-being. These can include behavioral problems, peer rejection, trauma, low self-esteem, difficulty setting realistic and attainable goals, and lessened chances to recognize personal successes (Al-Lamki, 2012; Snow, 2021). According to Al-Lamki (2012), children with dyslexia frequently develop severe anxiety disorder, which can last throughout their lives. They may also develop anger problems as a result of frequent frustration, and clinical depression as a result of poor self-image and self-esteem. The manifestation of anger and depression in this population can be exacerbated by teacher and parent responses and teasing from peers (Al-Lamki, 2012). People who have dyslexia are also at increased risk for poor emotional self-regulation, which is an important skill for academic and social success (Snow, 2021), as well as emotional-behavioral difficulties, which often lead to emotional and behavioral problems, and therefore lack of academic achievement and exclusion from school and society (Snow, 2020).

Unfortunately, these potential problems in school, and the high incidence of dropping out puts children and adolescents who have dyslexia at a heightened risk for the 'school-to-prison pipeline'. This can be caused by their difficulties being "undiagnosed and/or mis-managed in the school system, e.g., through an over-emphasis on behavioral manifestations and a perhaps understandable, yet still misplaced over-reliance on suspensions and exclusions" (Snow, 2021, p. 226). According to Al-Lamki (2012), reading disabilities are present in 85% of juvenile offenders. In a review of studies of incarcerated adults by Morken et al. (2021), one study found

that 47.5% demonstrated signs of dyslexia, and almost two thirds had poor reading comprehension. Another study in the same review found that 28.6% had at least moderate problems in spelling. It was concluded that those who have language and literacy disorders are at increased risk of criminal behavior (Morken et al., 2021).

When considered individually or together, many of these factors can lead to lack of, or lowered participation in society. According to Snow (2021), reading and writing competency leads to opportunities for academic success, higher education or training, and therefore advanced or stable positions in society and the economy. These opportunities may not be available to those who have reading and writing difficulties. Al-Lamki (2012) states that up to 20% of those in the workplace have dyslexia, and that it is often a hidden disability with negative impacts on performance and careers. Snow (2021) points out that employment opportunities that do not require competent reading and writing skills are diminishing.

Reading is not a luxury. It is something that all children need to learn. Therefore, it is essential that we know how to best prepare future educators who will work with children and help teach them to read.

### **Professional Perceptions**

It is apparent that many teachers and other professionals already in the work force have limited knowledge of dyslexia, negative attitudes towards it, and feel unprepared to work with children who have it (Shotwell, 2022; Wadlington & Wadlington, 2005). Knowledge of dyslexia is limited both in the actual definition of dyslexia and in misconceptions about both the disorder and the people who have it. For example, some professionals may think that dyslexia is when a person “mixes up their letters”. In reality, letter reversals are only one small manifestation of dyslexia experienced by a small percentage of people and do not account for the underlying

processes (Brooks et al., 2011). Preparedness to work with people who have dyslexia was considered by Wadlington and Wadlington (2005) when examining participant perception of whether or not formal education, informal education, and/or life experiences prepared them. They found that 87.8% of participants reported that their formal education had not prepared them to work with people who have dyslexia, and 72.4% reported that their informal education and/or life experiences had not prepared them. Additionally, “some expressed strong feelings of frustration and helplessness” in regard to their lack of preparedness (Wadlington & Wadlington, 2005, p. 27). In a survey study of educators by Shotwell (2022), when asked about preparedness to work with students with dyslexia, only 4.32% of general education teachers agreed that they had received sufficient training, while only 12.71% of other educators (including special education teachers) agreed that special education teachers receive sufficient training. This was an interesting response when compared to the data that 53.24% of general education teachers and 66.95% of other educators in this study reported working with students with dyslexia. Yet another study found that the six most frequently incorrect responses on a survey about dyslexia were all regarding treatment (White et al., 2020). For example, only 18.41% of respondents knew that the statement, “Students with dyslexia need instruction primarily in reading comprehension strategies” (p. 227), was false. Additionally, respondents did not understand the essential elements needed to teach reading to those with dyslexia, such as the difference between phonological awareness and phonics, or decodable and nondecodable text (White et al., 2020).

This lack of knowledge and/or lack of preparedness can lead to negative attitudes about dyslexia. In a study by Gwernan-Jones and Burden (2010), student teachers were surveyed regarding their attitudes towards dyslexia. A small percentage (1.9%) of participants responded agree or strongly agree to the statement that dyslexia is just an excuse to be lazy, and 4.2%

responded “neutral” (it was not reported as to whether “neutral” meant “neither agree nor disagree” or “I don’t know”). When presented with the statement that children with dyslexia often fail to succeed as adults, 2.7% responded agree or strongly agree, and 11.1% responded “neutral”. On another question, 4.6% of participants responded agree or strongly agree to the statement that children with dyslexia typically have low ability (although area of ability referred to was not reported), with 18.8% responding “neutral”. Of the participants, 34.5% responded agree or strongly agree to the statement that the label of dyslexia could be used as an excuse for a child to not try (although the authors did not indicate what “not try” referred to). To the statement that parents whose children are just immature want to call them dyslexic, 17.1% responded agree or strongly agree, and that parents whose children have low ability want to call them dyslexic, 21.8% responded agree or strongly agree (again, there was no detail on what the term “ability” was in reference to, but we interpret it to mean “academic ability”). While it is reassuring that only a small percentage of participants agreed with some of these statements, others had surprisingly high percentages. Whether the percentages were high or low, it is obvious that there is work to be done to eradicate these negative attitudes.

Similarly, Shotwell (2022) found that 11.08% of general education teachers, 9.32% of other educators, and 6.45% of administrators agreed with the false statement that giving students with dyslexia accommodations, such as extra time on tests, shorter spelling lists, special seating, and such is unfair to other students. When presented with the false statement, people with dyslexia have below average intelligence, 2.70% of general education teachers, 4.76% of other education teachers, and 6.25% of administrators agreed. When asked about the cause of dyslexia, 1.80% of general education teachers, 5.71% of other educators, and 6.25% of administrators agreed with the false statement, dyslexia is caused by a poor home environment and/or poor

reading instruction. Erroneous agreement with the false statement, dyslexia cannot be identified prior to a child being in 3<sup>rd</sup> grade, was 9.61% for general education teachers, 8.57% for other educators, and 18.75% for administrators.

Accordingly, one may wonder where this paucity of information stems from. It is probable that one source of misinformation, or lacking information may arise when educating professionals that will later work with children who have dyslexia. While there have been some surveys completed on general education, special education, and school psychology university majors (White et al., 2020), and on student teachers (Gwernan-Jones & Burden, 2010), pre-professionals in other fields of study that will work with children who have dyslexia, including speech-language pathologists and counselors, have not been questioned as to their pre-service experience with the disorder. Additionally, few surveys of university students have been conducted in the United States, and none in the mountain west region. In one study, textbooks used for reading education courses in universities were reviewed to determine the degree to which they incorporated the five essential components of literacy instruction suggested by the National Reading Panel (recall: phonemic awareness, phonics, reading fluency, vocabulary, and reading comprehension; Joshi et al., 2009). The study revealed that many textbooks do not satisfactorily cover these components or how to teach them, and sometimes even contain incorrect information. Of the 17 most commonly used textbooks, 13 contained all 5 components, but only 10 correctly defined all of the components. Within the textbooks, there was a range from 4% to 60% of coverage of the components. Phonemic awareness and fluency were not included in one of the textbooks, which was used by 91 universities included in the study (the total number of universities included in the study was not reported). This study provided valuable insight into one aspect of university education on reading education and dyslexia;

however, there are other aspects of the pre-service students' instruction that still need to be considered.

As many professionals are educated and seek employment in the same geographical area where they studied (Shotwell, 2022), to determine the roots of problems in those states that are behind the curve when it comes to dyslexia, such as Idaho, it is important to assess the educational programs for professionals in those regions.

### **Purpose**

Accordingly, the **long-term goal** of this research is to improve the attitudes toward and beliefs about dyslexia, knowledge of dyslexia, and preparedness to work with children who have dyslexia among relevant professionals through targeting change in university programs, such as general and special education, psychology, counseling, educational administration, and speech-language pathology. The **objective** of this study was to explore the attitudes towards dyslexia, knowledge of dyslexia, and preparedness to work with children who have dyslexia among university students in the mountain west region (i.e., Idaho and surrounding states) in programs for general and special education teachers, school psychologists, school counselors, educational administrators, and speech-language pathologists. The **central hypothesis** was that the knowledge and preparedness of university students in relevant programs in the mountain west region was insufficient to meet the needs of children with dyslexia, and that there were misconceptions and negative attitudes and beliefs about dyslexia. This hypothesis was formulated from preliminary data exploring the attitudes and knowledge about dyslexia in educators in Eastern Idaho (Shotwell, 2022). The **rationale** for this research was that a survey of university students regarding dyslexia in the mountain west region will have an important

positive impact by providing information that can be used to inform educational programs in the region.

Through three central aims, we tested the hypothesis. In university students in the mountain west region in collegiate programs relevant to working with students who have dyslexia, we determined the relationship between program of study and

- **Aim #1:** knowledge of dyslexia,
- **Aim #2:** attitudes towards dyslexia,
- **Aim #3:** preparedness to work with students who have dyslexia.

Based on preliminary data, for the **working hypothesis for aim #1**, we expected that knowledge of dyslexia would differ based on program of study, with those studying special education, psychology, counseling, and speech-language pathology having greater knowledge of dyslexia than those studying general education and educational administration. For the **working hypothesis for aim #2**, we expected that attitudes towards dyslexia would differ based on program of study, with those studying special education, psychology, counseling, and speech-language pathology having more positive attitudes towards dyslexia than those studying general education and educational administration. For the **working hypothesis for aim #3**, we expected that the majority of university students, regardless of program of study, would feel unprepared to work with students who have dyslexia.

## **Methods**

### **Participants**

All participants (n = 163) were students in mountain west region university programs for special education, general education, educational administration, psychology, counseling, and speech-language pathology (SLP). Data for the study was gathered via email survey. Publicly



available email addresses of faculty and staff in appropriate programs were gathered from university websites (2553 email addresses). We emailed the Qualtrics survey link to said faculty and staff, and requested they distribute the survey to students in their programs. The survey took roughly 15 minutes to complete and contained 73 items that fell within the broad categories of demographics, knowledge, attitudes, and preparedness. The majority of questions followed a Likert scale, where participants rated the extent to which they agreed or disagreed with the statements presented. The survey was created using adaptations of two existing surveys. The Dyslexia Belief Index (Wadlington & Wadlington, 2005) is a 30-question survey using a Likert scale. The Knowledge and Insights of Dyslexia Survey (White et al., 2020) is a 38-question survey that also follows a Likert scale, with some opportunities for short-answer explanations. Both contain questions relating to knowledge and misconceptions about dyslexia. The Knowledge and Insights of Dyslexia Survey additionally contains questions relating to demographics, perceived preparedness to work with students who have dyslexia, and who is responsible for working with students with dyslexia.

### **Materials and Procedure**

Approval was obtained from the Human Subjects Committee at Idaho State University prior to collection of data. Each participant provided voluntary informed consent prior to participation in the study. Participants were recruited using convenience sampling, which is not random and was used to target members of a group of interest who were readily available. The recruitment methods detailed are considered convenience sampling because all individuals in specific student roles within the mountain west region had an opportunity to complete the survey, but we only received responses from those who chose to fill out the survey, incorporating an element of volunteerism.

## Research Design and Data Analysis

Descriptive statistics (frequencies, percentages, mean, and range) were calculated to describe demographics and response rates. Survey response comparisons between respondent program of study (sorted by general education, special education, school psychology, counseling, educational administration, and SLP) are represented in tables for the following categories: demographics, attitudes towards dyslexia, knowledge about dyslexia, and preparedness to work with individuals who have dyslexia.

Chi-square tests of independence were completed using Jamovi, an open statistical software platform, to explore the relationship between program of study, attitudes, knowledge, and preparedness. A standard alpha of .05 was used to determine statistical significance between the criterion and predictor variables. In addition to exploring the significance of the relationships between variables, effect size was calculated using Cramer's V. Cramer's V is an effect size measurement for the chi-square test of independence, and it measures how strongly categorical fields are associated. In interpreting effect sizes, those lower than or equal to 0.2 are considered only weakly associated, those between 0.2 and 0.6 are considered moderate results, and those greater than 0.6 are considered to be strongly associated.

Some of the response categories were collapsed to decrease the number of response options explored. Data were collapsed as follows. When "level of agreement" was questioned, responses were collapsed from six categories to four categories such that strongly agree and agree became agree; strongly disagree and disagree became disagree; I don't know remained; and neither disagree nor agree became neither (nothing was collapsed here, the agreement label was simply shortened for presentation purposes). State of residence was collapsed from 50 response options to 6, per census geographic classification. Accordingly, Connecticut, Maine,

Massachusetts, New Jersey, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont were collapsed into the Northeast; Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin were collapsed into the Midwest; Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia were collapsed into the South; Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming were collapsed into the Mountain West; Alaska, California, Hawaii, Oregon and Washington were collapsed into the Pacific West; and undecided remained unchanged. Finally, some response options related to preparedness were collapsed from 6 to 4 categories, such that very prepared and prepared became prepared; very unprepared and unprepared became unprepared; I don't know remained; and neither unprepared nor prepared became neither (nothing was collapsed here, the preparedness label was simply shortened for presentation purposes).

## **Results**

Of the 242 surveys that were obtained, and 163 were useable (67.36% of the total response rate). Surveys were excluded if participants responded “no” to informed consent, did not respond to informed consent, did not respond to any survey question beyond informed consent and/or demographic information, or did not specify program of study. Also, for each specific variable of interest detailed below, you will see the number of respondents (*n*) varies slightly. We only included respondents who answered all questions for each statistical analysis, resulting in slightly different numbers of respondents across comparisons (e.g., 81 respondents studying general education under the category of “an individual can have dyslexia and be gifted” versus 68 studying general education under the category of “dyslexia is not a disorder” in Table

3). We queried respondent attitudes towards dyslexia, knowledge of dyslexia, and preparedness to work with individuals who have dyslexia. Combined with demographic data, this allowed for comparisons between the following 6 groups of student respondents: those studying 1) general education, 2) special education, 3) school psychology, 4) counseling, 5) educational administration, and 6) SLP.

## **Variables of Interest**

### **Program of Study and Demographics**

For information related to demographics and program of study, see Table 1. The majority of student respondents were studying general education (50.31%). With respect to level of degree sought, responses varied such that the majority of general education and special education students were undergraduate (79.3% and 81.3% respectively), while the majority of school psychology, counseling, educational administration, and SLP students were graduate (100%, 100%, 66.7%, and 75.6% respectively). The majority of general education, special education, educational administration, and SLP student respondents indicated they were studying at universities in Utah (47.6%, 68.8%, 66.7%, and 44.4% respectively), while the majority of school psychology student respondents were studying in Idaho (85.7%) and counseling student respondents were studying in Colorado (66.7%). With respect to what geographical region student respondents were planning to work in after completing their education, the majority of all respondents indicated Mountain West except for counseling students, who mostly indicated they planned to work in the Midwest (66.7%). The majority of general education, special education, school psychology, and educational administration student respondents indicated they planned to work in a kindergarten through 12<sup>th</sup> grade setting upon graduation (91.5%, 81.3%, 92.9%, and 66.7% respectively), while counseling student respondents mostly did not know what setting

they would work in (66.7%) and SLP student respondents equally did not know or planned to work in kindergarten through 12<sup>th</sup> grade (26.7% each). Further, with respect to the age group respondents intended to work with upon graduation, the majority of general education and school psychology students indicated elementary through high school age clients (85.85% and 83.33% respectively), special education students indicated preschool through middle school age clients (66.67%), counseling students indicated elementary, high school, or working age (18 to 64 years) clients (60%), educational administration students indicated high school or working age clients (100%), and SLP students indicated birth to elementary school age clients (59.79%). Finally, regardless of program of study, the majority of respondents have, or know someone who has dyslexia (59.51%) and have completed less than half of their program of study (53.37%).

**Table 1**  
**Program of Study and Demographics: Descriptive Statistics (N=163)**

	Program of Study											
	General Education		Special Education		School Psychology		Counseling		Educational Administration		Speech-Language Pathology	
	(n = 82)		(n = 16)		(n = 14)		(n= 3)		(n=3)		(n=45)	
	n	%	n	%	n	%	n	%	n	%	n	%
Do you or someone you know have dyslexia?												
Yes	49	59.8	11	68.8	10	71.4	1	33.3	2	66.7	24	53.3
No	28	34.1	3	18.8	4	28.6	1	33.3	1	33.3	18	40.0
I don't know	5	6.1	2	12.5	0	0.0	1	33.3	0	0.0	3	6.7
What level of degree are you seeking?												
Undergraduate	65	79.3	13	81.3	0	0.0	0	0.0	0	0.0	9	20.0
Graduate	17	20.7	3	18.8	14	100.0	3	100.0	2	66.7	34	75.6
Non-degree seeking	0	0.0	0	0.0	0	0.0	0	0.0	1	33.3	2	4.4
Approximately what percentage of your current program of study have you completed?												
25%	20	24.4	6	37.5	6	42.9	1	33.3	1	33.3	21	46.7
50%	18	22.0	4	25.0	3	21.4	0	0.0	1	33.3	6	13.3
75%	35	42.7	4	25.0	4	28.6	2	66.7	1	33.3	17	37.8
100%	9	11.0	2	12.5	1	7.1	0	0.0	0	0.0	1	2.2
In what state is the university you are attending?												
Arizona	1	1.2	1	6.3	2	14.3	1	33.3	0	0.0	1	2.2
Colorado	8	9.8	1	6.3	0	0.0	2	66.7	1	33.3	0	0.0
Idaho	28	34.1	2	12.5	12	85.7	0	0.0	0	0.0	18	40.0
Montana	6	7.3	0	0.0	0	0.0	0	0.0	0	0.0	5	11.1
Nevada	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	2.2
New Mexico	0	0.0	1	6.3	0	0.0	0	0.0	0	0.0	0	0.0
Utah	39	47.6	11	68.8	0	0.0	0	0.0	2	66.7	20	44.4
What geographical region are you planning to work in after completing your education?												
Northeast	1	1.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Midwest	2	2.4	0	0.0	0	0.0	2	66.7	0	0.0	2	4.4
South	4	4.9	0	0.0	0	0.0	0	0.0	0	0.0	3	6.7
Mountain West	70	85.4	15	93.8	14	100.0	1	33.3	3	100.0	31	68.9
Pacific West	2	2.4	0	0.0	0	0.0	0	0.0	0	0.0	7	15.6
Undecided	3	3.7	1	6.3	0	0.0	0	0.0	0	0.0	2	4.4
What setting do you plan to work in?												
Early intervention	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	6.7
Preschool	5	6.1	2	12.5	0	0.0	0	0.0	0	0.0	2	4.4

Kindergarten to 12 <sup>th</sup> grade	75	91.5	13	81.3	13	92.9	0	0.0	2	66.7	12	26.7
College/university	1	1.2	0	0.0	1	7.1	0	0.0	1	33.3	0	0.0
Hospital	0	0.0	0	0.0	0	0.0	1	33.3	0	0.0	9	20.0
Private practice	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	7	15.6
I don't know	1	1.2	1	6.3	0	0.0	2	66.7	0	0.0	12	26.7
What age group do you plan to work with? <i>Select all that apply.</i>												
	(n = 106)		(n = 24)		(n = 36)		(n = 10)		(n = 3)		(n = 97)	
Birth to 3 years	3	2.8	1	4.2	0	0.0	1	10.0	0	0.0	14	14.4
Preschool age	11	10.4	4	16.7	4	11.1	1	10.0	0	0.0	18	18.6
Elementary school age	56	52.8	8	33.3	11	30.6	2	20.0	0	0.0	26	26.8
Middle school age	13	12.3	4	16.7	12	33.3	1	10.0	0	0.0	10	10.3
Highschool age	22	20.8	3	12.5	7	19.4	2	20.0	1	33.3	5	5.2
Working age (18 to 64)	1	0.9	2	8.3	1	2.8	2	20.0	2	66.7	8	8.2
Elderly (65 years and up)	0	0.0	0	0.0	0	0.0	1	10.0	0	0.0	7	7.2
I don't know	0	0.0	2	8.3	1	2.8	0	0.0	0	0.0	9	9.3

The statistical relationships between demographics and program of study are listed in Table 2. As can be seen, comparisons between program of study with level of degree seeking, state of university attending, geographical region planning to work in, setting planning to work in, and age group planning to work with were statistically significant at the  $p < 0.001$ . Having or knowing someone with dyslexia and percentage of educational program completed were not statistically significant at the level of  $p < 0.05$ . Effect sizes ranged from weak to strong.

**Table 2**  
**Program of Study and Demographics: Chi Square ( $X^2$ ) and Cramer's V ( $\phi_c$ )**

Variables of Interest	$X^2$	$df$	$p$	$\phi_c$	Effect size
Do you or someone you know have dyslexia?	8.05	10	0.624	0.157	Weak
What level of degree are you seeking?	87.1	10	<0.001	0.517	Moderate
Approximately what percentage of your current program of study have you completed?	12.9	15	0.614	0.162	Weak
In what state is the university you are attending?	75.5	30	<0.001	0.304	Moderate
What geographical region are you planning to work in after completing your education?	52.7	25	<0.001	0.254	Moderate
What setting do you plan to work in?	125	30	<0.001	0.392	Moderate
What age group do you plan to work with? Select all that apply.	345	135	<0.001	0.651	Strong

## Aim #1. Program of Study and Knowledge

In Aim # 1, we sought to explore student knowledge of dyslexia. For presentation purposes, survey questions related to knowledge of dyslexia are divided into the categories of misconceptions, language and literacy, instruction, and other.

**Misconceptions.** As shown in Table 3, the majority of general education, special education, school psychology, and SLP students disagreed with the statement, “most poor

readers have dyslexia” (72.9%, 53.3%, 71.4%, and 65.8% respectively). Counseling students, on the other hand, equally disagreed and neither agreed/disagreed with this statement (50% in each instance), and educational administration students agreed with this statement (100%). There was a lot of variability in student response to the statement, “letter reversals are the major criterion in the identification of dyslexia.” General education students either agreed or did not know (41.2% and 36.8% respectively), special education students either agreed or disagreed (42.9% and 35.7%), school psychology students mostly disagreed (64.3%), counseling students either disagreed or did not know (50% in each instance), educational administration students disagreed (100%), and SLP students either agreed or disagreed (35.1% in each instance) with the statement about letter reversals. Regardless of program of study, the majority of respondents disagreed with the statements “dyslexia is usually outgrown” (77.8%), “children will likely not develop dyslexia if parents read to them” (75.2%), “medication can cure/help dyslexia” (57%), “having below average intelligence is a common characteristic of individuals with dyslexia” (79.9%), “dyslexia only affects the student's performance in reading” (not in math, social studies, etc.; 82.9%), and “all individuals with dyslexia exhibit similar characteristics” (57.4%). Further, regardless of program of study, the majority of respondents either disagreed or did not know how to respond to the statements “most individuals with dyslexia are naturally left-handed” (76.5%), “most pediatricians perform diagnostic evaluations to determine if a child has dyslexia” (75.2%), and “in most cases it is not possible to diagnose a child with dyslexia until the third grade” (72.3%). Finally, regardless of program of study, the majority of respondents either neither agreed/disagreed or did not know how to respond to the statement “more females than males have dyslexia” (67.8%).

**Table 3**  
**Program of Study by Knowledge (Misconceptions): Descriptive Statistics**

Program of Study												
	General Education		Special Education		School Psychology		Counseling		Educational Administration		Speech-Language Pathology	
	n	%	n	%	n	%	n	%	n	%	n	%
Dyslexia is usually outgrown.												
N=162	(n = 81)		(n = 16)		(n = 14)		(n= 3)		(n=3)		(n=45)	
Agree	4	4.9	1	6.3	0	0.0	0	0.0	0	0.0	0	0.0
Disagree	61	75.3	11	68.8	11	78.6	2	66.7	2	66.7	39	86.7
Neither	8	9.9	1	6.3	2	14.3	1	33.3	1	33.3	3	6.7
I don't know	8	9.9	3	18.8	1	7.1	0	0.0	0	0.0	3	6.7
Most individuals with dyslexia are naturally left-handed.												
N=162	(n = 81)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Agree	3	3.7	1	6.3	1	7.1	0	0.0	0	0.0	2	4.4
Disagree	24	29.6	7	43.8	9	64.3	0	0.0	0	0.0	15	33.3
Neither	19	23.5	4	25.0	1	7.1	0	0.0	0	0.0	7	15.6
I don't know	35	43.2	4	25.0	3	21.4	3	100.0	3	100.0	21	46.7
If parents read to their children, then their children will likely not develop dyslexia.												
N=149	(n = 76)		(n = 15)		(n = 14)		(n= 3)		(n=1)		(n=40)	
Agree	2	2.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Disagree	50	65.8	14	93.3	13	92.9	2	66.7	1	100.0	32	80.0
Neither	11	14.5	1	6.7	1	7.1	0	0.0	0	0.0	4	10.0
I don't know	13	17.1	0	0.0	0	0.0	1	33.3	0	0.0	4	10.0
Medication, when taken consistently, can cure/help dyslexia.												
N=149	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=40)	
Agree	5	6.6	0	0.0	0	0.0	0	0.0	0	0.0	1	2.5
Disagree	35	46.1	11	73.3	11	78.6	2	66.7	1	100.0	25	62.5
Neither	11	14.5	2	13.3	1	7.1	0	0.0	0	0.0	2	5.0
I don't know	25	32.9	2	13.3	2	14.3	1	33.3	0	0.0	12	30.0
More females than males have dyslexia.												
N=149	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=40)	
Agree	9	11.8	2	13.3	1	7.1	0	0.0	0	0.0	4	10.0
Disagree	11	14.5	4	26.7	5	35.7	0	0.0	1	100.0	11	27.5
Neither	20	26.3	7	46.7	4	28.6	0	0.0	0	0.0	7	17.5
I don't know	36	47.4	2	13.3	4	28.6	3	100.0	0	0.0	18	45.0
Having below average intelligence is a common characteristic of individuals with dyslexia.												
N=149	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=40)	
Agree	1	1.3	0	0.0	1	7.1	0	0.0	0	0.0	0	0.0
Disagree	55	72.4	13	86.7	12	85.7	3	100.0	1	100.0	35	87.5
Neither	7	9.2	2	13.3	1	7.1	0	0.0	0	0.0	1	2.5
I don't know	13	7.5	0	0.0	0	0.0	0	0.0	0	0.0	4	10.0
Most pediatricians perform diagnostic evaluations to determine if a child has dyslexia.												
N=149	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=40)	
Agree	19	25.0	1	6.7	1	7.1	0	0.0	0	0.0	2	5.0
Disagree	23	30.3	11	73.3	8	57.1	1	33.3	1	100.0	22	55.0
Neither	7	9.2	1	6.7	1	7.1	0	0.0	0	0.0	5	12.5
I don't know	27	35.5	2	13.3	4	28.6	2	66.7	0	0.0	11	27.5
In most cases it is not possible to diagnose a child with dyslexia until the third grade.												
N=148	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=39)	
Agree	14	18.4	3	20.0	5	35.7	0	0.0	0	0.0	2	5.1
Disagree	26	34.2	8	53.3	6	42.9	1	33.3	0	0.0	15	38.5
Neither	9	11.8	1	6.7	2	14.3	0	0.0	0	0.0	5	12.8
I don't know	27	35.5	3	20.0	1	7.1	2	66.7	1	100.0	17	43.6
In school, dyslexia only affects the student's performance in reading (not in math, social studies, etc.).												
N=140	(n = 70)		(n = 15)		(n = 14)		(n= 2)		(n=1)		(n=38)	
Agree	1	1.4	3	20.0	0	0.0	0	0.0	0	0.0	1	2.6
Disagree	58	82.9	10	66.7	14	100.0	2	100.0	1	100.0	31	81.6
Neither	4	5.7	2	13.3	0	0.0	0	0.0	0	0.0	2	5.3
I don't know	7	10.0	0	0.0	0	0.0	0	0.0	0	0.0	4	10.5
Most poor readers have dyslexia.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	0	0.0	3	20.0	1	7.1	0	0.0	1	100.0	1	2.6
Disagree	51	72.9	8	53.3	10	71.4	1	50.0	0	0.0	25	65.8
Neither	8	11.4	3	20.0	2	14.3	1	50.0	0	0.0	4	10.5
I don't know	11	15.7	1	6.7	1	7.1	0	0.0	0	0.0	8	21.1
All individuals with dyslexia exhibit similar characteristics.												
N=136	(n = 68)		(n = 14)		(n = 14)		(n = 2)		(n=1)		(n=37)	



Agree	7	10.3	3	21.4	2	14.3	0	0.0	0	0.0	6	16.2
Disagree	41	60.3	6	42.9	7	50.0	2	100.0	1	100.0	21	56.8
Neither	11	16.2	2	14.3	4	28.6	0	0.0	0	0.0	5	13.5
I don't know	9	13.2	3	21.4	1	7.1	0	0.0	0	0.0	5	13.5

Letter reversals are the major criterion in the identification of dyslexia.

N=136	(n = 68)		(n = 14)		(n = 14)		(n = 2)		(n=1)		(n=37)	
Agree	28	41.2	6	42.9	1	7.1	0	0.0	0	0.0	13	35.1
Disagree	7	10.3	5	35.7	9	64.3	1	50.0	1	100.0	13	35.1
Neither	8	11.8	2	14.3	2	14.3	0	0.0	0	0.0	3	8.1
I don't know	25	36.8	1	7.1	2	14.3	1	50.0	0	0.0	8	21.8

The statistical relationships between respondent program of study and knowledge related to common misconceptions of dyslexia are listed in Table 4. Statistically significant differences in levels of agreement between groups were present for the statements, “most poor readers have dyslexia” (moderate effect size), and “letter reversals are the major criterion in the identification of dyslexia” (moderate effect size) at a probability level of  $p < 0.05$ . All other comparisons generated statistically nonsignificant findings and weak to moderate effect sizes.

**Table 4**  
**Program of Study by Knowledge (Misconceptions): Chi Square ( $X^2$ ) and Cramer's V ( $\phi_c$ )**

Variables of Interest	$X^2$	$df$	$p$	$\phi_c$	Effect size
Dyslexia is usually outgrown.	11.1	15	0.749	0.151	Weak
Most individuals with dyslexia are naturally left-handed.	18.5	15	0.237	0.195	Weak
If parents read to their children, then their children will likely not develop dyslexia.	12.4	15	0.646	0.167	Weak
Medication, when taken consistently, can cure/help dyslexia.	12.8	15	0.617	0.169	Weak
More females than males have dyslexia.	19.9	15	0.177	0.211	Moderate
Having below average intelligence is a common characteristic of individuals with dyslexia.	14.1	15	0.516	0.178	Weak
Most pediatricians perform diagnostic evaluations to determine if a child has dyslexia.	22.6	15	0.092	0.225	Moderate
In most cases it is not possible to diagnose a child with dyslexia until the third grade.	16.9	15	0.322	0.195	Weak
In school, dyslexia only affects the student's performance in reading (not in math, social studies, etc.).	19.8	15	0.180	0.217	Moderate
Most poor readers have dyslexia.	41.0	15	<0.001	0.312	Moderate
All individuals with dyslexia exhibit similar characteristics.	7.02	15	0.957	0.131	Weak
Letter reversals are the major criterion in the identification of dyslexia.	30.6	15	0.010	0.274	Moderate

**Language and Literacy.** As shown in Table 5, the majority of general education, special education, school psychology, educational administration, and SLP students agreed with the statement, “phonemic awareness is the ability to recognize and manipulate speech sounds in words” (67.1%, 100%, 100%, 100%, and 92.1% respectively). Counseling students, on the other

hand, equally agreed and did not know how to respond to this statement (50% in each instance). Regardless of program of study, the majority of respondents agreed with the statements, “difficulty with phonological processing is a major contributing factor to dyslexia” (58.3%), “poor spelling is one symptom of dyslexia” (82.1%), “dyslexia is a learning disability that affects language processing” (58.1%), “decodable text has primarily phonetically regular patterns (words that can be sounded out)” (60.8%), “dyslexia often affects writing abilities” (87.1%), “individuals with dyslexia may comprehend a passage read to them but not a passage they read independently” (78.4), and “phonics is how letters correspond to speech sounds” (83.1%). Additionally, regardless of program of study, the majority of respondents either agreed or disagreed with the statements “phonological awareness is another term for phonics” (66.0%) and “dyslexia often affects speaking abilities” (69.3%). Further, regardless of program of study, the majority of respondents either agreed or did not know how to respond to the statements “individuals with dyslexia have trouble understanding the syntactic structure of language” (62.8%) and “children with dyslexia are more consistently impaired in phonemic awareness than any other abilities” (72.9%), and either agreed or neither agreed nor disagreed with the statement “individuals with dyslexia are usually extremely poor spellers” (70.5%). Finally, there was a lot of variability in response to the statement, “most students with dyslexia have difficulties with listening comprehension.” The majority of general education and special education students either agreed or disagreed (61.7% and 62.5% respectively), the majority of school psychology evenly split between agree, disagree, and neither agree nor disagree (33.3% each), educational administration students were evenly split between disagree, neither agree nor disagree, and did not know (33.3% each), and the majority of SLP students either disagreed or did not know how to respond to the statement (68.9%).

**Table 5**  
**Program of Study by Knowledge (Language and Literacy): Descriptive Statistics**

	Program of Study											
	General Education		Special Education		School Psychology		Counseling		Educational Administration		Speech-Language Pathology	
	n	%	n	%	n	%	n	%	n	%	n	%
Difficulty with phonological processing is a major contributing factor to dyslexia.												
N=163	(n = 82)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Agree	42	51.2	10	62.5	13	92.9	2	66.7	0	0.0	28	62.2
Disagree	5	6.1	1	6.3	0	0.0	0	0.0	0	0.0	2	4.4
Neither	11	13.4	1	6.3	0	0.0	0	0.0	0	0.0	4	8.9
I don't know	24	29.3	4	25.0	1	7.1	1	33.3	3	100.0	11	24.4
Most students with dyslexia have difficulties with listening comprehension.												
N=162	(n = 81)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Agree	18	22.2	5	31.3	1	7.1	1	33.3	0	0.0	8	17.8
Disagree	32	39.5	5	31.3	7	50.0	1	33.3	1	33.3	22	48.9
Neither	17	21.0	4	25.0	4	28.6	1	33.3	1	33.3	6	13.3
I don't know	14	17.3	2	12.5	2	14.3	0	0.0	1	33.3	9	20.0
Poor spelling is one symptom of dyslexia.												
N=162	(n = 81)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Agree	63	77.8	15	93.8	12	85.7	2	66.7	3	100.0	38	84.4
Disagree	4	4.9	0	0.0	0	0.0	0	0.0	0	0.0	2	4.4
Neither	9	11.1	0	0.0	1	7.1	0	0.0	0	0.0	3	6.7
I don't know	5	6.2	1	6.3	1	7.1	1	33.3	0	0.0	2	4.4
Phonological awareness is another term for phonics.												
N=162	(n = 81)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Agree	26	32.1	4	25.0	5	35.7	0	0.0	1	33.3	8	17.8
Disagree	24	29.6	8	50.0	6	42.9	1	33.3	1	33.3	23	51.1
Neither	8	9.9	1	6.3	2	14.3	0	0.0	0	0.0	5	11.1
I don't know	23	28.4	3	18.8	1	7.1	2	66.7	1	33.3	9	20.0
Dyslexia is a learning disability that affects language processing.												
N=148	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=39)	
Agree	42	55.3	12	80.0	9	64.3	0	0.0	0	0.0	23	59.0
Disagree	17	22.4	1	6.7	4	28.6	1	33.3	1	100.0	5	12.8
Neither	4	5.3	1	6.7	0	0.0	0	0.0	0	0.0	1	2.6
I don't know	13	17.1	1	6.7	1	7.1	2	66.7	0	0.0	10	25.6
Decodable text has primarily phonetically regular patterns (words that can be sounded out).												
N=148	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=39)	
Agree	45	59.2	11	73.3	13	92.9	1	33.3	1	100.0	19	48.7
Disagree	2	2.6	1	6.7	0	0.0	0	0.0	0	0.0	0	0.0
Neither	6	7.9	0	0.0	0	0.0	0	0.0	0	0.0	4	10.3
I don't know	23	30.3	3	20.0	1	7.1	2	66.7	0	0.0	16	41.0
Individuals with dyslexia have trouble understanding the syntactic structure of language.												
N=148	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=39)	
Agree	28	36.8	5	33.3	4	28.6	0	0.0	1	100.0	10	25.6
Disagree	13	17.1	3	20.0	2	14.3	0	0.0	0	0.0	9	23.1
Neither	11	14.5	4	26.7	5	35.7	1	33.3	0	0.0	7	17.9
I don't know	24	31.6	3	20.0	3	21.4	2	66.7	0	0.0	13	33.3
Dyslexia often affects writing abilities.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	63	90.0	13	86.7	14	100.0	2	100.0	1	100.0	29	76.3
Disagree	2	2.9	2	13.3	0	0.0	0	0.0	0	0.0	3	7.9
Neither	1	1.4	0	0.0	0	0.0	0	0.0	0	0.0	3	7.9
I don't know	4	5.7	0	0.0	0	0.0	0	0.0	0	0.0	3	7.9
Dyslexia often affects speaking abilities.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	15	21.4	5	33.3	2	14.3	0	0.0	0	0.0	8	21.1
Disagree	28	40.0	7	46.7	9	64.3	0	0.0	1	100.0	22	57.9
Neither	14	20.0	3	20.0	3	21.4	1	50.0	0	0.0	6	15.8
I don't know	13	18.6	0	0.0	0	0.0	1	50.0	0	0.0	2	5.3
Phonemic awareness is the ability to recognize and manipulate speech sounds in words.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	47	67.1	15	100.0	14	100.0	1	50.0	1	100.0	35	92.1
Disagree	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	2.6
Neither	3	4.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
I don't know	20	28.6	0	0.0	0	0.0	1	50.0	0	0.0	2	5.3
Children with dyslexia are more consistently impaired in phonemic awareness than any other abilities.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	

Agree	17	24.3	6	40.0	10	71.4	1	50.0	0	0.0	12	31.6
Disagree	9	12.9	3	20.0	0	0.0	0	0.0	0	0.0	4	10.5
Neither	11	15.7	2	13.3	2	14.3	0	0.0	0	0.0	7	18.4
I don't know	33	47.1	4	26.7	2	14.3	1	50.0	1	100.0	15	39.5
Individuals with dyslexia are usually extremely poor spellers.												
N=139	(n = 69)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	21	30.4	8	53.3	8	57.1	0	0.0	1	100.0	21	55.3
Disagree	10	14.5	2	13.3	1	7.1	0	0.0	0	0.0	1	2.6
Neither	22	31.9	4	26.7	4	28.6	1	50.0	0	0.0	8	21.1
I don't know	16	23.2	1	6.7	1	7.1	1	50.0	0	0.0	8	21.1
Individuals with dyslexia may comprehend a passage read to them but not a passage they read independently.												
N=139	(n = 69)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	51	73.9	12	80.0	12	85.7	2	100.0	1	100.0	31	81.6
Disagree	0	0.0	1	6.7	0	0.0	0	0.0	0	0.0	0	0.0
Neither	5	7.2	2	13.3	1	7.1	0	0.0	0	0.0	4	10.5
I don't know	13	18.8	0	0.0	1	7.1	0	0.0	0	0.0	3	7.9
Phonics is how letters correspond to speech sounds.												
N=136	(n = 68)		(n = 14)		(n = 14)		(n = 2)		(n=1)		(n=37)	
Agree	58	85.3	13	92.9	14	100.0	1	50.0	1	100.0	26	70.3
Disagree	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	8.1
Neither	1	1.5	0	0.0	0	0.0	0	0.0	0	0.0	2	5.4
I don't know	9	13.2	1	7.1	0	0.0	1	50.0	0	0.0	6	16.2

The statistical relationships between respondent program of study and knowledge related to language and literacy of dyslexia are listed in Table 6. Statistically significant differences in levels of agreement between groups were present for the statement, “phonemic awareness is the ability to recognize and manipulate speech sounds in words” (moderate effect size) at a probability level of  $p < 0.05$ . All other comparisons generated statistically nonsignificant findings and weak to moderate effect sizes.

**Table 6**  
**Program of Study by Knowledge (Language and Literacy): Chi Square ( $X^2$ ) and Cramer's V ( $\phi_c$ )**

Variables of Interest	$X^2$	$df$	$p$	$\phi_c$	Effect size
Difficulty with phonological processing is a major contributing factor to dyslexia.	18.4	15	0.241	0.194	Weak
Most students with dyslexia have difficulties with listening comprehension.	8.34	15	0.909	0.131	Weak
Poor spelling is one symptom of dyslexia.	9.29	15	0.862	0.138	Weak
Phonological awareness is another term for phonics.	13.9	15	0.534	0.169	Weak
Dyslexia is a learning disability that affects language processing.	19.2	15	0.205	0.208	Moderate
Decodable text has primarily phonetically regular patterns (words that can be sounded out).	16.4	15	0.357	0.192	Weak
Individuals with dyslexia have trouble understanding the syntactic structure of language.	11.4	15	0.721	0.160	Weak
Dyslexia often affects writing abilities.	12.2	15	0.663	0.171	Weak
Dyslexia often affects speaking abilities.	17.9	15	0.269	0.206	Moderate
Phonemic awareness is the ability to recognize and manipulate speech sounds in words.	25.0	15	0.050	0.244	Moderate
Children with dyslexia are more consistently impaired in phonemic awareness than any other abilities.	17.3	15	0.303	0.203	Moderate
Individuals with dyslexia are usually extremely poor spellers.	16.3	15	0.362	0.198	Weak
Individuals with dyslexia may comprehend a passage read to them but not a passage they read independently.	15.3	15	0.429	0.192	Weak

Phonics is how letters correspond to speech sounds.	17.2	15	0.308	0.205	Moderate
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**Instruction.** As shown in Table 7, regardless of program of study, the majority of respondents disagreed with the statement, “poor instruction is one cause of dyslexia” (79.0%). The majority of respondents, regardless of program of study, agreed with the statements, “multisensory instruction is beneficial for students with dyslexia to learn” (71.4%), “students with dyslexia need structured, sequential, direct instruction in basic academic/reading skills and learning strategies” (66.4%), “reading instruction should include lessons in all of the following: phonemic awareness, phonics, reading fluency, vocabulary, and reading comprehension” (87.1%), “spelling practice is important for reading improvement” (52.2%), and “there are methods of reading instruction that are most effective for all children (regardless of whether or not they have dyslexia)” (52.2%). Additionally, regardless of program of study, the majority of respondents either agreed or disagreed with the statement, “students with dyslexia need instruction primarily in reading comprehension strategies” (62.3%), agreed or did not know how to respond to the statements, “students with dyslexia learn to read most quickly through the use of decodable, or predictable, text” (81.8%) and “colored lenses or overlays help improve reading in people with dyslexia” (68.9%), disagreed or did not know how to respond to the statement, “after 3 to 5 hours of instruction, most educators can work competently with students who have dyslexia” (59.6%), and either neither agreed nor disagreed or did not know how to respond to the statement, “students with dyslexia learn to read most quickly through the use of authentic text” (66.2%).

**Table 7**  
**Program of Study by Knowledge (Instruction): Descriptive Statistics**

	Program of Study											
	General Education		Special Education		School Psychology		Counseling		Educational Administration		Speech-Language Pathology	
	n	%	n	%	n	%	n	%	n	%	n	%
Poor instruction is one cause of dyslexia.												
N=162	(n = 81)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Agree	3	3.7	2	12.5	0	0.0	0	0.0	1	33.3	2	4.4
Disagree	65	80.2	10	62.5	13	92.9	1	33.3	2	66.7	37	82.2
Neither	9	11.1	3	18.8	0	0.0	1	33.3	0	0.0	3	6.7
I don't know	4	4.9	1	6.3	1	7.1	1	33.3	0	0.0	3	6.7
Students with dyslexia need instruction primarily in reading comprehension strategies.												
N=162	(n = 81)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Agree	30	37.0	3	18.8	2	14.3	1	33.3	1	33.3	15	33.3
Disagree	20	24.7	6	37.5	9	64.3	0	0.0	0	0.0	14	31.1
Neither	17	21.0	4	25.0	3	21.4	0	0.0	0	0.0	6	13.3
I don't know	14	17.3	3	18.8	0	0.0	2	66.7	2	66.7	10	22.2
Students with dyslexia learn to read most quickly through the use of decodable, or predictable, text.												
N=148	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=39)	
Agree	33	43.4	6	40.0	6	42.9	1	33.3	0	0.0	18	46.2
Disagree	5	6.6	2	13.3	0	0.0	0	0.0	0	0.0	1	2.6
Neither	6	7.9	4	26.7	4	28.6	0	0.0	0	0.0	5	12.8
I don't know	32	42.1	3	20.0	4	28.6	2	66.7	1	100.0	15	38.5
Students with dyslexia learn to read most quickly through the use of authentic text.												
N=148	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=39)	
Agree	19	25.0	2	13.3	1	7.1	0	0.0	0	0.0	4	10.3
Disagree	10	13.2	4	26.7	3	21.4	0	0.0	0	0.0	7	17.9
Neither	15	19.7	5	33.3	4	28.6	0	0.0	0	0.0	9	23.1
I don't know	32	42.1	4	26.7	6	42.9	3	100.0	1	100.0	19	48.7
Colored lenses or overlays help improve reading in people with dyslexia.												
N=148	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=39)	
Agree	15	19.7	7	46.7	7	50.0	1	33.3	0	0.0	8	20.5
Disagree	11	14.5	2	13.3	2	14.3	0	0.0	0	0.0	10	25.6
Neither	12	15.8	2	13.3	3	21.4	0	0.0	0	0.0	4	10.3
I don't know	38	50.0	4	26.7	2	14.3	2	66.7	1	100.0	17	43.6
Multisensory instruction is beneficial for students with dyslexia to learn.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	50	71.4	10	66.7	12	85.7	1	50.0	1	100.0	26	68.4
Disagree	1	1.4	0	0.0	0	0.0	0	0.0	0	0.0	2	5.3
Neither	6	8.6	2	13.3	0	0.0	0	0.0	0	0.0	2	5.3
I don't know	13	18.6	3	20.0	2	14.3	1	50.0	0	0.0	8	21.1
Students with dyslexia need structured, sequential, direct instruction in basic academic/reading skills and learning strategies.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	43	61.4	14	93.3	11	78.6	1	50.0	1	100.0	23	60.5
Disagree	5	7.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Neither	6	8.6	1	6.7	1	7.1	0	0.0	0	0.0	4	10.5
I don't know	16	22.9	0	0.0	2	14.3	1	50.0	0	0.0	11	28.9
Reading instruction should include lessons in all of the following: phonemic awareness, phonics, reading fluency, vocabulary, and reading comprehension.												
N=139	(n = 69)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	55	79.7	15	100.0	13	92.9	2	100.0	1	100.0	35	92.1
Disagree	0	0.0	0	0.0	1	7.1	0	0.0	0	0.0	0	0.0
Neither	3	4.3	0	0.0	0	0.0	0	0.0	0	0.0	2	5.3
I don't know	11	15.9	0	0.0	0	0.0	0	0.0	0	0.0	1	2.6
Spelling practice is important for reading improvement.												
N=136	(n = 68)		(n = 14)		(n = 14)		(n = 2)		(n=1)		(n=37)	
Agree	38	55.9	8	57.1	10	71.4	0	0.0	1	100.0	14	37.8
Disagree	6	8.8	3	21.4	2	14.3	0	0.0	0	0.0	4	10.8
Neither	12	17.6	2	14.3	1	7.1	0	0.0	0	0.0	10	27.0
I don't know	16	17.6	1	7.1	1	7.1	2	100.0	0	0.0	9	24.3
After 3 to 5 hours of instruction, most educators can work competently with students who have dyslexia.												
N=136	(n = 68)		(n = 14)		(n = 14)		(n = 2)		(n=1)		(n=37)	
Agree	14	20.6	2	14.3	5	35.7	0	0.0	0	0.0	2	5.4
Disagree	17	25.0	6	42.9	1	7.1	0	0.0	1	100.0	12	32.4
Neither	14	20.6	3	21.4	6	42.9	0	0.0	0	0.0	9	24.3
I don't know	23	33.8	3	21.4	2	14.3	2	100.0	0	0.0	14	37.8

	There are methods of reading instruction that are most effective for all children, regardless of whether or not they have dyslexia.											
N=136	(n = 68)		(n = 14)		(n = 14)		(n = 2)		(n=1)		(n=37)	
Agree	36	52.9	10	71.4	11	78.6	0	0.0	1	100.0	13	35.1
Disagree	12	17.6	0	0.0	1	7.1	0	0.0	0	0.0	5	13.5
Neither	8	11.8	1	7.1	1	7.1	0	0.0	0	0.0	6	16.2
I don't know	12	17.6	3	21.4	1	7.1	2	100.0	0	0.0	13	35.1

The statistical relationships between respondent program of study and knowledge related to instruction of dyslexia are listed in Table 8. No statistically significant differences in levels of agreement between groups were present at a probability level of  $p < 0.05$ . All comparisons generated statistically nonsignificant findings and weak to moderate effect sizes.

**Table 8**  
**Program of Study by Knowledge (Instruction): Chi Square ( $X^2$ ) and Cramer's V ( $\phi_c$ )**

Variables of Interest	$X^2$	$df$	$p$	$\phi_c$	Effect size
Students with dyslexia need instruction primarily in reading comprehension strategies.	23.8	15	0.069	0.221	Moderate
Poor instruction is one cause of dyslexia.	18.9	15	0.218	0.197	Weak
Students with dyslexia learn to read most quickly through the use of decodable, or predictable, text.	14.5	15	0.484	0.181	Weak
Students with dyslexia learn to read most quickly through the use of authentic text.	14.0	15	0.522	0.178	Weak
Colored lenses or overlays help improve reading in people with dyslexia.	17.7	15	0.279	0.200	Weak
Multisensory instruction is beneficial for students with dyslexia to learn.	7.16	15	0.953	0.131	Weak
Students with dyslexia need structured, sequential, direct instruction in basic academic/reading skills and learning strategies.	13.8	15	0.543	0.181	Weak
Reading instruction should include lessons in all of the following: phonemic awareness, phonics, reading fluency, vocabulary, and reading comprehension.	20.0	15	0.170	0.219	Moderate
Spelling practice is important for reading improvement.	19.6	15	0.189	0.219	Moderate
After three to five hours of instruction, most educators can work competently with students who have dyslexia.	21.9	15	0.110	0.232	Moderate
There are methods of reading instruction that are most effective for all children, regardless of whether or not they have dyslexia.	21.8	15	0.114	0.231	Moderate

**Other.** As shown in Table 9, the majority of general education and SLP students either agreed or did not know how to respond to the statement, “dyslexia is hereditary” (88.2% and 90.0% respectively). Conversely, the majority of special education and school psychology students either agreed or neither agreed nor disagreed with this statement (80.0% and 71.4% respectively), and the counseling and educational administration students all agreed (100% each). In response to the statement, “less than 5% of the population has dyslexia”, the majority of general education, school psychology, and SLP students either disagreed or did not know how to

respond (75.0%, 85.7%, and 67.5% respectively), while the majority of special education students either disagreed or neither agreed nor disagreed (66.7%). All counseling students did not know how to respond (100%), and all educational administration students agreed (100%). In response to the statement, “people with dyslexia often excel in science, music, art, and/or technical fields” the majority of general education and school psychology students either agreed or neither agreed nor disagreed (70.0% and 78.6% respectively). The majority of special education students, on the other hand, either agreed or did not know how to respond (80.0%), counseling students neither agreed nor disagreed or did not know how to respond (100%), educational administration students disagreed (100%), and SLP students agreed, neither agreed nor disagreed, or did not know how to respond (100%). Regardless of program of study, the majority of respondents agreed with the statements, “dyslexia is neurobiological in origin” (58.9%), “an individual can be diagnosed with both ADHD and dyslexia” (89.9%), “dyslexia often causes social, emotional, and/or family problems” (55.7%), “the brains of individuals with dyslexia are different from those of people without dyslexia” (52.1%), and “some students with mild dyslexia may not experience problems due to dyslexia until middle school or later” (50.0%).

**Table 9**  
**Program of Study by Knowledge (Other): Descriptive Statistics**

Program of Study												
	General Education		Special Education		School Psychology		Counseling		Educational Administration		Speech-Language Pathology	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Dyslexia is neurobiological in origin.												
N=163	(n = 82)		(n = 16)		(n = 14)		(n= 3)		(n=3)		(n=45)	
Agree	44	53.7	8	50.0	10	71.4	2	66.7	1	33.3	31	68.9
Disagree	1	1.2	1	6.3	1	7.1	0	0.0	0	0.0	0	0.0
Neither	8	9.8	4	25.0	0	0.0	0	0.0	0	0.0	3	6.7
I don't know	29	35.4	3	18.8	3	21.4	1	33.3	2	66.7	11	24.4
Dyslexia is hereditary.												
N=149	(n = 76)		(n = 15)		(n = 14)		(n= 3)		(n=1)		(n=40)	
Agree	39	51.3	8	53.3	8	57.1	3	100.0	1	100.0	22	55.0
Disagree	2	2.6	1	6.7	3	21.4	0	0.0	0	0.0	0	0.0
Neither	7	9.2	4	26.7	2	14.3	0	0.0	0	0.0	4	10.0
I don't know	28	36.8	2	13.3	1	7.1	0	0.0	0	0.0	14	35.0
Less than 5% of the population has dyslexia.												
N=149	(n = 76)		(n = 15)		(n = 14)		(n= 3)		(n=1)		(n=40)	
Agree	8	10.5	2	13.3	1	7.1	0	0.0	1	100.0	6	15.0



Disagree	19	25.0	5	33.3	9	64.3	0	0.0	0	0.0	10	25.0
Neither	11	14.5	5	33.3	1	7.1	0	0.0	0	0.0	7	17.5
I don't know	38	50.0	3	20.0	3	21.4	3	100.0	0	0.0	17	42.5
An individual can be diagnosed with both ADHD and dyslexia.												
N=149	(n = 76)		(n = 15)		(n = 14)		(n = 3)		(n=1)		(n=40)	
Agree	65	85.5	15	100.0	13	92.9	3	100.0	1	100.0	37	92.5
Disagree	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Neither	2	2.6	0	0.0	1	7.1	0	0.0	0	0.0	0	0.0
I don't know	9	11.8	0	0.0	0	0.0	0	0.0	0	0.0	3	7.5
People with dyslexia often excel in science, music, art, and/or technical fields.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	24	34.3	8	53.3	6	42.9	0	0.0	0	0.0	14	36.8
Disagree	3	4.3	0	0.0	1	7.1	0	0.0	1	100.0	0	0.0
Neither	25	35.7	3	20.0	5	35.7	1	50.0	0	0.0	12	31.6
I don't know	18	25.7	4	26.7	2	14.3	1	50.0	0	0.0	12	31.6
Dyslexia often causes social, emotional, and/or family problems.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	33	47.1	8	53.3	8	57.1	1	50.0	1	100.0	27	71.1
Disagree	10	14.3	2	13.3	0	0.0	0	0.0	0	0.0	0	0.0
Neither	12	17.1	3	20.0	5	35.7	1	50.0	0	0.0	4	10.5
I don't know	15	21.4	2	13.3	1	7.1	0	0.0	0	0.0	7	18.4
The brains of individuals with dyslexia are different from those of people without dyslexia.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	34	48.6	9	60.0	9	64.3	0	0.0	0	0.0	21	55.3
Disagree	8	11.4	2	13.3	0	0.0	1	50.0	0	0.0	1	2.6
Neither	11	15.7	2	13.3	1	7.1	0	0.0	0	0.0	4	10.5
I don't know	17	24.3	2	13.3	4	28.6	1	50.0	1	100.0	12	31.6
Some students with mild dyslexia may not experience problems due to dyslexia until middle school or later.												
N=140	(n = 70)		(n = 15)		(n = 14)		(n = 2)		(n=1)		(n=38)	
Agree	32	45.7	7	46.7	11	78.6	0	0.0	1	100.0	19	50.0
Disagree	5	7.1	2	13.3	1	7.1	0	0.0	0	0.0	5	13.2
Neither	11	15.7	3	20.0	0	0.0	2	100.0	0	0.0	3	7.9
I don't know	22	31.4	3	20.0	2	14.3	0	0.0	0	0.0	11	28.9

The statistical relationships between respondent program of study and knowledge related to other information about dyslexia are listed in Table 10. Statistically significant differences in levels of agreement between groups were present for the statements, “dyslexia is hereditary”, “less than 5% of the population has dyslexia”, and “people with dyslexia often excel in science, music, art, and/or technical fields” at a probability level of  $p < 0.05$  with moderate effect sizes. All other comparisons generated statistically nonsignificant findings and weak to moderate effect sizes.

**Table 10**  
**Program of Study by Knowledge (Other): Chi Square ( $\chi^2$ ) and Cramer's V ( $\phi_c$ )**

Variables of Interest	$\chi^2$	$df$	$p$	$\phi_c$	Effect size
Dyslexia is neurobiological in origin.	17.2	15	0.309	0.187	Weak
Dyslexia is hereditary.	25.1	15	0.048	0.237	Moderate
Less than 5% of the population has dyslexia.	26.7	15	0.032	0.244	Moderate
An individual can be diagnosed with both ADHD and dyslexia.	7.61	10	0.667	0.160	Weak
People with dyslexia often excel in science, music, art, and/or technical fields.	34.4	15	0.003	0.286	Moderate
Dyslexia often causes social, emotional, and/or family problems.	17.8	15	0.271	0.206	Moderate

The brains of individuals with dyslexia are different from those of people without dyslexia.	15.6	15	0.408	0.193	Weak
Some students with mild dyslexia may not experience problems due to dyslexia until middle school or later.	22.8	15	0.089	0.233	Moderate

## **Aim #2. Program of Study and Attitudes**

In Aim # 2, we sought to explore student attitudes toward dyslexia. As shown in Table 11, when presented with the statement, “in your opinion, of the options listed, which school practitioner has the greatest responsibility towards supporting students with dyslexia?”, the majority of general education, special education, and school psychology students chose general education teacher and special education teacher (70.7%, 87.5%, and 85.7% respectively). Counseling students, however, chose general education teacher and SLP (100%), educational administration students chose special education teacher and counselor (100%), and SLP students chose special education teacher or SLP (75.6%). Regardless of program of study, the majority of respondents agreed with the statements, “as an educator in your chosen profession, it will be your responsibility to assist in providing appropriate services (e.g., diagnosis, accommodations, intervention, etc.) for individuals with dyslexia” (83.4%) and “an individual can have dyslexia and be gifted” (96.3%). Additionally, the majority of respondents, regardless of program of study, disagreed with the statements, “giving students with dyslexia accommodations such as extra time on tests, shorter spelling lists, special seating, and so forth is unfair to other students” (89.7%), “dyslexia is not a disorder” (71.9%), “parents whose children are just immature want to say they have dyslexia” (60.7%), “individuals with dyslexia have less potential to succeed academically than their peers” (84.6%), “dyslexia is just an excuse to be lazy” (93.4%), and “children with dyslexia often fail to succeed as adults” (82.4%). Finally, regardless of program of study, the majority of respondents either disagreed or neither agreed nor disagreed with the statements, “the label of dyslexia could be used as an excuse for a child to not try in school”



N=136	(n = 68)		(n = 14)		(n = 14)		(n= 2)		(n=1)		(n=37)	
Agree	10	14.7	1	7.1	2	14.3	0	0.0	0	0.0	1	2.7
Disagree	31	45.6	6	42.9	6	42.9	1	50.0	1	100.0	15	40.5
Neither	13	19.1	6	42.9	4	28.6	1	50.0	0	0.0	8	21.6
I don't know	14	20.6	1	7.1	2	14.3	0	0.0	0	0.0	13	35.1
Dyslexia is just an excuse to be lazy.												
N=136	(n = 68)		(n = 14)		(n = 14)		(n= 2)		(n=1)		(n=37)	
Agree	1	1.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Disagree	61	89.7	14	100.0	13	92.9	2	100.0	1	100.0	36	97.3
Neither	2	2.9	0	0.0	1	7.1	0	0.0	0	0.0	1	2.7
I don't know	4	5.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Children with dyslexia often fail to succeed as adults.												
N=136	(n = 68)		(n = 14)		(n = 14)		(n= 2)		(n=1)		(n=37)	
Agree	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	2.7
Disagree	57	83.8	11	78.6	12	85.7	2	100.0	1	100.0	29	78.4
Neither	3	4.4	2	14.3	2	14.3	0	0.0	0	0.0	2	5.4
I don't know	8	11.8	1	7.1	0	0.0	0	0.0	0	0.0	5	13.5

The statistical relationships between respondent program of study and attitudes toward dyslexia are listed in Table 12. Statistically significant differences in levels of agreement between groups were present for the statement, “in your opinion, of the options listed, which school practitioner has the greatest responsibility towards supporting students with dyslexia?” (moderate effect size) at a probability level of  $p < 0.05$ . All other comparisons generated statistically nonsignificant findings and weak to moderate effect sizes.

**Table 12**  
**Program of Study by Attitudes: Chi Square ( $X^2$ ) and Cramer's V ( $\phi_c$ )**

Variables of Interest	$X^2$	$df$	$p$	$\phi_c$	Effect size
As an educator in your chosen profession, it will be your responsibility to assist in providing appropriate services (e.g., diagnosis, accommodations, intervention, etc.) for individuals with dyslexia.	21.2	15	0.131	0.208	Moderate
In your opinion, of the options listed, which school practitioner has the greatest responsibility towards supporting students with dyslexia?	93.3	35	<0.001	0.338	Moderate
An individual can have dyslexia and be gifted.	12.5	15	0.642	0.160	Weak
Giving students with dyslexia accommodations such as extra time on tests, shorter spelling lists, special seating, and so forth is unfair to other students.	4.77	15	0.994	0.108	Weak
Dyslexia is not a disorder.	15.8	15	0.395	0.198	Weak
Parents whose children are just immature want to say they have dyslexia.	15.1	15	0.447	0.193	Weak
Individuals with dyslexia have less potential to succeed academically than their peers.	5.89	15	0.981	0.120	Weak
The label of dyslexia could be used as an excuse for a child to not try in school.	16.8	15	0.332	0.203	Moderate
Parents whose children have low academic ability want to say they have dyslexia.	14.1	15	0.517	0.186	Weak
Dyslexia is just an excuse to be lazy.	6.59	15	0.968	0.127	Weak
Children with dyslexia often fail to succeed as adults.	8.59	15	0.898	0.145	Weak

### **Aim #3. Program of Study and Preparedness**

In Aim # 3, we sought to explore student preparedness to work with individuals who have dyslexia. As shown in Table 13, the majority of special education, school psychology, and counseling students felt prepared when presented with the statement “how prepared do you feel you are to work with students with dyslexia?” (53.3%, 57.1%, and 66.7% respectively).

Conversely, most educational administration and SLP students felt unprepared (66.7% and 57.8% respectively), and general education students felt either unprepared or neither prepared nor unprepared (73.2%). There was a lot of variability in response to the statement, “most school psychologist are knowledgeable about dyslexia.” The majority of school psychology and educational administration students agreed with the statement (85.7% and 66.7% respectively), special education students neither agreed nor disagreed (56.3%), general education students either agreed or neither agreed nor disagreed (64.6%), SLP students either agreed or did not know who to respond (55.6%), and counseling students were split evenly between agree, disagree, and neither agree nor disagree (100%). There was also a lot of variability in response to the statement, “most special education teachers receive intensive training to work with students with dyslexia.” The majority of general education and SLP students either disagreed or did not know how to respond (73.5% and 94.6% respectively), special education students either agreed or disagreed (78.6%), school psychology and educational administration students disagreed (50% and 100% respectively), and counseling students did not know how to respond (100%).

Regardless of program of study, the majority of respondents indicated they had not taken any courses covering dyslexia-related content (54.3%). Respondents were fairly evenly split in response to the question, “have you had any experience working with someone who has dyslexia” (47.2% responded “yes” and 48.5% responded “no”; 95.7% total). The majority of

respondents, regardless of program of study, either agreed or disagreed with the statement, “most teachers are knowledgeable about dyslexia” (72.4%), and disagreed with the statement, “most regular education teachers receive intensive training to work with students with dyslexia” (66.2%).

**Table 13**  
**Program of Study by Preparedness: Descriptive Statistics**

Program of Study												
	General Education		Special Education		School Psychology		Counseling		Educational Administration		Speech-Language Pathology	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Have you taken any courses covering dyslexia-related content?												
N=162	(n = 82)		(n = 15)		(n = 14)		(n= 3)		(n=3)		(n=45)	
Yes	33	40.2	7	46.7	7	50.0	0	0.0	1	33.3	24	53.3
No	47	57.3	8	53.3	7	50.0	3	100.0	2	66.7	21	46.7
I don't know	2	2.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Have you had any experience working with someone who has dyslexia?												
N=163	(n = 82)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Yes	38	46.3	10	62.5	10	71.4	3	100.0	2	66.7	14	31.1
No	41	50.0	5	31.3	3	21.4	0	0.0	1	33.3	29	64.4
I don't know	3	3.7	1	6.3	1	7.1	0	0.0	0	0.0	2	4.4
How prepared do you feel you are to work with students with dyslexia?												
N=162	(n = 82)		(n = 15)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Prepared	19	23.2	8	53.3	8	57.1	2	66.7	1	33.3	10	22.2
Unprepared	28	34.1	4	26.7	5	35.7	1	33.3	2	66.7	26	57.8
Neither	32	39.0	3	20.0	1	7.1	0	0.0	0	0.0	9	20.0
I don't know	3	3.7	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Most school psychologist are knowledgeable about dyslexia.												
N=163	(n = 82)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Agree	30	36.6	3	18.8	12	85.7	1	33.3	2	66.7	12	26.7
Disagree	8	9.8	1	6.3	0	0.0	1	33.3	0	0.0	10	22.2
Neither	23	28.0	9	56.3	2	14.3	1	33.3	1	33.3	10	22.2
I don't know	21	25.6	3	18.8	0	0.0	0	0.0	0	0.0	13	28.9
Most teachers are knowledgeable about dyslexia.												
N=163	(n = 82)		(n = 16)		(n = 14)		(n = 3)		(n=3)		(n=45)	
Agree	35	42.7	2	12.5	4	28.6	1	33.3	0	0.0	19	42.2
Disagree	31	37.8	6	37.5	4	28.6	2	66.7	1	33.3	13	28.9
Neither	13	15.9	5	31.3	6	42.9	0	0.0	1	33.3	6	13.3
I don't know	3	3.7	3	18.8	0	0.0	0	0.0	1	33.3	7	15.6
Most special education teachers receive intensive training to work with students with dyslexia.												
N=136	(n = 68)		(n = 14)		(n = 14)		(n = 2)		(n=1)		(n=37)	
Agree	12	17.6	6	42.9	3	21.4	0	0.0	0	0.0	1	2.7
Disagree	18	26.5	5	35.7	7	50.0	0	0.0	1	100.0	18	48.6
Neither	6	8.8	1	7.1	1	7.1	0	0.0	0	0.0	1	2.7
I don't know	32	47.1	2	14.3	3	21.4	2	100.0	0	0.0	17	45.9
Most regular education teachers receive intensive training to work with students with dyslexia.												
N=136	(n = 68)		(n = 14)		(n = 14)		(n = 2)		(n=1)		(n=37)	
Agree	5	7.4	1	7.1	0	0.0	0	0.0	0	0.0	0	0.0
Disagree	45	66.2	9	64.3	10	71.4	0	0.0	1	100.0	25	67.6
Neither	3	4.4	2	14.3	1	7.1	0	0.0	0	0.0	0	0.0
I don't know	15	22.1	2	14.3	3	21.4	2	100.0	0	0.0	12	32.4

The statistical relationships between respondent program of study and preparedness to work with individuals who have dyslexia are listed in Table 14. Statistically significant differences in levels of agreement between groups were present for the statements, “how

prepared do you feel you are to work with students with dyslexia?”, “most school psychologist are knowledgeable about dyslexia”, and “most special education teachers receive intensive training to work with students with dyslexia” at a probability level of  $p < 0.05$  with moderate effect sizes. All other comparisons generated statistically nonsignificant findings with weak to moderate effect sizes.

**Table 14**  
**Program of Study by Preparedness: Chi Square ( $X^2$ ) and Cramer's V ( $\phi_c$ )**

Variables of Interest	$X^2$	$df$	$p$	$\phi_c$	Effect size
Have you taken any courses covering dyslexia-related content?	6.52	10	0.770	0.142	Weak
Have you had any experience working with someone who has dyslexia?	14.9	10	0.137	0.214	Moderate
How prepared do you feel you are to work with students with dyslexia?	27.0	15	0.029	0.236	Moderate
Most school psychologist are knowledgeable about dyslexia.	32.0	15	0.006	0.256	Moderate
Most teachers are knowledgeable about dyslexia.	24.6	15	0.055	0.224	Moderate
Most special education teachers receive intensive training to work with students with dyslexia.	25.3	15	0.046	0.249	Moderate
Most regular education teachers receive intensive training to work with students with dyslexia.	17.1	15	0.311	0.205	Moderate

## Discussion

The purpose of this project was to assess education programs in the mountain west region in order to better understand knowledge and attitudes about dyslexia and preparedness to work with individuals who have dyslexia among pre-professionals in relevant fields. Specifically, we explored the relationship between program of study (general education, special education, school psychology, counseling, educational administration, and SLP) and knowledge of dyslexia, attitudes towards dyslexia, and perceived preparedness to work with individuals who have dyslexia.

### Characteristics of Student Respondents

#### Program of Study and Demographics

Respondents varied significantly in their level of degree sought, with the majority of general education and special education students seeking undergraduate degrees, while the

majority of school psychology, counseling, educational administration, and SLP students seeking graduate degrees. This is consistent with the fact that the entry level degree for positions as general and special education teachers is an undergraduate degree, while the other programs lead into professions requiring a graduate degree. Respondents also varied in the state in which they were attending a university. The majority of general education, special education, educational administration, and SLP student respondents were studying at universities in Utah, while the majority of school psychology student respondents were studying in Idaho and counseling student respondents were studying in Colorado. Among other undetermined reasons, this could in part have been due to Colorado and Utah having more universities than the other states, and the survey therefore being distributed to more professors in those states. Additionally, the authors are based in Idaho, and may have therefore unintentionally influenced professors at Idaho State University to distribute the survey to their students. The majority of all respondents (82.2%) were planning to work in the mountain west region after graduating, as was expected based on research by Shotwell (2022). As one might expect, the majority of general education, special education, school psychology, and educational administration student respondents indicated they planned to work in a kindergarten through 12<sup>th</sup> grade setting upon graduation. As counselors and SLPs can work in a wider variety of settings, it makes sense that counseling student respondents mostly did not know what setting they would work in and SLP student respondents equally did not know or planned to work in kindergarten through 12<sup>th</sup> grade. This mostly aligned with the age group respondents intended to work with upon graduation. The majority of all respondents had completed less than half of their program of study (53.37%), which could be a contributing factor to lack of knowledge and negative attitudes toward dyslexia. Finally, 59.5% of respondents indicated that they either had or knew someone who had



dyslexia. However, 33.7% said they did not have or did not know anyone with dyslexia. As 5 to 20% of individuals have dyslexia (Wagner et al., 2020), it is unlikely that anyone actually does not know someone who has dyslexia. This lack of personal connection to dyslexia could be another potential factor contributing to lack of knowledge and negative attitudes towards dyslexia.

### **Aim #1. Program of Study and Knowledge**

Aim #1 was to explore student knowledge of dyslexia in relation to student program of study. To streamline exploration and discussion of results, the knowledge variable was broken into the categories of misconceptions, language and literacy, instruction, and other.

**Misconceptions.** There are many misconceptions that those who lack knowledge of dyslexia may hold, several of which were evident among study respondents. Knowledge of whether or not most poor readers have dyslexia varied significantly between program of study. The majority of general education, special education, school psychology, and SLP students correctly disagreed with this misconception. However, half of counseling students neither agreed/disagreed with this statement, and all educational administration students incorrectly agreed. While the majority of students in most programs of study did not hold this misconception, 32.1% of respondents overall either agreed, neither agreed/disagreed, or did not know how to respond. Therefore, there are still a large percentage of students who did not disagree with the misconception, with counseling and educational administration students having the highest percentage of incorrect answers. This may be because these two programs, along with school psychology, tend to work the least on reading with individuals. There was also a lot of variability in student response to the misconception, “letter reversals are the major criterion in the identification of dyslexia.” Consistent with what was hypothesized, only 10.3% of general

education students correctly disagreed with this misconception. Comparatively more special education and SLP students answered correctly (35.7% and 35.1% respectively), although still not the majority. Counseling students were split between correctly disagreeing and not knowing how to respond, but the majority of educational administration and school psychology majors answered correctly (100% and 64.3% respectively). General and special education students may have had lower percentages in part due to having relatively less education, although it was surprising that SLP students had a lower percentage as well, as they typically had completed more education and preliminary data showed them as being more knowledgeable about dyslexia. Regardless of program of study, the majority of respondents understood that dyslexia is life-long, children will develop dyslexia whether or not parents read to them, medication cannot cure/help dyslexia, individuals with dyslexia have average to above average intelligence, dyslexia can affect a student's performance in reading (...and math, social studies, science, etc.), and there are a range of characteristics the present in different ways across individuals with dyslexia. In response to the misconception “most individuals with dyslexia are naturally left-handed”, only 34.0% of respondents correctly disagreed, with 42.6% responding “I don’t know”. Similarly, the statements “most pediatricians perform diagnostic evaluations to determine if a child has dyslexia” and “in most cases it is not possible to diagnose a child with dyslexia until the third grade” resulted in 44.3% and 37.8% of respondents respectively correctly disagreeing, and 30.9% and 34.5% of respondents respectively not knowing how to answer. When presented with the incorrect statement “more females than males have dyslexia”, only 21.5% of respondents correctly disagreed, with 42.3% answering that they did not know, and 25.5% answering neither agree nor disagree, perhaps meaning that they presumed the incidence to be equal among males and females. Based on this data, we see that, overall, the majority of respondents held few

misconceptions about dyslexia; however, lack of knowledge in this area was still prevalent among some, especially in terms of diagnosis and characteristics of dyslexia. Accordingly, pre-service educators, as a whole, would benefit from learning that many poor readers do not have dyslexia, letter reversals are not the major criterion in identification of dyslexia, dyslexia is not dependent on or related to individual hand preference, pediatricians do not perform diagnostic evaluations of dyslexia, most children can be diagnosed with dyslexia well before third grade, and dyslexia does not affect one gender more than the other.

**Language and Literacy.** Having knowledge of language and literacy is important for those who will go on to work with individuals with dyslexia, as most of these study respondents likely will in some capacity. In response to the survey there was, correctly, a high level of agreement with the statement “phonemic awareness is the ability to recognize and manipulate speech sounds in words” among general education, special education, school psychology, educational administration, and SLP students. However, only 50% of counseling students agreed with the statement, perhaps because phonemic awareness is not as frequently addressed in counseling programs. The most frequently believed correct statements were “difficulty with phonological processing is a major contributing factor to dyslexia”, “poor spelling is one symptom of dyslexia”, “dyslexia is a learning disability that affects language processing”, “decodable text has primarily phonetically regular patterns (words that can be sounded out)”, “dyslexia often affects writing abilities”, “individuals with dyslexia may comprehend a passage read to them but not a passage they read independently”, and “phonics is how letters correspond to speech sounds”, although incorrect responses varied from 12.9% to 41.9% for these statements. Only 38.9% of respondents correctly disagreed with the statement “phonological awareness is another term for phonics”, leaving the majority (61.1%) with incorrect answers.

This is a common inaccuracy that many people believe, which was exhibited in this sample of pre-service educators as well. Another statement that the majority of respondents answered incorrectly was the true statement “dyslexia often affects speaking abilities”. Only 21.4% of respondents correctly agreed with this, with the other 78.6% answering incorrectly. This is likely a lesser known fact, as dyslexia is typically only equated with reading and writing skills. Another statement that most respondents answered incorrectly was “individuals with dyslexia have trouble understanding the syntactic structure of language”. Only 32.4% correctly agreed with this statement, while 30.4% responded that they did not know (although it is unknown if respondents did not know what syntax was, or if they did not know if individuals with dyslexia have difficulties with syntax). Most respondents also responded incorrectly to the statement “children with dyslexia are more consistently impaired in phonemic awareness than any other abilities”, with only 32.9% correctly agreeing. Once again, a high percentage of respondents (40.0%) answered that they did not know. Likely most pre-service educators in this sample had not learned enough about dyslexia to know affected abilities, and most knowledge about dyslexia is broadly spanning the more general terms of reading and writing. Additionally, only 42.4% of respondents correctly agreed with the statement “individuals with dyslexia are usually extremely poor spellers” and only 42.0% correctly disagreed with “most students with dyslexia have difficulties with listening comprehension”. Overall, knowledge of language and literacy related to dyslexia was lower than knowledge of misconceptions, with the majority of respondents answering incorrectly on many of the presented questions. Accordingly, pre-service educators, as a whole, would benefit from learning that phonological awareness and phonics are separate terms, dyslexia often affects speaking abilities, the syntactic structure of language is difficult for individuals with dyslexia to understand, children with dyslexia are consistently impaired in

phonemic awareness, dyslexia affects spelling, and dyslexia does not affect listening comprehension.

**Instruction.** Preparedness to work with individuals with dyslexia begins with knowledge of dyslexia, including how to appropriately instruct individuals with dyslexia. Survey respondents demonstrated sufficient knowledge in some areas of instruction but not in others. The following statements were answered correctly by the majority of respondents: “poor instruction is one cause of dyslexia” (not true), “multisensory instruction is beneficial for students with dyslexia to learn” (true), “students with dyslexia need structured, sequential, direct instruction in basic academic/reading skills and learning strategies” (true), “reading instruction should include lessons in all of the following: phonemic awareness, phonics, reading fluency, vocabulary, and reading comprehension” (true), “spelling practice is important for reading improvement” (true) and “there are methods of reading instruction that are most effective for all children (regardless of whether or not they have dyslexia)” (true). It is good news that many students understand these basic principles of reading instruction. However, for the statement “students with dyslexia need instruction primarily in reading comprehension strategies”, responses were split, with 32.1% agreeing and 30.2% disagreeing. It is true that individuals with dyslexia need support in reading comprehension, but intervention is best when intensively and systematically split across *all* essential components of reading put forth by the National Reading Panel (NRP): phonemic awareness, phonics, vocabulary, reading fluency, *and* reading comprehension (NICHD, 2000). Only 43.2% correctly agreed with the statement “students with dyslexia learn to read most quickly through the use of decodable, or predictable, text”, only 16.9% correctly disagreed with “colored lenses or overlays help improve reading in people with dyslexia”, only 27.2% correctly disagreed with “after 3 to 5 hours of instruction, most educators

can work competently with students who have dyslexia”, and only 17.6% correctly agreed with “students with dyslexia learn to read most quickly through the use of authentic text”. Therefore, while some basic knowledge about instruction of individuals with dyslexia was understood, a lot of other information, including more specific and detailed information, was answered incorrectly by the majority of the respondents. Instruction is an area where knowledge appears to be lacking in pre-service educators, which feeds into lesser preparedness to work with individuals who have dyslexia. Accordingly, pre-service educators, as a whole, would benefit from learning that reading comprehension strategies are important for individuals with dyslexia to learn, instruction in all essential components of reading is necessary, use of decodable and authentic texts are helpful in learning to read for students with dyslexia, colored lenses or overlays do not help improve reading in people with dyslexia, and educators need much more than 3 to 5 hours of instruction to competently work with students who have dyslexia.

**Other.** Questions regarding incidence, onset, outcomes, or other information not related to previous knowledge categories are included in the “Other” subsection. The majority of all respondents correctly agreed that dyslexia is hereditary, although a fairly large percentage of pre-service educators in this sample (48.7% of general education students, 46.7% of special education, 45% of SLP students, and 42.9% of school psychology students) answered incorrectly, signifying a lack of knowledge on this topic in many respondents. Varied responses were present for the statement “less than 5% of the population has dyslexia”. School psychology students were the only group with a majority correctly disagreeing. Educational administration students incorrectly agreed, with the rest of the pre-service educator groups not knowing if the statement was correct or incorrect. The answer to this statement would likely not be known from personal experience, but rather only if a person was taught this fact, therefore the lack of

knowledge indicates potential lack on instruction on this type of knowledge of dyslexia in university programs. The highest levels of agreement with the true statement “people with dyslexia often excel in science, music, art, and/or technical fields” were found among special education and school psychology students, followed by SLP and general education students (with special education students the only group with the majority giving the correct answer). No counseling or educational administration students answered this question correctly, indicating lack of knowledge regarding positive outlooks for those with dyslexia. There were not statistically significant results for the following statements, and the majority of all respondents correctly agreed that dyslexia is neurobiological in origin, individuals can be diagnosed with both ADHD and dyslexia, dyslexia often causes social, emotional, and/or family problems, the brains of individuals with dyslexia are different from those of people without dyslexia, and some students with mild dyslexia may not experience problems due to dyslexia until middle school or later. Once again, lack of knowledge on more general dyslexia topics is lacking among many students, with educational administration students having the least knowledge overall on statistically significant statements and school psychology, special education, and SLP students having the most knowledge. Accordingly, pre-service educators, as a whole, would benefit from learning that 5 to 20% of people have dyslexia, and people with dyslexia often excel in science, music, art, and/or technical fields.

## **Aim #2. Program of Study and Attitudes**

Through aim # 2, we sought to explore student attitudes toward dyslexia in relation to program of study. Overall, most respondents had positive attitudes towards dyslexia, agreeing that they would be responsible, as educators in their chosen professions, to help provide services for individuals with dyslexia, that individuals can have dyslexia and be gifted, and that those

with dyslexia have the same potential as their peers to succeed both academically and as adults. They also mostly disagreed with the negative beliefs that it is unfair to provide accommodations to individuals with dyslexia, that parents of immature children want to say they have dyslexia, that dyslexia is just an excuse to be lazy, and that dyslexia is not a disorder. However, less than half of educational administration, general education, and school psychology students disagreed with the negative belief that the label of dyslexia could be used as an excuse for a child to not try in school, and less than half of general education, special education, SLP, and school psychology students disagreed with the negative belief that parents whose children have low academic ability want to say they have dyslexia. While most respondents felt responsible for helping provide services for individuals with dyslexia, regardless of their chosen profession, statistically significant responses were given for which school practitioner has the greatest responsibility towards supporting students with dyslexia. Interestingly, general education, special education, and SLP students more frequently chose their own profession than other professions, which was not true of educational administration and school psychology students, who mostly chose special education teachers, and counseling students, who mostly chose general education teachers.

This leaves us asking the question, who is responsible for serving children with dyslexia in the school system? At the very least, the best answer to this question is that *all* educators, through their chosen professions, are responsible for serving children with dyslexia in the school system. Administrators, for example, need to support educators in providing appropriate curriculum and developing/implementing strong IEPs/504 plans for students with dyslexia. Counselors should be prepared to support the social-emotional needs of children with dyslexia. School psychologists need to actively diagnose and organize the team of educators for supporting the student with dyslexia. Special education teachers and SLPs need to implement



IEPs and 504 plans as appropriate with lesson plans grounded in the science of reading. General education teachers need to work with all other educators to ensure all students learn to the best of their abilities. Therefore, all pre-service educators would benefit from learning their specific roles and responsibilities in helping individuals with dyslexia, as well as learning that dyslexia is not an excuse for parents of children with low academic ability or for students who do not want to try in school.

### **Aim #3. Program of Study and Preparedness**

The purpose of aim # 3 was to explore student preparedness to work with individuals who have dyslexia in relation to program of study. Most pre-service educators in this sample showed lack of preparation by indicating they had not taken any courses covering dyslexia-related content in their university programs; however, approximately half of the respondents reported having some experience working with individuals with dyslexia. When asked if they felt prepared to work with individuals with dyslexia, the majority of special education, counseling, and school psychology students felt prepared, while the majority of SLP and educational administration students felt unprepared. The most general education students felt neither prepared nor unprepared, followed closely by those who felt unprepared. This is interesting when seen in the light of subsequent statements. As most school psychology students felt prepared, it makes sense that the majority of these students thought that most school psychologist are knowledgeable about dyslexia. However, the only other program of study with a majority agreement on this statement was educational administration. Additionally, while the majority of special education students reported feeling prepared to work with individuals with dyslexia, less than half of them agreed that they receive intensive training to work with students with dyslexia. In fact, not a single program of study had a majority agreement with this statement. Similarly,

less than half of the respondents from all programs of study agreed that most general education teachers are knowledgeable about dyslexia, and only 4.4% of respondents agreed that most general education teachers receive intensive training to work with students with dyslexia.

Overall, most respondents felt that both they and other pre-service educators lack knowledge, are underprepared, and are under trained when it comes to working with individuals who have dyslexia. This needs to be changed! Pre-service educators, as a whole, need to receive greater instruction and training to work with individuals with dyslexia in order to feel more confident in their own and their colleague's preparedness to work with this population.

### **Implications**

While some pre-service educators in the sample of respondents had knowledge of dyslexia, mostly positive attitudes towards dyslexia, and felt prepared to work with individuals who have dyslexia, most lacked knowledge across the array of questions asked, held misconceptions and negative beliefs/attitudes, and felt unprepared to work with those with dyslexia. With reading being so important for children and adults in our literate society, and dyslexia being so prevalent, it is essential that pre-service educators that will be working with individuals who have dyslexia acquire the necessary knowledge to address the needs of this population. As the participants in this study represent these future professionals, it is obvious that there is work to be done, and that curriculum changes in pre-service educator university programs can be targeted for improvement. Improved instruction and training regarding dyslexia in university programs would likely help improve outcomes for many individuals with dyslexia, to immeasurably beneficial ends.

## **Study Limitations**

Examination of the methods employed in the study revealed a few possible limitations which could have impacted study results. First of all, the survey utilized convenience sampling to recruit participants, which is not random. It also incorporated an element of volunteerism, as we only received responses from those who chose to fill out the survey. This may incorporate response bias into the results. Specifically, those who feel strongly about dyslexia may have been more likely than others to respond, which could have affected the results. Students who feel strongly about dyslexia may also be more knowledgeable about the topic than those who did not volunteer to respond. Additionally, while we do not know the true proportions of individuals in each program of study within universities in the mountain west region, we did not accumulate an even distribution of respondents (volunteers) across programs of study. While there are likely more students studying general education than other programs, which was consistent with respondent program (82 general education respondents), we had only three respondents for counseling students and three for educational administration students, which is likely less than the true ratio of general education to counseling or educational administration students, and almost too few respondents to conduct our analyses. In the future, this could be addressed by obtaining a larger sample, weighting responses from job classification categories with fewer respondents than proportions in the population or reducing the number of categories prior to distribution of the survey.

Question formulation may have also impacted respondent answers. The wording of statements may have swayed respondents to reply in a certain way. This limitation was somewhat mitigated by two statements being repeated with different wording throughout the survey. Answers to these questions varied somewhat for the statements “poor spelling is one

symptom of dyslexia” and “individuals with dyslexia are usually extremely poor spellers” but were similar for the statements “dyslexia is neurobiological in origin” and “the brains of individuals with dyslexia are different from those of people without dyslexia”. This indicates that wording may have had some, but varying influence on how respondents answered.

One more potential limitation to the study is that, for greater ease of reporting, we collapsed some response categories together, such as agree and strongly agree becoming agree. This may have reduced variability among answers. Collapsing the data in this was also prevented information to be interpreted on how firmly students did or did not agree with a statement. In the future, this could be addressed by stratifying the sample to accurately represent the responses to each statement.

### **Future Directions**

In the future, researchers may delve more specifically into what aspects of reading and dyslexia curriculum are, or are not taught in universities in the mountain west region in order to more fully understand which areas could benefit from modification or addition to curriculum. Increased knowledge and preparedness facilitated through university training programs in the mountain west will have important implications throughout the region, as most students in these universities go on to work in the mountain west region. Other areas that could impact knowledge, attitudes, and preparedness related to dyslexia (other than university curriculum) could also be researched, such as reading curriculum implemented in school districts and continuing education programs for professionals in the region. Replications of this study with larger sample sizes could also expand this information. The knowledge obtained from this study may be used to improve outcomes for individuals in the mountain west region who have dyslexia by advocating for change to curriculum in pre-service educator university programs to more fully

cover knowledge of dyslexia, attitudes towards dyslexia, and how to work with individuals who have dyslexia.

## **Conclusions**

Through this study, we aimed to identify the relationship between (#1) knowledge of dyslexia, (#2) attitudes towards dyslexia, and (#3) preparedness to work with individuals who have dyslexia and relevant pre-service educator programs of study. Overall, knowledge of dyslexia was found to be lacking across groups, with educational administration, general education, and counseling students tending to have the least knowledge, although this was variable across statements. In terms of attitudes towards dyslexia, most students reported having positive attitudes. Educational administration, general education, and counseling students typically had the most negative attitudes towards dyslexia. Additionally, most respondents felt underprepared to work with individuals with dyslexia and felt that professionals in relevant fields lacked sufficient knowledge and training to work with these individuals (although counseling, special education, and school psychology students reported feeling more prepared than SLP, educational administration, and general education students). It is apparent that progress needs to be made in university programs in the mountain west in regard to better teaching knowledge of dyslexia and how to work with individuals who have dyslexia. Future research could explore dyslexia curriculums in universities and schools throughout the mountain west region, as well as continuing education programs for professions in the region. This information could improve advocacy for individuals who have dyslexia, as well as for pre-service educators and educators, students, and organizations who work, or will work, with this population.

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## Appendix A

Survey (adapted from Wadlington & Wadlington, 2005 and White et al., 2020)

1. What is your major?
  - a. General Education, Special Education, School Psychology, Counseling, Educational Administration, Speech-Language Pathology, Other
2. What level of degree are you seeking?
  - a. Undergraduate degree, Graduate degree, Non-degree seeking
3. Approximately what percentage of your current program of study have you completed?
  - a. 25%, 50%, 75%, 100%
4. In what state is the university you are attending?
5. What state are you planning to work in after completing your education?
6. After graduation, what age group do you plan to work with?
  - a. Birth to 3 years of age, Preschool age, Elementary school age, Middle school age, High school age, Working age (18-64 years of age), Elderly (65 years of age and older), I don't know
7. What setting are you planning to work in after completing your education?
  - a. Early Intervention (ages 0-3 years), Preschool, K-12 School, College/University, Hospital (acute care, rehabilitation, etc.), Residential Health Care Facility, Home Health, Private Practice, Corporate, Public Health Department, I don't know, Other
8. Have you taken any courses covering dyslexia-related content?
  - a. Yes, No, I don't know
9. Have you had any experience working with someone who has dyslexia?

- a. Yes, No, I don't know

10. Do you or someone you know have dyslexia?

- a. Yes, No, I don't know

All remaining responses (unless otherwise noted) are reported on a "level of agreement" Likert scale such that 1 = strongly disagree, 2 = disagree, 3 = neither disagree nor agree, 4 = agree, 5 = strongly agree, and 6 = I don't know.

11. As an educator in your chosen profession, it will be your responsibility to assist in providing appropriate services (e.g., diagnosis, accommodations, intervention, etc.) for individuals with dyslexia.

12. In your opinion, of the options listed, which school practitioner has the greatest responsibility towards supporting students with dyslexia?

- a. General Education Teacher, Special Education Teacher, School Psychologist, Speech-Language Pathologist, Counselor, School Administrator, Other

13. How prepared do you feel you are to work with students with dyslexia?

- a. Very unprepared, Unprepared, Neither unprepared nor prepared, Prepared, Very prepared, I don't know

14. Most school psychologists are knowledgeable about dyslexia.

15. Most teachers are knowledgeable about dyslexia.

16. Dyslexia is neurobiological in origin.

17. Difficulty with phonological processing is a major contributing factor to dyslexia.

18. Most students with dyslexia have difficulties with listening comprehension.

19. Dyslexia is usually outgrown.

20. Poor spelling is one symptom of dyslexia.

21. Poor instruction is one cause of dyslexia.
22. An individual can have dyslexia and be gifted.
23. Most individuals with dyslexia are naturally left-handed.
24. Students with dyslexia need instruction primarily in reading comprehension strategies.
25. Phonological awareness is another term for phonics.
26. If parents read to their children, then their children will likely not develop dyslexia.
27. Medication, when taken consistently, can cure/help dyslexia.
28. More females than males have dyslexia.
29. Dyslexia is hereditary.
30. Having below average intelligence is a common characteristic of individuals with dyslexia.
31. Less than 5% of the population has dyslexia.
32. An individual can be diagnosed with both ADHD and dyslexia.
33. Most pediatricians perform diagnostic evaluations to determine if a child has dyslexia.
34. Students with dyslexia learn to read most quickly through the use of decodable, or predictable, text.
35. Students with dyslexia learn to read most quickly through the use of authentic text.
36. In most cases it is not possible to diagnose a child with dyslexia until the third grade.
37. Colored lenses or overlays help improve reading in people with dyslexia.
38. Dyslexia is a learning disability that affects language processing.
39. Decodable text has primarily phonetically regular patterns (words that can be sounded out).

40. Individuals with dyslexia have trouble understanding the syntactic structure of language.
41. Dyslexia often affects writing abilities.
42. Dyslexia often affects speaking abilities.
43. Multisensory instruction is beneficial for students with dyslexia to learn.
44. In school, dyslexia only affects the student's performance in reading (not in math, social studies, etc.).
45. People with dyslexia often excel in science, music, art, and/or technical fields.
46. Dyslexia often causes social, emotional, and/or family problems.
47. Phonemic awareness is the ability to recognize and manipulate speech sounds in words.
48. Most poor readers have dyslexia.
49. Students with dyslexia need structured, sequential, direct instruction in basic academic/reading skills and learning strategies.
50. The brains of individuals with dyslexia are different from those of people without dyslexia.
51. Some students with mild dyslexia may not experience problems due to dyslexia until middle school or later.
52. Children with dyslexia are more consistently impaired in phonemic awareness than any other ability.
53. Reading instruction should include lessons in all of the following: phonemic awareness, phonics, reading fluency, vocabulary, and reading comprehension.
54. Individuals with dyslexia are usually extremely poor spellers.

55. Individuals with dyslexia may comprehend a passage read to them but not a passage they read independently.
56. All individuals with dyslexia exhibit similar characteristics.
57. Letter reversals are the major criterion in the identification of dyslexia.
58. Phonics is how letters correspond to speech sounds.
59. Spelling practice is important for reading improvement.
60. Giving students with dyslexia accommodations such as extra time on tests, shorter spelling lists, special seating, and so forth is unfair to other students.
61. Dyslexia is not a disorder.
62. Parents whose children are just immature want to say they have dyslexia.
63. Individuals with dyslexia have less potential to succeed academically than their peers.
64. The label of dyslexia could be used as an excuse for a child to not try in school.
65. After three to five hours of instruction, most educators can work competently with students who have dyslexia.
66. Parents whose children have low academic ability want to say they have dyslexia.
67. There are methods of reading instruction that are most effective for all children, regardless of whether or not they have dyslexia.
68. Dyslexia is just an excuse to be lazy.
69. Children with dyslexia often fail to succeed as adults.
70. Most special education teachers receive intensive training to work with students with dyslexia.
71. Most regular education teachers receive intensive training to work with students with dyslexia.