THE IDENTIFICATION AND PREVALENCE OF DYSLEXIA AMONG ENGLISH LEARNERS

A Dissertation

by

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ABSTRACT

Although changes in the identification of dyslexia have shifted in recent years, the rate of identification of dyslexia for English Learners (ELs) continues to lag behind that of monolinguals. Using a large sample of student data reported in the Public Education Information Management system (PEIMS) across two school years (2013-14 and 2019-20; n=4,692,688), data were analyzed to assess the rates of identification before and after the implementation of a mandatory screener in Grades K and 1 alongside a state dyslexia handbook. The prevalence of dyslexia was found to be below the commonly acknowledged rate of 5-17% for both monolinguals and English learners for both years 1 and 2. Identification improved from year 1 to year 2; however, ELs were less likely to be identified with dyslexia, at a slower pace, and at a later grade than their monolingual peers. Males were more likely to be identified than females, even more so when males were also ELs. Students who receive free and reduced lunch were more likely to be identified with dyslexia. Students of an ethnic identity other than Caucasian were less likely to be identified with dyslexia. Moreover, the likelihood of dyslexia identification for students who are African American decreased from year 1 to year 2. Finally, school personnel who evaluate and identify students with dyslexia were surveyed to provide information regarding the criteria and assessments used to identify ELs with dyslexia. Qualitative analysis of the responses related to the testing of ELs revealed inconsistencies in the way they are identified, as well as the assessments employed. Future studies should examine preservice and in-service training of evaluators for specific knowledge of reading and language development, as well as the development of a consistent procedure for identifying ELs with dyslexia that is implemented with fidelity and supervision.

Keywords: dyslexia, dyslexia identification, English learner, rate of identification

DEDICATION

This dissertation is dedicated to my husband, Jeff, who has been my cheerleader, coach, steady rock, and inspiration. You make me better, and I love you more than when I wrote this.

I would also like to dedicate this to my children, Jacob, Audrey, and Aidan, who bring me endless joy, motivation, and encouragement to keep going even when things are difficult. I also dedicate this dissertation to my parents, Tim and Barbara Taylor, who always knew what I could accomplish and have reinforced that with their love and encouragement, and my parents-in-love, Terry and Herschell Moore, for loving me as their own and for their endless love and support.

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This work was supervised by a dissertation committee consisting of Dr. R. Malatesha Joshi (advisor), Dr. Emily Binks-Cantrell, and Dr. Kausalai (Kay) Wijekumar of the Department of Teaching, Learning, and Culture and Dr. Oi-Man Kwok of the Department of Educational Psychology.

All work conducted for the dissertation was completed by the student independently.

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The opinions expressed are those of the author and do not represent the views of the Texas Education Agency.

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CHAPTER I
INTRODUCTION

Dyslexia, the difficulty with reading due to phonological processing, is likely present in every language and around the world (Goswami, 2003, 2006; Zeigler & Goswami, 2005). As the United States becomes increasingly diverse, it is essential to understand the role language plays in skilled reading so that we may effectively provide adequate instruction to all students who enter school. Furthermore, we must accurately identify factors that contribute to reading difficulties for students learning English as a second language to provide them with the most significant opportunity for success. Studies of children learning to read in two alphabetic orthographies demonstrate that children with dyslexia will present similar reading deficits across both languages (Klein & Doctor, 2003; Mortimore et al., 2012; Rose, 2009). Students come from various experiences and linguistic backgrounds. Still, they are held to a standard set of linguistic expectations in English from teachers whose backgrounds align more consistently with the standards than the students (Proctor & Chang-Bacon, 2020).

In recent years, there has been a growing interest in identifying dyslexia due to grassroots efforts of parents and advocacy groups demanding appropriate services for children in schools (Youman & Mather, 2018). Dyslexia, generally associated with a deficit in the phonological component of language, is the most commonly identified reading disability, often reported with a prevalence anywhere between 5-17% in children (Shaywitz, 1998). For English Learners (ELs), establishing a prevalence poses a formidable challenge given the role language plays in reading acquisition (Francis, 2019; Mortimore et al., 2012; Rose, 2009). Snowling (2000) suggests that depending on the transparency of the language, the prevalence of dyslexia can decrease to approximately 5%.

It is difficult to tease out what characteristics might be problematic given language acquisition versus an actual reading disability without first assessing the students' mastery of their first language when compared to their proficiency in English (Becker & Deris, 2019; Francis et al., 2019; Geva et al., 2019; Lesaux, 2019; Morgan et al., 2015; Mortimore, 2012; Samson & Lesaux, 2009). To accomplish this, it is imperative to conduct assessments in both English and the student's first language to make comparisons of strengths and weaknesses across languages (Sandman Hurley, 2017). With a wide variety of languages represented in schools across the United States, few standardized test measures in languages other than English are utilized, and districts do not possess trained professionals able to test in those languages (Francis et al., 2019; Lesaux, 2019; Mortimore, 2012). In fact, English as a second language is now considered typical, meaning that knowledge of language acquisition and its implications is critical for those tasked with identification and intervention (Takanishi & LeMenestrel, 2017). English learners face late diagnoses and underrepresentation in special education services and contend with misinterpretation of data due to demographic shifts and the connections between literacy, language, and cognition (Proctor & Chang-Bacon, 2020; Samson & Lesaux, 2009). Attention must be given to matters involving language and disability to promote awareness of these complexities when working with students learning English as a second language.

With this in mind, I hypothesized that the number of ELs identified with dyslexia would be lower than that of monolinguals due to the influence of language factors and districts' difficulties related to comprehensive testing that includes both students' first language and English. In addition, I estimated that the presence of factors such as socioeconomic status (SES), ethnicity, and first language would contribute to a profile for ELs identified with dyslexia. Odegard et al. (2020) revealed that African American and Hispanic students were less likely than

Caucasian students to be recognized as having dyslexia. I attempted to replicate some of these findings to examine whether the same would be true for students in Texas and to investigate what factors might be predictive of a dyslexia status with specific consideration given to ethnicity, gender, and SES.

The dissertation aimed to examine a large sample of student-level data from the state of Texas to determine the prevalence of dyslexia for ELs for the 2013-14 and 2019-20 school years. The study examines the change in the prevalence of dyslexia for ELs compared to monolingual students from the 2013-14 school year, the first year reporting was mandated by the state, to the 2019-2020 school year. Secondly, the study investigates factors that contribute to dyslexia identification for ELs (e.g., SES, school membership, ethnicity, language, gender) due to the implementation of state legislation for screening and identifying students with dyslexia. Finally, the study examines whether a profile emerges for ELs with dyslexia and differences that can be observed when compared to factors commonly associated with profiles of monolinguals.

Background

On the most recent National Assessment of Educational Progress (NAEP) (2019), ELs scored approximately 33 points lower in reading than monolinguals, demonstrating a similar gap to that found between students with and without reading disabilities, respectively. Scamman (2018) reported that Texas accounted for the second-highest population of ELs in the United States, with 14% of the total United States. With approximately 164 languages represented in Texas it is imperative that there are systems in place to support students who come to school with diverse language backgrounds as they learn how to read in English (Scamman, 2018). Across large urban school districts such as Austin, Dallas, and Houston, as many as 100 languages are present (Austin ISD, 2021; Houston ISD, 2021; The Hub, 2018) highlighting the

need for not only knowledgeable teachers and school psychologists but also materials and personnel to accurately identify and intervene for students who may have a reading difficulty that persists across languages.

Miciak and Fletcher (2019) highlighted that limited English proficiency must be a factor for identifying a specific learning disability (SLD) like dyslexia, given that many students with reading disabilities possess language difficulties. Children with a home language different from the language encountered in school demonstrate a higher risk for academic challenges due to the need to understand content while learning English – similar to the old adage "building a plane while flying it." For accurate identification, their assessment results must be carefully interpreted with special consideration for their language exposure and the fact that they may not have received adequate instruction in their first language. In addition, continually attributing reading difficulties to a lack of language proficiency only perpetuates under-identification disregarding a number of students whose difficulties might actually be the result of an actual disability (Geva et al., 2019).

Furthermore, Francis et al. (2019) point to the idea that current guidelines for identifying students with reading disabilities in the United States have been established based on data mainly from monolingual, English-speaking children and may need to be adapted for students learning more than one language. Districts offer a range of instructional models for ELs (e.g., early-exit, late-exit, dual-language, immersion) with instruction provided in a language the student has yet to master (Texas School Accountability, 2018). Therefore, it is critical to understand the contribution of oral language and developmental progression for ELs to determine what factors impact and influence the identification of dyslexia for this population.

Texas has been at the forefront of establishing legislation to address the needs of dyslexic learners by passing the *Revised Procedures Concerning Dyslexia and Related Disorders* in 1992 (TEA, 2018). These have since been updated multiple times and under a new title, *The Dyslexia Handbook: Procedures Concerning Dyslexia and Related Disorders.* The purpose of the handbook is to highlight the importance of using evidence-based instruction to intervene for students with characteristics of dyslexia. In addition, specific procedures are defined for evaluations that include detailed instructions for ELs and a thorough description of guidelines for professionals involved in interpreting results and identifying ELs with dyslexia. Provisions for these professionals include knowledge of first and second language acquisition theory, knowledge related to orthographic depth and structure of languages (e.g., transparent or opaque; syllabic or morphosyllabic), knowledge of the students native and second languages, as well as an ability to analyze and interpret the results from a cross-linguistic perspective (Geva et al., 2019; TEA, 2018). Moreover, the handbook provides clear guidance for what to do in the absence of a test in the student's native language; however, school personnel is not typically directed to this stipulation.

In 2013, House Bill (HB) 1264 added Texas Education Code, §42.006, requiring school districts and open-enrollment charter schools to report the number of students enrolled who are identified as having dyslexia through the Public Education Information Management System (PEIMS). The implementation of this bill allowed the state to examine rates of dyslexia identification when compared to the commonly reported prevalence of dyslexia, an estimated 5-17% (Shaywitz, 1998). Four years later, Texas passed House Bill 1886, making screening for all Kindergarten and Grade 1 students mandatory and establishing provisions for teachers trained in

the characteristics of dyslexia and multisensory instruction to deliver the appropriate intervention to identified and at-risk students (H.B. 1886, 2017).

Most recently, updates have been passed to the handbook that shifts evaluation for dyslexia and dysgraphia to a single pathway for identification under the Individuals with Disabilities Education Act (IDEA) (TEA, 2021). If a student is identified with characteristics requiring intervention, parental consent must be obtained prior to evaluation. While this decision provides students with a comprehensive evaluation from a Licensed Specialist in School Psychology, it will not improve the situation until the requirements from the Dyslexia Handbook are consistently consulted to better understand the unique needs of ELs. Given the idea that ELs are underrepresented when examining rates of those identified with a specific learning disability (Francis et al., 2019), it is safe to assume the same is true for ELs with dyslexia. Likely, this decision will further overload the system and underrepresentation for ELs will remain an issue. Because it often takes several months to conduct full, comprehensive evaluations, testing materials are limited mainly to English and Spanish, and the knowledge and skill required on the part of the evaluator for understanding and interpreting results, it is difficult to say if those identified will be consistent and accurate.

Collectively, these findings are concerning and demonstrate the need for greater awareness in the way ELs are identified for dyslexia. Establishing a prevalence of dyslexia for English Learners and recognizing possible factors that contribute to a diagnosis can highlight areas for improvement, reveal instances of bias or discriminatory policies, and allow for greater opportunities to correct areas of weakness so that we may best address the literacy needs of a multitude of learners.

Statement of the Problem and Purpose of the Study

Difficulties persist in trying to separate the impact of language factors and characteristics of dyslexia (e.g., phonological deficits) for ELs (Geva et al., 2019; Vender & Melloni, 2021). For example, poor language proficiency may negatively impact ELs' outcomes on English standardized reading tests (Elbro et al., 2012), but this might not always reflect a reading disability. Because of this layer of complexity, the identification of dyslexia among ELs presents a greater challenge in a field that already experiences ongoing debates in both research and practice fronts regarding characteristics that mark true dyslexia for English L1 children (e.g., Gearin et al., 2021). The problem is further compounded by biases and under-identification issues (Francis et al., 2019; Geva et al., 2019; Lesaux, 2019; Mortimore et al., 2012; Odegard et al., 2020) that likely stem from a lack of understanding or misunderstandings about the nuances that exist in identifying ELs with dyslexia. The primary goal of identification is not eligibility for services, but an opportunity for adequate intervention and improved outcomes for all students (Miciak & Fletcher, 2019). To do this effectively, it is crucial to establish a baseline for current identification rates for ELs and examine factors that contribute to discrepancies among learners.

Research Questions

First, what is the prevalence of dyslexia for English Learners when compared to that of monolinguals? How does it compare to the previously reported national average of 5-17% for monolinguals? And how has the prevalence changed for English Learners since it was first reported during the 2013-14 school year? Additionally, what factors contribute to a dyslexia designation for an English Learner (e.g., SES, ethnicity, school membership, language, gender)? What changes in ELs identified with dyslexia can be observed between 2013-14 and 2019-20 given the implementation of mandatory screening and state legislation regarding the

identification of students with dyslexia? Finally, what measures and criteria are used to identify students with dyslexia across the state of Texas? And how are ELs identified for dyslexia when tests are not available in their first language?

The variables referenced in this study are defined based on codes established by Public Education Information Management System (PEIMS). Each school district is required to report to the PEIMS system four times each school year (i.e., fall, spring, summer, and extended school year) to ensure all students are included in reporting (Texas Student Data System, 2021). The schedule is established by the PEIMS Data Standards with PEIMS data reporting requirements that include 1) descriptions of the data elements and codes, 2) descriptions of the responsibilities of entities participating in the data submission process, and 3) descriptions of the submission record layout and data edit specifications (TSDS, 2021). PEIMS codes are designated by the Texas Education Agency and updated each year to reflect new or modified data categories. Each variable is clearly defined to promote the most accurate identification of students in each category. The data requested included several PEIMS variables to best examine the research questions. Variables included gender, economic disadvantage, Limited English Proficiency (LEP), language, English as a Second Language, disability, race/ethnicity, gifted and talented program, and the dyslexia indicator. Student and school ID numbers were obtained but scrambled due to the Family Educational Rights and Privacy Act (FERPA).

Conceptual Framework

Models of reading can facilitate greater understanding of contributing factors to reading success. The Componential Model of Reading (CMR) was developed to account for not only the cognitive factors that contribute to skilled reading, but for the psychological (i.e., motivation, interest, teacher expectation) and ecological (i.e., home environment, language variety, language)

factors that also play a role (Aaron et al., 2008; Joshi & Aaron, 2012). The cognitive domain includes two components: word recognition and comprehension that correspond to the widely accepted Simple View of Reading; however, a child can be deficient in literacy skills due to a deficit in any component of the three domains. In identifying the areas of weakness within a domain, teachers can focus on the source of the problem, eliminating the need for numerous tests. Using this model, Aaron et al. (2008) found that when the weak component was identified followed by targeted appropriate intervention, the result was higher overall reading achievement.

For English Learners with dyslexia, this is especially insightful. As the IDA definition states, students will demonstrate difficulty with word-level reading and spelling, typically related to a phonological deficit. Secondary consequences related to reading comprehension and reduced reading experience as a consequence of issues with vocabulary and background knowledge are related to second language acquisition and explained by the ecological component of the CMR. As each difficulty is targeted and begins to remediate, there are fewer components that need attention and overall reading comprehension can improve.

Connor (2016) proposed the Lattice Model for reading comprehension which is comprised of valuable models of child development and reading comprehension. This model is similar to the CMR in its inclusion of psychological and ecological facets (i.e., language) that influence reading comprehension. Its design acknowledges reading comprehension as a complex system supported by several smaller complex systems working together to buttress proficient reading comprehension. The Lattice Model incorporates text-specific processes such as orthographic knowledge, decoding, spelling, fluency, and text structure skills essential for reading and writing that can be difficult depending on the transparency of the orthography. The

model accounts for these together as a system of linguistic processes that would be observed in a typically developing reader.

When thinking about the identification of dyslexia according to the Lattice model, there are several considerations that can prove helpful. Deficits in these areas can lead to difficulty with the construction of appropriate representations that impede the development of the other systems in the model, thus impairing reading comprehension as a whole. With instruction as a mediating factor across the factors, a knowledgeable teacher is imperative for not only identifying the areas of struggle for a student to appropriately refer for testing, but also to choose the correct skills to target in intervention. Furthermore, the Lattice Model accounts for the contribution of home factors to reading comprehension, which could be connected to the heritability of dyslexia, as well as other elements such as language variety or socioeconomic status – all of which have been shown to contribute to overall reading performance (Cardenas-Hagan, 2020; Odegard et al., 2020; Washington & Seidenberg, 2021).

In 2020, Wagner et al. (2020) asserted the prevalence of dyslexia was not as high as the 5-20% previously reported attributing the discrepancy to interpretations of the definition that translated to decisions about testing and the cut points used in diagnoses. The proposed Constellation model has three overarching factors that should be considered in a diagnosis of dyslexia: (1) impaired phonological processing (2) genetic risk, and (3) environmental factors that include impoverished sight word vocabulary that could be attributed to second language learning. Based on these factors, the consequences of dyslexia can be reliably predicted as poor decoding (Lyon et al., 2003), diminished sight-word vocabulary, poor response to instruction and intervention (Fletcher et al., 2019), and listening comprehension better than reading comprehension. These factors can apply to ELs given the influence of environmental factors

(e.g., home language, language variety), oral language and vocabulary, as well as the lack of response to appropriate intervention. Wagner et al. (2020) identified two kinds of readers, unexpected poor readers (i.e., dyslexic) whose listening comprehension was higher than their reading comprehension and expected poor readers whose level of listening comprehension was consistent with their listening comprehension. Findings indicated that less than half of poor readers were unexpected, indicating that the prevalence of dyslexia is likely lower when comparing unexpected poor readers to expected poor readers. These findings again highlight the importance of using multiple criteria when identifying students with dyslexia, including ELs, to include a focus on students whose reading is poor relative to their oral language versus poor reading in light of their grade level peers. If we continue to identify dyslexia, for monolingual students and ELs, based on poor performance, we will "likely miss more individuals with dyslexia than [we] will correctly identify," with a majority being expected rather than unexpected poor readers (Wagner et al., 2020. p. 362).

With this in mind, many are currently advocating for a multi-factorial model of dyslexia that incorporates a variety of factors when attempting to identify dyslexia. Compton (2021) points to the idea that not all people with dyslexia will present with the same deficits that contribute to issues with reading and spelling. Catts & Petscher (2021) proposed risk factors that increase the likelihood of difficulties when learning to read. Factors such as rapid automatized naming, executive functioning, and oral language would be considered individually for a child. Socioeconomic status and ethnicity are thought to be endogenous factors that can become endogenous due to the neurological impact they present over time (Catts & Petscher, 2021). Daniels and Share (2018) presented 10 dimensions that may account for differences in reading ability and dyslexia across language varieties that could prove more beneficial when considering

the difficulties of students who come from varying linguistic backgrounds (Daniels & Share, 2018). All of these considerations prove useful when examining dyslexia for ELs and the way they are currently identified within our school system.

Assumptions and Limitations

This study assumes that the dyslexia designation of students in the sample data is accurate and valid and that those who participate in the survey are representative of the entire population, including data that was not accessible due to masking for privacy. Due to some of the variables creating very small groups of students, the Texas Education Agency masks student records to prevent any opportunity of identification of those students. As a result, the sample does not include the entire student population, thus, the findings may not be generalizable to other populations. In addition, measures used to identify students with dyslexia vary across districts. Without knowledge of the specific battery of assessments given, it is difficult to know the accuracy of the dyslexia designation for all students. The included survey attempts to tease out some of this information; however, it is limited to the provided responses.

One limitation of this study is the absence of specificity in codes for Special Education from the PEIMS database. PEIMS data is coded from 0-9 with 8 identifying a specific learning disability. Unfortunately, no designation was available between reading and math disabilities, therefore no specific correlations could be made between dyslexia status and Special Education membership. In addition, to prevent the masking of many records, categories such as language had to be collapsed into smaller groups to allow for a larger sample. Hence, conclusions about language will be limited to languages including English, Spanish, Mandarin, Korean, Vietnamese, and other.

Significance of the Study

Much of the literature on the identification of dyslexia is focused on specific languages or English; however, very little specifically addresses ELs identified with dyslexia. According to the National Center for Educational Statistics (NCES), the percentage of public-school students in the United States who were ELs was 10.2 percent, or 5.0 million students in 2018, which is an increase from 9.2 percent, or 4.5 million students in 2010 (NCES, 2021). Texas and California have the highest percentages of English Learners enrolled with 18.7 and 19.4 respectively. Given this, as well as the NAEP scores from 2019, it is necessary to establish a prevalence allowing districts to better address the needs of ELs and highlight the existence of gaps in identification between English Learners and monolinguals. As our schools become increasingly diverse, we must identify ways to support the acquisition of literacy for all students.

While recent research has provided evidence for many of the distinct strengths, skills, and needs that ELs bring into classrooms, this progress is contrasted by the lack of clear, explicit, and evidence-based guidance regarding how ELs are identified for dyslexia and language disabilities. This discrepancy can promote issues of underrepresentation or overrepresentation in special education, or ineffective instruction for the population as a whole and in each of these situations, ELs suffer (Becker & Deris, 2019; Lesaux, 2019; Morgan, et al., 2015; Samson & Lesaux, 2009).

This study contributes to the literature in several ways. Establishing a foundational prevalence of ELs with dyslexia in a large state with a higher percentage of ELs represented can inform practices that can be valuable for other states. With knowledge of discrepancies between populations of students, informed decisions can be made for systems of identification and intervention that bests support ELs struggling to acquire reading in English. The concluding

hypothesis would be that the prevalence of dyslexia for ELs is significantly lower than that of monolinguals due to issues related to identification and a lack of understanding of the role of language in learning to read. Lack of testing materials and trained professionals to assess the wide variety of languages that are present in Texas pose challenges that are not easily remedied. Given the implementation of state legislation through the Dyslexia Handbook and House Bill 1886, I anticipate the percentage of English Learners has increased, yet I postulate it still to be considerably less than the percentage found for students whose first language is English. Moreover, I predict a profile will emerge for English Learners identified with dyslexia related to factors including campus membership, ethnicity, socioeconomic status and home language. Profiles provide insight for future areas of research and provide opportunities for adjustment in the way we identify, assess, and intervene for multilingual students

Definition of Terms

- **English Learner (EL) -**students who often come from non-English speaking homes and backgrounds and typically require specialized instruction in both the English language and academic subjects. ELs were formerly referred to as English-Language Learners (ELLs) (Birsh & Carreker, 2018).
- **English as a Second Language (ESL) –** learning English in a country where English is dominantly spoken or where English is the official language (Reading Horizons, 2021).
- **Limited English Proficiency (LEP) –** classification for students who do not speak English as their primary language and have limited ability to read, speak, write, or understand English These individuals may require language assistance to facilitate their success in academic settings (Limited English Proficiency, 2021).

- **Monolingual –** a student who speaks only one language. For the purpose of this study, monolingual refers to students who speak only English (Monolingual, 2021).
- **Orthography –** the way a written language is represented. In alphabetic systems, this refers to spelling. In nonalphabetic language systems like Chinese, orthography refers to characters (Aaron et al., 2008).

Chapter II
LITERATURE REVIEW

Given the attention and awareness dyslexia has received in recent years, identification of dyslexia still poses challenges that can be attributed to interpretations of the universally referenced definition. In 2002, the International Dyslexia Association (IDA) adopted the following definition of dyslexia:

> 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. (IDA, 2019, p. 2)

The purpose in providing a common, comprehensive definition for dyslexia was to bring clarity and consistency to identification and intervention. The specificity in the construction of this definition was intended to allow researchers and educators to address a variety of issues and the unique needs each student presents; however, a lack of consensus on its interpretation, the use of other popularly adopted definitions, and confusion among educators and evaluators of students have led to some debate surrounding what should and should not be a part of the identification process. This is especially important when examining the impact for ELs and considering the intersection that exists between literacy, language, and cognition (Proctor & Chang-Bacon, 2020). The IDA has global partners from all over the world as dyslexia is “no respecter of language”, therefore, their definition is written in a way that can be utilized for a global population. In the United States, greater attention must be diverted to issues of language and

dyslexia to develop an awareness of the complexities involved with identifying and working with ELs.

A Brief History of Dyslexia

Dyslexia was first identified by Rudolph Berlin in 1887 (University of Oxford, 2021). Influenced by the writings of a German physician, Adolph Kussmaul, Berlin coined the term 'dyslexia'. A few short years later, James Hinshelwood, an ophthalmologist, was the first to attribute this reading difficulty to the brain, and William Pringle Morgan broadened the research focus by including children and publishing a case in the British Medical Journal describing a student with 'congenital word-blindness' (Pringle-Morgan, 1896). Accordingly, it was established that some children with average to high intelligence could demonstrate difficulty learning to read. Awareness of the term "dyslexia" arose due to the work of Samuel Orton and his colleagues, who developed a theory of dyslexia and interventions using the term 'strephosymbolia", meaning twisted symbols (Orton, 1928; 1937). Over the years, knowledge and understanding of learning disabilities evolved, yet the original definition of dyslexia remained ambiguous and unopposed until the crafting of the IDA adopted definition (Fletcher, 2019; Gearin et al., 2021). This current definition is rooted in significant scientific evidence. The term "neurobiological in origin" stems from the original work of Kussmaul, Berlin, Hinshelwood, and Morgan asserting that dyslexia was not a visual impediment but located in the brain.

Dyslexia in Languages Other Than English

A great deal of evidence demonstrates the existence of dyslexia across languages. Delayed or incomplete reading development (dyslexia) is expected to occur in all languages. Characteristics of dyslexia might present differently between languages depending on the way

reading develops in that particular language. Cross-linguistic comparisons of reading acquisition and dyslexia have been conducted based on orthographic systems (Seymour, 2006).

According to Petersen and Pennington (2012), cognitive predictors of early reading presented similar findings across five orthographies including Finnish, Hungarian, Dutch, Portuguese, and French. A deficit related to phonological awareness was consistent across languages, although the effect was observed more consistently in more transparent orthographies. McBride-Chang et al. (2011) highlighted that a similar pattern existed for children in Hong Kong, China, to that of children learning alphabetic languages. Substantial and enduring difficulties in reading fluency are a primary characteristic of dyslexia across orthographies (Gangl et al., 2018; Peterson & Pennington, 2012), with consequences for fluency as a result of deficient phonological awareness (Vellutino et al., 2004). Children whose first language was English, Spanish, or Chinese performed poorly on tasks related to auditory rime. The same proved true with students who spoke French and Italian. This finding remained consistent for all languages considering phonological awareness and reading skills (Peterson & Pennington, 2012). In addition, a family history of dyslexia also contributed to identification for students across languages.

Employing the Componential Model of Reading in Dyslexia Identification

The CMR accounts for the influence of language in reading acquisition. The CMR includes the ecological domain highlighting home and school environment factors such as the home literacy environment (Chiu et al., 2012), teaching practices (Sáez et al., 2012), and dialects or language varieties (e.g., Ortiz et al., 2012). According to Li et al. (2020), ecological factors such as the home literacy environment have received significant attention supported by evidence that substantiates a strong association between the home literacy environment and reading

outcomes for students across languages (Li et al., 2020). Chiu et al. (2012) outlined factors related to the ecological domain that significantly predicted reading outcomes over the other domains in the CMR (i.e., cognitive, psychological). Likewise, other research has shown that students from higher SES backgrounds tend to demonstrate higher reading achievement when compared to those from low SES backgrounds (Dickinson & Snow, 1987; Korat, 2005). Li et al. (2020) emphasized that outcomes in reading comprehension for students may be the result of the home literacy environment on the cognitive domain of the CMR. These are important considerations to keep in mind when attempting to identify ELs with dyslexia.

Reading Acquisition in a Predominantly English System

As a result, the field of education must thoughtfully respond to the current demographic realities present in the schools of the United States. This involves achieving a balance between student populations, teacher practice, and educational policy (Proctor & Chang-Bacon, 2020). More specifically, literacy requires an understanding of the interaction between these three factors to ensure not only our understanding of what best supports students but also ways to accurately identify difficulties for prescriptive interventions that facilitate their acquisition of literacy in English. Students who enter school in the United States as white, middle-class students benefit from established social and academic expectations of schools over students from differing cultural backgrounds (Smagorinsky et al., 2020).

In 2013, Ryan reported roughly one in five students speak a language other than English at home. More recently, estimates are that almost one-quarter of U.S. children, approximately 10 million, speak a language other than English in the home; however, English is the language of instruction encountered in school (Escamilla et al., 2022). As an example, monolingual students acquiring literacy in English are only responsible for mastery of skills connected to one system

of background cultural knowledge (Verhoeven, 2011). On the contrary, ELs must master these same abilities for two languages. With the majority of ELs born in the United States and that number only projected to increase as much as 20% by 2060, there are many considerations that must be made for the way we identify and intervene for ELs with dyslexia and specific learning disabilities in reading in public schools (Proctor & Chang-Bacon, 2020).

Orthographic Depth and Linguistic Distance

An orthography is defined as the visual representation of a language demonstrated by phonological, syntactic, morphological, and semantic features of the language (Joshi & Aaron, 2006). In a transparent and shallow orthography, there are more consistent sound to symbol correspondences that allow students to master reading at an earlier age or grade than that of opaque and deep orthographies. In an opaque and deep orthography, the correspondences between sound and symbol are not straightforward and there will be many sounds that map to one symbol, thus in English students demonstrate proficiency in literacy later due to the complexities of the orthography (Frost, Katz, & Bentin, 2981; Joshi & Aaron, 2006). In other words, reading acquisition looks different based on the depth and transparency of a language and the consistency of the correspondences between letters and sounds.

Seymour, Aro, and Erskine (2003) demonstrated that it can take up to two and a half years of formal instruction to develop decoding skills in English orthography compared to only one year of formal instruction in transparent orthographies like German, Spanish, and Finnish. It can take English speaking students until Grade 4 to match the mastery shown in more transparent orthographies at an earlier grade level. Additionally, it has also been reported that while both speed and accuracy of reading words might have been affected among children with reading difficulties in English-speaking children, only speed of word recognition, but not the accuracy of

reading words, might be affected in German- and Spanish-speaking children with reading difficulties (Joshi & Aaron, 2006). This is important to consider for students who are speaking one language at home and learning another in school.

Students learning English as a second language require explicit teaching of structured literacy concepts in English to demonstrate mastery. Dialects, also referred to as language varieties, can pose similar challenges for students when learning to read. A dialect is defined as a regionally or socially distinctive variety of language characterized by distinct vocabulary, sets of words, and even grammatical structures (Dialect, 2021). Dialects are mostly spoken and encountered in home environments and communities. Labov (1995), Charity et al. (2004), and Seidenberg (2017) have suggested that the linguistic features of African American English (AAE), spoken by some African American children, may be a source of some of African American children's literacy difficulties given that there is more often a gap between phonology and orthography than typically found in General American English. Further, Treiman (2004) and Washington and Craig (2002) have found that AAE affects spelling performance among African American children. Pittman (2014) reported that African American children performed below their counterparts in reading performance with 51% of African American fourth grade students at a below basic level in reading. These results are thought to be due to differences between AAE and General American English. African American English is a language variety commonly present in classrooms across the United States. It is considered a dialect or language variety of English that requires explicit and systematic teaching of English. With this in mind, students who come from an AAE background might also benefit from considerations of language when being evaluated for dyslexia or other learning disabilities.

Similar to the idea of orthographic depth, the amount of dialect observed in a student's language, known as dialect density, can influence their acquisition of reading and writing (Washington & Seidenberg, 2021). The higher the dialect density, the further the child's speech is from the language used in reading and writing. Linguistic distance determines how much instruction and practice might be required to make the connection between a student's oral language at home, oral language spoken by their teacher, and the language experienced in academic settings. Regardless of the dialect density and linguistic distance, it is imperative that a teacher or evaluator show consideration for the language differences a child brings to the testing environment. They must possess knowledge of ways these factors influence testing performance and reading outcomes to appropriately identify ELs with dyslexia (TEA, 2018). Furthermore, evaluators must have knowledge of linguistic transfer, or the amount of language transfer that can occur from a student's first language (L1) to their second language (L2). The foundations for early reading must be established for ELs with regard for their home literacy environment and the role it plays in reading development.

Identification of Dyslexia for Monolinguals

The process for screening monolingual students with dyslexia focuses on students who demonstrate significant problems in phonological awareness, sound-symbol correspondence, word decoding, fluency, and comprehension, along with difficulties related to spelling and written expression (Lyon et al., 2003; Tunmer & Greaney, 2010). Difficulties in reading can also be a result of poor or inadequate instruction and may also occur when students present with deficits in vision, hearing, or intellectual disabilities that impede reading (Rose, 2009). Not long ago, it was recommended that students wait until Grade 2 or 3 to be tested for dyslexia – the idea of 'wait to fail'. Research has shown that it is more beneficial for students to be identified

through early screening to provide ample opportunity for progress (Ferrer, et al., 2015; Hall & Moats, 1999). Gearin et al. (2021) reports that 33 states currently require universal screening for dyslexia. Of these 33 states, 13 of those require screening for Grades K-3, five for grades K-2, six require screening in K-1, two required screening only in kindergarten, and one required screening only in Grade 1 (Gearin, 2021). Further, the International Dyslexia Association (2019) recommends that evaluations should assess for the following factors: oral language skills, word recognition, decoding, spelling, phonological processing, automaticity/fluency skills, reading comprehension, and vocabulary knowledge. A child's educational background and family history can also provide useful insight into their specific difficulties. While early identification is key, older students may also present with characteristics of dyslexia.

Research indicates that students with dyslexia typically display several common characteristics: (a) difficulty with word reading (b) difficulty with spelling, (c) phonological processing difficulties that affect the way they connect sounds of language to print; and (d) reading is often slow and laborious (International Dyslexia Association, 2019). Furthermore, if a parent has dyslexia there is an increased likelihood that their children will also have dyslexia (Stanley & Petscher, 2017). Depending on the severity of their characteristics, individuals with dyslexia may experience long-term effects that require ongoing intervention.

In his 2019 book, *Learning Disabilities,* Fletcher et al. describes dyslexia as a "word level reading disability" (p. 109). This term is synonymous to dyslexia and is generally used in special education contexts. Fletcher highlights the presence of multiple factors that may contribute to dyslexia. Phonological awareness, awareness of the sounds system of a language, and Rapid Automatized Naming (RAN), the ability to name letters, numbers, or pictures quickly and correctly, are commonly associated with dyslexia. While they are independent of one

another, they do demonstrate a correlation. If a student struggles with phonological awareness, they may have difficulty manipulating the sounds in a language. This involves tasks such as blending, segmentation, isolation, and deletion, and can lead to difficulties with sound-symbol correspondence that translates to word reading and spelling. A difficulty with rapid naming is traditionally assessed by having students quickly read letters or numbers on the page in a timed setting. If a student struggles with this ability, it can manifest in basic word-level reading, as well as impair fluency.

Kilpatrick (2015) outlines the Simple View of Reading (SVR) and details the two components contributing to word-level reading that could account for characteristics of dyslexia. Cipher knowledge is the ability to use a code to pronounce words, while word-specific knowledge refers to a person's knowledge and experience with a particular word. Without letter-sound knowledge, emerging readers are unable to develop word-specific knowledge. Cipher knowledge consists of things such as phonological awareness, working memory, morphological awareness and rapid automatized naming. Kilpatrick (2015) continues that word-specific knowledge consists of cipher skills plus more advanced skills such as phonemic awareness, and vocabulary/phonological long-term memory. The skills required for reading achievement build on and interact with one another to create a solid foundation that leads to proficient reading comprehension. Given the number of factors that can contribute to a reading difficulty, dyslexia identification can prove challenging, therefore, it is imperative that educators and those responsible for conducting evaluations have specialized knowledge to be able to provide accurate determinations of dyslexia. Unfortunately, this is not always the case.

Identification of Dyslexia for ELs

The identification of dyslexia for ELs poses a particularly complex challenge as evaluators must disentangle the contributing factors for a diagnosis. It is necessary to discriminate between language-based or cognitive disabilities and the typical progression of second-language acquisition (Klingner et al., 2014). While the Texas Dyslexia Handbook has defined expectations for those who evaluate students for dyslexia, requiring specific knowledge about languages and analyzing the results through a cross-lingusitic lens (Geva et al., 2019; TEA, 2018), it remains problematic due to limitations regarding available materials in a student's first language and personnel trained to deliver those assessments. With a wide variety of languages represented in schools across the United States, few standardized test measures in languages other than English are utilized, and districts do not possess trained professionals able to test in those languages (Francis et al., 2019; Lesaux, 2019; Mortimore, 2012). In fact, English as a second language is now considered typical, meaning that knowledge of language acquisition and its implications is critical for those tasked with identification and intervention (Takanishi & LeMenestrel, 2017). When these factors remain elusive, it is impossible to achieve accurate identification for ELs, mistaking true reading difficulties for an English language development issue.

Dyslexia-Specific State Legislation

Only two states have yet to pass legislation related to dyslexia processes for identification and treatment (National Center on Improving Literacy, 2021). While this is a significant victory for students and families, issues remain in the way this legislation is carried out in each individual state specifically with regard to identification. Inconsistencies resulting from the interpretation of the definition of dyslexia, who is qualified to identify and intervene, as well as

the criteria that mark true dyslexia hamper the progress that could be made in such an historic time. In 2017, Texas passed House Bill 1886 that made screening mandatory for all Kindergarten and Grade 1 students and created provisions for teachers trained in the characteristics of dyslexia and multisensory instruction to deliver appropriate interventions to identified and at-risk students (H.B. 1886, 2017). This was ratified in an attempt to create a system of early identification so that students could receive earlier intervention in order to lessen the gap that widens as a result of later identification.

Specifically in Texas, there exists an ongoing debate whether to place dyslexia under special education where they would receive the benefits of the Individuals with Disabilities Education Act (IDEA) or under section 504 where they merely receive accommodations but have access to specialized intervention in the least restrictive environment (U. S. Department of Education, 2010, 2018). The Texas Tribune published this about the situation in 2020:

> Despite the revision, many schools confused by the handbook are still consistently declaring students with dyslexia automatically ineligible for special education. One educator wrongly told federal officials that students with dyslexia did not struggle with reading comprehension or fluency, so they did not need additional services. School staff referenced the Dyslexia Handbook as support for their current practices or, in some cases, a source of ambiguous guidance. (Swabby, 2020)

This reveals not only a misunderstanding of what level of services best support a student with dyslexia, but also a lack of understanding on the part of those serving the students. To further emphasize the issue of placement, in a report submitted to the Texas Education Agency in 2019, Because of confusion in the language surrounding students with dyslexia under special education, there is a discrepancy in the reporting as well. Stoker et al. (2019) demonstrated two

categories that seem very similar in language. A matter of semantics paints two very different pictures. Students with dyslexia who received special education services accounted for approximately 18.7%. Students receiving special education who have a dyslexia diagnosis account for only 5.21%. The report was not clear as to what differentiated the groups from one another, but it is evident that clarity is needed to get a true number of students identified with dyslexia who are also under the special education umbrella. Fortunately, the state has also recognized the need for this clarity and made some changes to address this issue.

Recent updates to the dyslexia handbook (2021) emphasize changes to the way students are identified. House Bill 1525 moves dyslexia to a single pathway for identification under IDEA requiring a Full and Individual Initial Evaluation (FIIE) that requires a full battery of tests in all areas (i.e., cognitive, achievement, behavioral) (H.B. 1525, 2021). While students will receive an exhaustive evaluation from a Licensed Specialist in School Psychology, this decision does not specifically address the unique needs of ELs nor provide information regarding ways districts can ensure diagnosticians have the appropriate knowledge and expertise to identify students with dyslexia.

An LSSP, also known as an Educational Psychologist (EP) or Educational Diagnostician (ED), is traditionally tasked with evaluating students for a dyslexia; however, they are not necessarily required to have specialized training in reading or understanding of reading assessments (Stothard et al., 2018). On a survey of six educational psychologists, Stothard et al. (2018) found no evidence of knowledge of theoretical models pertaining to dyslexia or reading, and only one of the six referenced phonological processing – a primary characteristic typically associated with dyslexia. Researchers also observed that the psychologists had issues with using

the label ‘dyslexia’, as well as several who did not perceive dyslexia as a priority for the school. This is troubling given that dyslexia is the most commonly identified reading disability.

In addition, the *Texas Dyslexia Handbook* outlines clear guidelines for those providing assessments and diagnoses of dyslexia for ELs. Professionals involved in the evaluation, interpretation of test results, and identification of ELs with dyslexia must possess the following understanding: 1) training/knowledge: 2) knowledge of first and second language acquisition theory, 3) knowledge of the written system of the first language: transparent (e.g., Spanish, Italian, German), syllabic (e.g., Japanese-kana), Semitic (e.g., Arabic, Hebrew), and morphosyllabic (e.g., Chinese-Kanji), 4) knowledge of the student’s literacy skills in both first and second languages, 5) knowledge of how to interpret results from a cross-linguistic perspective, 6) understanding how to interpret TELPAS (Texas English Language Proficiency Assessment System) results, and 6) knowledge to interpret the results of the student’s oral language proficiency in two or more languages in relation to the results of the tests measuring academic achievement and cognitive processes as well as academic data gathered and economic and socioeconomic factors (TEA, 2018). Requirements for training on these components for evaluators and diagnosticians must be updated as a part of their certification to ensure they possess the necessary knowledge for making accurate decisions about dyslexia identification.

Challenges in the Identification of Dyslexia

If psychologists lack understanding of dyslexia and the theories that support it, one can assume that this knowingly impacts the measures they employ in an evaluation, interpretation of the results, and the interventions they recommend. Stothard et al. (2018) further reported psychologists still rely on IQ testing and a discrepancy model to interpret results, despite other models that have been proven more effective for the diagnosis of dyslexia. Moreover,

recommendations from these psychologists for interventions related to commonly purchased curricula that did not focus on structured literacy or concentrated on psychological components such as motivation and self-image, with no mention of phonemic awareness, decoding, or structured literacy instruction.

Furthermore, many have reported issues with the way students are qualified following an evaluation. Dyslexia occurs on a continuum but is measured using certain cut scores that can seem arbitrary (Gearin et al., 2021; Wagner et al, 2020; Fletcher, 2019). A student who scores at or above the 25th percentile on a standardized test is considered in the average range, while a student who scores below the 25th percentile is considered below average. These students may be only a few points apart, but one receives a dyslexia diagnosis and access to services within the school, while the other may also require those same services to improve but misses qualification for services by marginal points. Gearin et al. (2021) maintains that there are heterogeneous conditions among students, meaning that students present with a variety of characteristics, and that in using equally valid assessments, evaluators could come to completely different conclusions regarding a dyslexia diagnosis. Similarly, as some states are requiring early screening for dyslexia, the grade levels vary, as well as the types of assessments and qualifying criteria used to decide.

Another factor with the identification of dyslexia relates to the "provision of effective classroom instruction" (Lyon, 2003). Also referred to as 'dysteachia', poor instruction has the propensity to contribute significantly to a student's success – or lack thereof - in reading (Binks-Cantrell & Joshi, 2015). Students may struggle to become proficient readers due to dysteachia, dyslexia, or both. Dysteachia occurs when teachers lack the explicit knowledge of the science of reading and often continue to use antiquated classroom practices that lack evidence (Brady &

Moats, 1997; Lyon, 1997). This is important because dysteachia can inflate the number of students who may qualify for dyslexia. For example, if a student has not been provided explicit instruction in phonological awareness, they would likely perform poorly on a screener which would trigger a formal dyslexia evaluation. When this student is formally evaluated, they will still do poorly on an assessment of phonological awareness and likely be identified as dyslexic. Consequently, when a teacher has knowledge of the science of reading, they know the value of phonological awareness instruction and provide it to all students in their classroom. In offering this instruction, identification of those who actually have a deficit becomes clearer and more reliable.

Classroom teachers face persistent obstacles in the identification of dyslexia for monolinguals, which proves even more difficult when faced with ELs demonstrating characteristics of dyslexia given concerns related to teachers' knowledge and ability to adequately address ELs in the classroom in general. Binks-Cantrell et al. (2012) observed that teachers are not being trained in their university programs to address the needs of struggling readers. Additionally, when we consider the structured literacy needs of our linguistically diverse students, research supports the idea that teachers are also not being trained in how a student's first language or dialect can impact their acquisition of academic English (Cárdenas-Hagan, 2020; Fogel & Ehri, 2006; Pittman et al., 2014; Pittman et al., 2020). This lack of teacher knowledge can then lead to an outcome of untreated dyslexia. In fact, some research suggests that ELs are under-identified in early elementary when interventions would be more effective (Artilles et al., 2005; Banks, 2017; Cirino et al., 2009; Lavin et al., 2020; Park, 2020). By upper elementary, some studies have shown they are over-represented and have missed the needed structured literacy intervention that might have closed the gap. For ELs in particular, until 2016

United States policy did not require districts or states to even collect data on English learners in special education programs. (Lavin et al. 2020). Thus, significant pedagogical challenges occur when the literacy practices of the school contrast greatly from those a student experiences in their homes and communities, and where teachers have little to no understanding of their home literacy experiences (Glynn et al., 2005; Wearmouth 2017), making it unfeasible for dyslexia identification to be accurate and for targeted interventions to be possible.

Finally, the prevalence rates of dyslexia have been reported based on research published prior to the passage of much of the dyslexia legislation (Fletcher, 2009; Fletcher et al., 2018; Lyon et al., 2007; Odegard et al., 2020). Therefore, more work must be done to assess the impact of these laws to allow for necessary updates with special attention given to the identification of ELs. The factors discussed are essential in allowing ample opportunities for ELs to be properly identified so they may receive appropriate intervention to have the greatest opportunities for success. Therefore, the present study will attempt to establish a rate of identification and factors that predict dyslexia identification for ELs to highlight areas for future research and growth and opportunities for policy development that ensure equitable conditions for all students.

CHAPTER III
METHODOLOGY

The present study is the result of a large sample of data from two significant years in the collection of PEIMS data for the state of Texas. 2013-14 was the first-year students identified with dyslexia were reported within the PEIMS system. 2019-20 was the most recent year reported with students in school for the majority of the school year considering the COVID-19 pandemic. Under identification for dyslexia is anticipated for students identified as ELs, thus, this study will examine the prevalence of dyslexia for the sample across the two school years to compare rates of identification for monolinguals to those of ELs. Moreover, factors that can be associated with a school dyslexia designation will also be investigated.

Research Design

The purpose of this study is to examine the identification of dyslexia for ELs and investigate changes in the rate of ELs identified with dyslexia related to the implementation of state legislation requiring mandatory screening for all Kindergarten and Grade 1 students. Specifically, this study aims to ascertain how the prevalence of dyslexia for monolinguals compares to that of ELs and how both compare to the percentages (i.e., 5-17%) commonly reported for monolinguals. Additionally, variables including SES, ethnicity, gender, and first language will be analyzed statistically using a multilevel logistic regression approach to account for the nesting of students within their schools and to investigate factors that predict dyslexia identification of ELs at the student and school levels.

To answer the research questions, student-level data was obtained through a public information request from the Texas Education Agency through PEIMS, which is used to track a variety of student variables. Specific variables requested include gender, grade level, ESL program, gifted, EL, dyslexia, ethnicity, Limited English Proficiency (LEP), and special

education. Exemption from the internal review board (IRB) for the student-level data has been requested and approved. A subsequent IRB request for the district employee survey has been submitted and deemed exempt due to the fact that no personal or identifiable information will be collected.

Data will be analyzed to examine the percentage of students identified with dyslexia for both the 2013-14 (n=2,337,241) and 2019-20 school years (n=2,355,447). In addition, specific percentages for monolinguals and ELs will be calculated to determine differences between the school years. Quantitative analysis will also be used to determine what factors predict a dyslexia identification for ELs (e.g., SES, gender, language, ethnicity). Descriptive and inferential statistical tests using Stata 17 will be used to fully investigate all research questions. Descriptive analyses will provide specific characteristics of the data set and include information on frequency and dispersion for both school years. This will allow the researcher to analyze the results to determine patterns for understanding relationships among the different variables (SES, gender, language, ethnicity) and how they may contribute to a dyslexia identification for ELs. Further, inferential statistical will be used to examine the relationship between the two samples, including differences across languages and shifts across grade levels between the years.

Multilevel logistic regression is used to predict the probability of membership dyslexic based on a set of predictors. Similar to the analysis conducted by Odegard et al. (2020), multilevel logistic regression will be utilized to investigate what variables (SES, gender, language, ethnicity) predict the likelihood of dyslexia identification for students also designated as English Learners. Odegard et al. (2020) highlighted that students with an ethnic identity of Hispanic or African American are less likely to be identified with dyslexia in the school setting. Analysis will attempt to replicate these findings with a more specific population. These will be

computed with statistically significantly correlated coefficients marked with an asterisk at both the $p < .05$ (*) and $p < .01$ (**) levels. Given the large sample size of this study, it is likely that significant results will be found. Therefore, calculations of the explained variance will also be included as a further measure to confirm significance. Finally, a series of hierarchical linear models (HLM; Raudenbush & Bryk, 2002) will be used, which controls for the nested nature of the data, to investigate the relationship between dyslexia identification and the aforementioned independent variables. Further discussion associated with the research design, description of the data sample, and plan for data analysis will follow.

Participants

Individual student-level data for the 2013-14 and 2019-20 school years was solicited through a public information request from the state of Texas through the PEIMS system maintained by the Texas Education Agency. Student records for 2013-14 included 2,337,241 student records, and another 2,355,447 records were obtained for the 2019-20 school year. Variables requested included gender, SES, EL, Limited English Proficiency (LEP), gifted, ethnicity, language, as well as dyslexia and special education classification. Campus ID and Student ID numbers were scrambled due to FERPA requirements; however, students from the same campus have the same scrambled campus identification number, thus making it possible to conduct the multilevel analysis and compare

Demographics

The total number of public and charter elementary schools reported in Texas as of 2021 includes 5,815 (Greatschools.org, n.d.). According to the Enrollment of Texas Public schools report from 2013-14, the total number of students enrolled for grades K-5 was 2,352,048. The sample includes 2,337,241 student records for that school year. The number of elementary

schools (public and charter) represented in this sample for 2013-14 is 5,056. The Enrollment of Texas Public schools report from 2019-20 published the total number of students enrolled in Texas elementary schools to be 2,373,588. The sample data for 2019-20 contains 2,355,447 student records and 5,226 elementary schools. Thus, the sample data represents approximately 99% of the total population for both 2013-14 and 2019-20.

All student-level data (n=4,692,688) obtained from the state of Texas will be used in the analysis to determine the percentage of students identified with dyslexia that will then be compared to ELs with and without a dyslexia identification. Student demographic information is presented in Table 1. For the 2013-14 school year, the state of Texas data sample is 28.94% White, 52.75% Hispanic, 12.28% African American, 3.54% Asian, and 2.49% other. Overall, 48.65% of the students in the state are female and 51.35% are male. 61.79% of students are designated as economically disadvantaged. Approximately, 24.88% of the sample is identified as EL, with 29.92% of the sample speaking a first language other than English. Spanish represents the majority of that percentage at 26.86%. Finally, students identified with a learning disability account for 1.76% of the sample for 2013-14.

Demographics for the 2019-20 school year followed a similar pattern - 27.50% White, 52.28% Hispanic, 16.93% African American, 4.53% Asian, and 3.29% other. The breakdown of gender did not change significantly for 2019-20 with 48.81% of the students in the state being female and 51.19% male. 63.22% of students are designated as economically disadvantaged with 24.98% of the sample identified as EL, and 29.43% speaking a first language other than English. Students speaking Spanish continued to represent the majority of that percentage at 25.34%. Finally, students identified with a specific learning disability increased to 2.40% of the sample for 2019-20.

It is interesting to note that ELs represent approximately 24-25% of the sample population across the year, but that English is spoken by approximately 70% of the sample. One reason for this discrepancy might be attributed to the way families fill out Home Language surveys when enrolling in school. Misunderstandings surrounding how to fill out the form or parents feeling that there will be repercussions in some way for stating that their first language is not English could contribute to a misrepresentation that translates to these numbers.

Table 1

Student Demographics

	2013-14		2019-20	
Category	**Number**	**Percentage**	**Number**	**Percentage**
Ethnic Distribution				
White	676,445	28.94	647,723	27.50
Hispanic	1,232,815	52.75	1,231,404	52.28
African American	287,094	12.28	292,190	12.40
Asian	82,787	3.54	106,601	4.53
Other	58,100	2.49	77,529	3.29
Gender				
Female	1,137,661	48.65	1,149,644	48.81
Male	1,200,180	51.35	1,205,803	51.19
Economically Disadvantaged	1,474,495	63.09	1,455,376	61.79
English Learners	581,541	24.88	588,430	24.98
Language				
English	1,637,959	70.08	1,662,285	70.57
Spanish	627,778	26.86	596,805	25.34
Korean	2,379	0.10	2,521	0.11
Mandarin	3,886	0.17	5,903	0.25
Vietnamese	15,159	0.65	12,710	0.54
Other	50,080	2.14	75,223	3.19
Special Education – Learning Disability	41,169	1.76	56,609	2.40

Students

Student enrollment by grade level (i.e., K-5) was calculated for both school years. This information is presented in Table 2. The obtained sample demonstrates consistent enrollment across years and grade levels for both school years.

Table 2

Student Enrollment by Grade

	2013-14		2019-20	
Grade	**Number**	**Percentage**	**Number**	**Percentage**
Kindergarten	389,886	16.68	381,948	16.22
Grade 1	407,179	17.42	388,750	16.50
Grade 2	391,973	16.77	385,625	16.37
Grade 3	387,236	16.57	388,353	16.49
Grade 4	380,816	16.29	396,805	16.85
Grade 5	380,151	16.26	413,966	17.57
Total	2,337,241	100	2,355,447	100

District Dyslexia and Special Education Personnel

To better understand the way students are identified with dyslexia, district personnel were surveyed to determine the measures and criteria commonly used in identification, as well as the process enacted when a student requires assessment in their first language and English. District employees were purposively sampled from a variety of districts around the state of Texas including a variety of district sizes to ensure the sample represents the general population. District personnel who held a district-level position and are charged with oversight of dyslexia assessment and/or identification through either a dyslexia department or Special Education were invited to participate in the survey via email recruitment. The anonymous survey was also shared widely across social media groups with the purpose of dyslexia evaluation or diagnosticians

focused on dyslexia identification. A random sample was taken of the responses to provide validity to the analysis.

Procedures

Access to state-maintained student-level data is secured through the Texas Education Agency's PEIMS portal. Due to FERPA regulations data is masked if small samples of students are identified that might lead to identification (e.g., one student connected to a campus ID that speaks Vietnamese is masked because of the very small representation). Each student-level variable will be coded depending on the number of categories obtained in the sample (e.g., ethnicity contained 5 categories). Variables were entered as categorical with a school identification of *Dyslexia* being 1, and 0 for otherwise. Sample data from the 2013-14 school year will be coded as 1, while data from 2019-20 will be coded as 2 under the variable *Year.* The variable for *EL* will also be coded 1 and 0 for yes and no respectively. *Ethnicity* will be coded 0 for Caucasian as the reference group, 1 for Hispanic, 2 for African American, 3 for Asian, and 4 for other. *SES* was coded 1 for students who received free and reduced lunch and 0 for those that did not, and *Gender* was coded 1 for male and 0 for female. *Language* will be coded similarly with 0 for English as the reference group, 1 for Spanish, 2 for Korean, 3 for Mandarin, 4 for Vietnamese, and 5 for other.

Data Analysis

Research Question 1

To answer RQ1 (What is the prevalence of dyslexia for ELs in grades K-5 when compared to that of monolinguals? How does it compare to the previously reported national average of 5-17% for monolinguals?), both datasets (i.e., 2013-14 and 2019-20) will be analyzed to identify the total number of students identified with dyslexia in the PEIMS system. Student

records will be coded to examine dyslexia status (1 if identified, 0 if not) and to determine the total number present in the dataset. Students identified with an English learner designation will also be coded (1 for yes, 0 for no) to establish a total number. Students who are both ELs and dyslexic will be separated to make a comparison between monolingual students identified with dyslexia and ELs identified with dyslexia. Preliminary observations for RQ1 can be found in Table 3 with differences in identification between populations and years modeled across both years in Figure 1. For both groups in both years, dyslexia identification is below the expected minimum rate of 5%, with ELs being considerably lower than monolinguals.

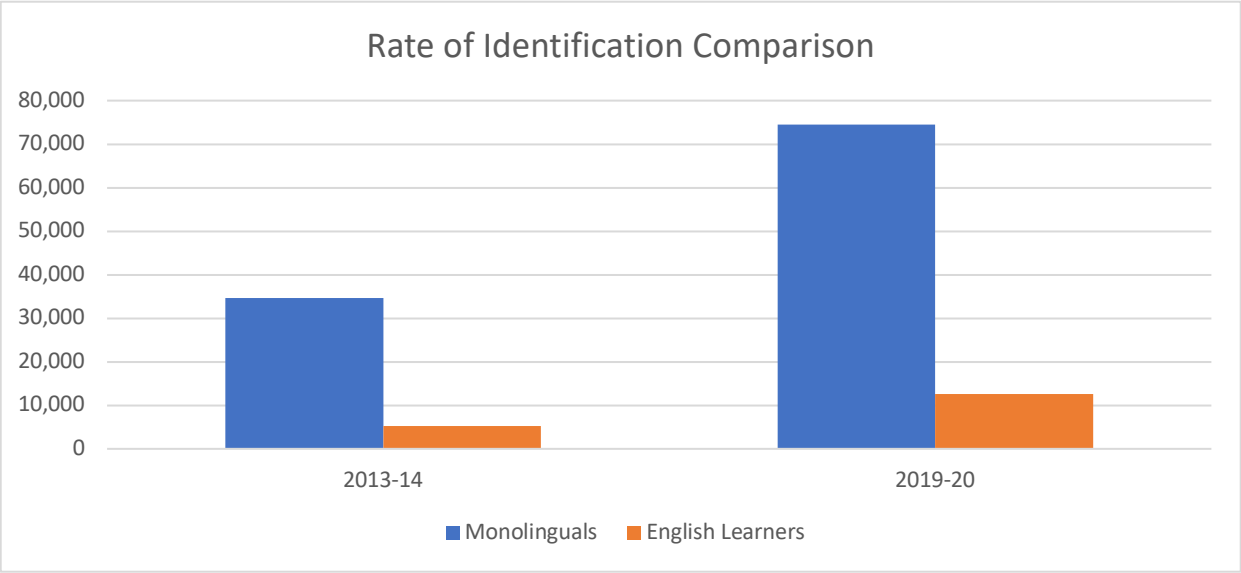
Table 3

Dyslexia Identification by Year

	2013-14			2019-20		
	Total Students	**Identified w Dyslexia**	**Rate of Identification**	**Total Students**	**Identified w Dyslexia**	**Rate of Identification**
Monolinguals	1,664,408	34,592	2.08%	1,767,017	74,420	4.2%
English Learners	549,558	5,195	0.95%	588,430	12,557	2.1%
Total	2,337,241	39,787	1.7%	2,355,447	86,977	3.7%

Figure 1.

Rate of Dyslexia Identification for Monolinguals vs ELs



Note. This figure demonstrates the differences between the identification of monolinguals and ELs between the two sample years, 2013-14 and 2019-20.

Additionally, the data were analyzed by grade level (i.e., K-5) to determine total number of students, total number of students identified with dyslexia, and total number of students identified as ELs to examine trends in identification across the two years following the implementation of state legislation requiring all Kindergarten and Grade 1 students to be screened for dyslexia. A shift in identification to an earlier grade level in year 2 is anticipated as a result. Descriptive statistics by grade level can be found in Table 4.

Table 4

Dyslexia Identification by Grade Level

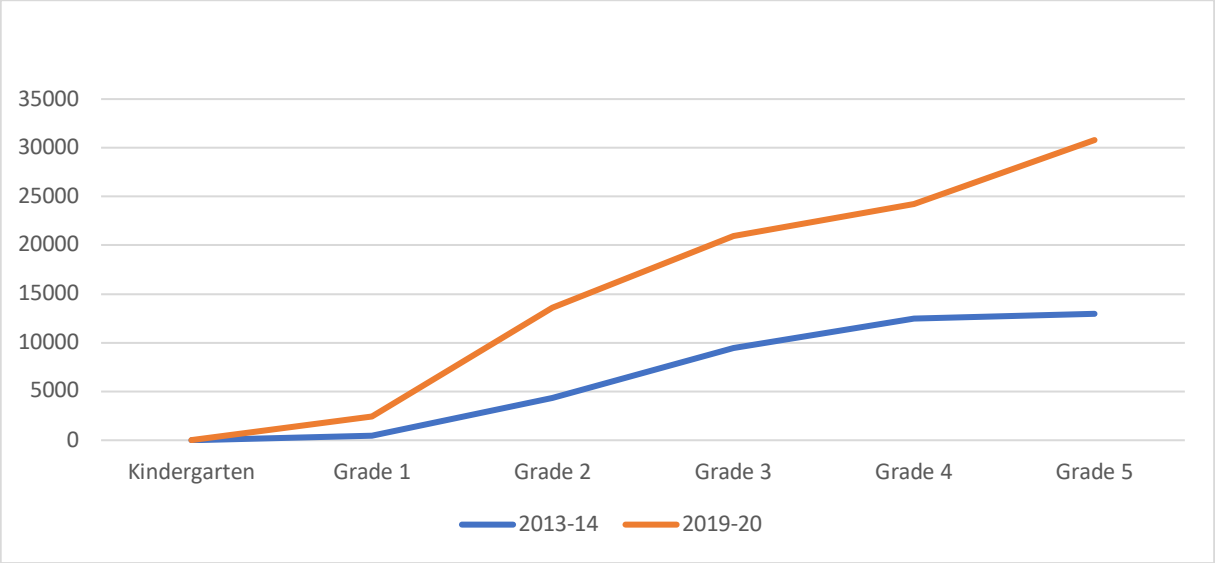
	2013-14			2019-20		
Grade Level	**Number**	**Dyslexia**	**%**	**Number**	**Dyslexia**	**%**
Kindergarten	389,886	0	0	381,948	17	.003
Grade 1	174,186	197	.11	388,750	2,408	.58
Grade 2	160,496	1,584	.99	385,625	13,590	3.9
Grade 3	159152	4,007	2.5	388,353	20,950	5.0

Grade 4	131,468	4,305	3.3	396,805	24,214	6.7
Grade 5	156,662	5,279	3.4	413,966	25,798	6.3
Total	**2,337,241**	**38,787**	**1.7**	**2,355,447**	**86,977**	3.7

Figure 2 demonstrates the trend in identification of dyslexia for all students across grade levels from both school years included in the sample. Further analysis will include the identification of ELs by grade level compared to that of monolinguals for a comparison between the trajectories to determine if there are statistically significant differences between groups at each grade level and between years.

Figure 2.

Dyslexia Identification by Grade Level



Note. This represents the total number of students identified with dyslexia in the samples from both school years.

Research Question 2

To answer RQ2 [How has the prevalence changed for English Learners since it was first reported during the 2013-14 school year? And what factors contribute to a dyslexia designation

for an English Learner (e.g., SES, ethnicity, school membership, language, gender)?], a series of hierarchical linear models (HLM; Raudenbush & Bryk, 2002) were used to control for the nested nature of the data, with students nested within schools. Intraclass correlations (ICC) were examined to determine the variability among schools.

A multilevel logistic regression model was examined that includes four student-level predictors as fixed effects. The model also contained one school-level predictor as a random effect. The dependent variable in the multilevel logistic regression model was the student's assigned dyslexia status from PEIMS. It was coded as a dichotomous variable with 1 for dyslexia and 0 otherwise. The associated regression equation is provided followed by the notation for the combined equation (Raudenbush & Bryk, 2002).

(1) Level 1: $\mathbf{Y_{ij} = \beta_{0j} + \beta_{1j}EnglishLearner_{ij} + \beta_{2j}SES_{ij} + \beta_{3j}Gender_{ij} + \beta_{4j}Ethnicity_{ij} + e_{ij}}$

Y_{ij} is dyslexia identification for student *i* in school *j*, β_{0j} is the student specific intercept, β_{1j} is the regression coefficient that captures the effect that being an English Learner has on the likelihood of dyslexia identification, β_{2j} is the regression coefficient that captures the effect that SES has on the likelihood of dyslexia identification, β_{3j} is the regression coefficient that captures the effect that being gender has on the likelihood of dyslexia identification, β_{4j} is the regression coefficient that captures the effect that a student's ethnicity has on the likelihood of dyslexia identification, and e_{ij} is the error term at the student level.

Level 2A: $\mathbf{\beta_{0j} = \gamma_{00} + U_{0j}}$

The adjusted mean score in a school is further modeled as the mean score across all schools plus a residual (i.e., school random effect associated with the intercept).

$$\textbf{Dyslexia Identification} = \gamma_{00} + \gamma_{01}\textit{EnglishLearner}_{ij} + \gamma_{02}\textit{SES}_{ij} + \gamma_{03}\textit{Gender}_{ij} + \gamma_{04}\textit{Ethnicity}_{ij} + \mathbf{u_{0j}}$$

The four separate student-level predictors were created by dummy coding each student in a school as a 1 if the student (a) is identified in PEIMS as dyslexic (1 for dyslexic, 0 for no), (b) identified as an English learner (1 for yes, 0 for no), (c) was male (1 for male, 0 for no), and (e) received free/reduced lunch (1 for yes, 0 for no).

Regression coefficients for each variable captured the effect of that predictor on dyslexia identification for student *i* in school *j*. The estimates represent whether EL status, SES, gender, or ethnicity predict the likelihood of dyslexia identification for student *i* in school *j*. The model also estimated the role of individual ethnic identities (e.g., Hispanic, African American, Asian, other) on the likelihood of dyslexia identification in the sample. Ethnicity was coded as a categorical variable with Caucasian as the reference category labeled as 0, Hispanic as 1, African American as 2, Asian as 3, and other as 4. The estimates for the school-level predictor represent the role of campus in dyslexia identification.

Research Question 3

Likelihood of Dyslexia Identification by Year. The individual data sets were compared to determine shifts in dyslexia identification for ELs across time. Moreover, the data sets from both 2013-14 and 2019-20 were combined and coded by Year, with 2013-14 as the reference group (coded as 1, 2019-20 = 2), to determine changes between groups and the likelihood of a dyslexia diagnosis for ELs depending on the year of identification. A model was examined

including five student-level predictors as fixed effects and two school-level predictors as random effects. The dependent variable in the multilevel logistic regression model was again the student's assigned dyslexia status from PEIMS. It was coded as a dichotomous variable with 1 for dyslexia and 0 otherwise. The associated regression equation is as follows, followed by the notation for the combined equation (Raudenbush & Bryk, 2002).

(2) **Level 1:** $\mathbf{Y_{ij} = \beta_{0j} + \beta_{1j}Year_{ij} + \beta_{2j}EnglishLearner_{ij} + \beta_{3j}SES_{ij} + \beta_{4j}Gender_{ij} + \beta_{5j}Ethnicity_{ij} + e_{ij}}$

Y_{ij} is dyslexia identification for student *i* in school *j*, β_{0j} is the student specific intercept, β_{1j} is the regression coefficient that captures the effect that year has on the likelihood of dyslexia identification., β_{2j} is the regression coefficient that captures the effect that English learner status has on the likelihood of dyslexia identification, β_{3j} is the regression coefficient that captures the effect SES has on the likelihood of dyslexia identification, β_{4j} is the regression coefficient that captures the effect gender has on the likelihood of dyslexia identification, β_{5j} is the regression coefficient that captures the effect that a student's ethnicity has on the likelihood of dyslexia identification, and e_{ij} is the error term at the student level.

Level 2A: $\mathbf{\beta_{0j} = \gamma_{00} + U_{0j}}$

The adjusted mean score in a school is further modeled as the mean score across all schools plus a residual (i.e., school random effect associated with the intercept).

Combined = $\gamma_{00} + \gamma_{01}\mathbf{Year}_{ij} + \gamma_{02}\mathbf{EnglishLearner}_{ij} + \gamma_{03}\mathbf{SES}_{ij} + \gamma_{04}\mathbf{Gender}_{ij} + \gamma_{05}\mathbf{Ethnicity}_{ij} + \gamma_{10}\mathbf{Campus}_{ij} + \gamma_{20}\mathbf{Year}_{ij} + \mathbf{U}_{0j} + \mathbf{e}_{ij}$

Dyslexia Identification by Grade Level. Differences among grade level were also investigated to note patterns related to dyslexia identification. Given the importance of early identification for students with dyslexia, analysis of shifts across time regarding the likelihood of a dyslexia identification at a certain grade level were conducted.

(3) Level 1 (student level): $\mathbf{Y}_{ij} = \beta\mathbf{0j} + \beta\mathbf{1jYear}_{ij} + \beta\mathbf{2jEnglishLeaner}_{ij} + \beta\mathbf{3jGrade}_{ij} + \mathbf{e}_{ij}$

Y_{ij} is the average odds of receiving a dyslexia diagnosis score for for *i* in school *j*, β_{0j} is the school-specific intercept, $Year_{ij}$, English $Learner_{ij}$, and $Grade_{ij}$ are the student characteristic variables for student *i* in school *j*, β_{1j} is the regression coefficient that captures the effect that Year has on the likelihood of dyslexia identification, β_{2j} is the regression coefficient that captures the effect that English Learner status has on the likelihood of dyslexia identification, β_{3j} is the regression coefficient that captures the effect that grade level has on the likelihood of dyslexia identification, and e_{ij} is the error term at the student level.

Level 2A (school level): $\beta_{0j} = \gamma_{00} + \mathbf{U}_{0j}$

The adjusted mean score in a school is further modeled as the mean score across all schools plus a residual (i.e., school random effect associated with the intercept).

$$\textbf{Combined} = \gamma_{00} + \gamma_{01}\textbf{Year}_{ij} + \gamma_{02}\textbf{EnglishLearner}_{ij} + \gamma_{03}\textbf{Grade}_{ij} + \gamma_{10}\textbf{Campus}_{ij} + \gamma_{20}\textbf{Year}_{ij} + \textbf{U}_{0j} + \textbf{e}_{ij}$$

Research Question 4

Finally, to answer RQ4 (What measures and criteria are used to identify students with dyslexia across the state of Texas? And how are ELs identified for dyslexia when tests are not available in their first language?), a brief mixed-methods survey using Qualtrics was delivered to purposively sampled district personnel around the state via email recruitment for participation. Response to the survey included consent for participation prior to delivery of the survey questions. The sample included participants from across the state of Texas who are in a role tasked with identifying students with dyslexia. Contact information (i.e., email) was obtained from publicly available, published district websites. Emails including the informed consent and survey link were sent with a four-week window for completion provided before the survey was deactivated. The anonymous survey link was also posted in several private social media groups for professionals who have a role in identifying dyslexia. Once responses were received and coded, a random sample was taken from the surveys to ensure a complete representation of the population.

The *Texas Dyslexia Handbook* outlines areas that should be evaluated in the identification of dyslexia regarding both monolinguals and ELs; however, districts have the autonomy to select measures utilized in this process and LSSPs and diagnosticians play a significant role in the delivery and interpretation of these measures. Given this, a brief, eight-question survey was delivered to gather specific information about the processes followed by districts across the state of Texas. The following questions were included in the survey: 1) What state are you associated with? 2) What is your role in dyslexia identification? (e.g., Reading

Specialist/CALT, Educational Diagnostician, Dyslexia Specialist – District, LSSP) 3) What assessment instruments are typically used in the identification of dyslexia in your district (e.g., Woodcock-Johnson IV Cognitive, CTOPP-2, GORT-5)? 4) What criteria are used to make a determination of dyslexia for monolinguals and ELs (i.e., IQ, RAN, listening vs. Reading Comprehension, other)? and 5) How are ELs addressed with regard to dyslexia identification? Do they receive testing in their first language and English? What is the process when testing in their first language (i.e., Mandarin, Korean, Arabic) is not available? 6) Who is responsible for testing in your school district (e.g., LSSP, Educational Diagnostician, Reading Specialist, other)? 7) Do you believe that IQ should be considered in dyslexia identification? 8) What type of school are you associated with (e.g., public, charter, private)?

Responses to the survey were coded and analyzed for patterns related to common assessments, criteria, and processes across districts. In addition, responses were compared to expectations of the *Texas Dyslexia Handbook* to determine consistency across districts and adherence to the guidelines. Analysis of these responses should emphasize inconsistencies across the state and provide insight into ways to improve the identification of students with characteristics of dyslexia, as well as strengths and weaknesses involved in the way districts address the identification of ELs.

CHAPTER IV
RESULTS

This chapter presents the results of the dissertation study. Stata17 (Stata Corp, 2021) was used to conduct all statistical analyses. In the present study, student-level data (i.e., dyslexia status, SES, Language, ethnicity, campus ID) obtained from the Texas Education Agency for students enrolled in grades K-5 for the school years 2013-14 and 2019-20 were coded and analyzed. In addition, responses from a brief survey including district personnel tasked with dyslexia identification were examined.

Research Question 1: Prevalence of dyslexia for ELs in grades K-5

2013-14 School Year

Data from the 2013-14 school year (n=2,337,241) were analyzed using Stata17 (Stata Corp, 2021). Variables were coded, examined, and compared to determine the prevalence of dyslexia for ELs. The commonly reported and referenced prevalence can be anywhere between 5-17% in children learning to read in English (Shaywitz, 1998). In order to compare percentages between the two groups, it was necessary to establish an overall percentage of students identified with dyslexia within the data to understand patterns of identification. Preliminary calculations referenced in the previous chapter were confirmed through repeated analysis. To calculate the overall percentage of students identified with dyslexia, the number of students with an assigned dyslexia status (n=39,787) was divided by the total number of students in the sample (N=2,337,241) for a percentage of 1.7%, well below the 5% noted by Shaywitz (1998) and reinforced by Shaywitz et al. (2021) as shown in Table 5. The data was then divided among monolinguals and ELs to ascertain differences between groups. The prevalence of dyslexia for monolinguals equaled 2.1%. The number of ELs identified with dyslexia (n=5,195) was divided

by the total number of students designated with an EL status (N= 549,558) resulting in a percentage of .95%.

Table 5

Students Identified with Dyslexia 2013-14

	Total Students	Identified w Dyslexia	Rate of Identification
Monolinguals	1,664,408	34,592	2.1%
English Learners	549,558	5,195	0.95%
Total	2,337,241	39,787	1.7%

Gender. One commonly acknowledged myth regarding dyslexia is that it is more present in males than in females (Shaywitz et al., 1990; Miles et al., 1998). The data were investigated to highlight trends in dyslexia identification between males and females, as well as between males and females who were also ELs. Of the overall number of students identified with dyslexia, 59% were male and 41% female. When examining ELs specifically, 64% were male and only 36% were female. ELs that were male account for 8.3% of the total number of EL students identified with dyslexia, while females who were also ELs account for only 4.7%. The number of males who were also ELs (n=3,317) was divided by the total number of students (N=2,337,241) to find the rate of identification which resulted in .14%, as presented in Table 6. Finally, the number of females who were also ELs (n=1,878) was divided by the total number of students (N=2,337,241) for a rate of identification of .08%. It is evident from the sample that more males than females across both monolinguals and ELs are being identified with dyslexia over females.

Table 6

Dyslexia Identification by Gender 2013-14

	Monolingual	English Learner	Total	Rate of Identification for ELs (%)
Male	20,288	3,318	23,606	.14
Female	14,304	1,878	16,182	.08
Total	34,592	5,196	39,788	.22

Socioeconomic status. As approximately 63% of students in Texas receive free and reduced lunch indicating a low socioeconomic status, it was important to determine the percentage of ELs that are identified with dyslexia in relation to their SES. There are 581,541 ELs in the sample and 89% of those students receive free and reduced lunch. 61% of all students identified with dyslexia were also qualified as low SES. With 39,788 students in the sample identified with dyslexia, only 12% also classified as both EL and low SES, seemingly low compared to the 89% who receive free and reduced lunch.

Ethnicity. Further analysis was conducted to determine the role of ethnicity in dyslexia identification. The majority of students in the sample were recognized as Hispanic/Latino representing 53% of the overall sample demonstrated in Table 7. Dyslexia identification among Hispanic students, however, was only1.4%. Caucasian students represented only 29% of the overall sample yet had the highest number of students identified with dyslexia at 2.5%. African American students account for 12.3% of the overall sample with approximately 1.6% identified with dyslexia, slightly higher than the Hispanic/Latino percentage. 3.5% of the sample includes Asian students with an identification rate of .016. Finally, students included in the 'other' category (e.g., Native Hawaiian or Pacific Islander, American Indian or Alaska Native, two or more races) comprised 2.5% of the overall sample with 1.6% of these students being identified with dyslexia. These results demonstrate a higher prevalence of dyslexia identification for students classified as Caucasian.

Table 7

Dyslexia Identification by Ethnicity 2013-14

Ethnicity	Identified with Dyslexia	No Dyslexia Identification	Total Students	% of total population	%
Caucasian	17,063	659,382	676,445	29	2.5
Hispanic/Latino	17,571	1,215,244	1,232,815	53	1.4
African American	4,234	282,860	287,094	12	1.6
Asian	13	82,774	82,787	3.5	<.001
Other	906	57,194	58,100	2.5	1.6
Total	39,787	2,297,454	2,337,241	100	1.7

Language. Additionally, the data were evaluated to investigate dyslexia identification with regard for a student's first language. As shown in Table 8, contrary to ethnicity, the majority of students (n=1,637,959) in the overall sample indicated English as their first language with 70%. Students speaking English and identified with dyslexia account for 2.1%. Approximately 27% of the overall sample designated Spanish as their first language. Students whose first language is Spanish and are identified with dyslexia account for .93% of the sample. There were no students identified with dyslexia for other languages represented in the data for 2013-14 (e.g., Korean, Mandarin, Vietnamese).

Table 8

Dyslexia Identification by Language 2013-14

Language	Identified with Dyslexia	No Dyslexia Identification	Total Students	% of total population	%
English	33,977	1,603,982	1,637,959	70	2.1
Spanish	5,810	621,968	627,778	27	.93
Korean	0	2,379	2,379	.10	0
Mandarin	0	3,886	3,886	.17	0
Vietnamese	0	15,159	15,159	.65	0

Other	0	50,080	50,080	2.1	0
Total	39,787	2,297,454	2,337,241	100	1.7

Grade level. The sample was also analyzed by the number of students identified with dyslexia per grade level. No students in kindergarten were identified with dyslexia for the 2013-14 school year. The percentage of students increased with grade level, and the highest number of students were observed in Grade 5, presented in Table 9.

Table 9

Dyslexia Identification by Grade Level 2013-14

Grade Level	Number	Students with Dyslexia	%
Kindergarten	389,886	0	0
Grade 1	407,179	489	0.12
Grade 2	391,973	4,358	1.11
Grade 3	387,236	9,463	2.44
Grade 4	380,816	12,505	3.28
Grade 5	380,151	12,972	3.41
Total	2,337,241	39,787	1.7

Finally, identification by grade level was further separated between monolinguals and ELs. Percentages were calculated to determine differences in dyslexia identification between the two groups across grade levels. Table 10 shows the percentage of students identified for both groups increased with grade level. Consistent with other findings, monolingual students were identified with dyslexia in greater numbers overall, as well as recognized at an earlier grade level than their EL peers. Percentages of monolingual students with dyslexia were double or more than double the percentage of ELs in grades 1, 2, and 3. The highest percentage of monolingual students was identified in Grade 4 at 3.65% while the highest percentage for ELs was observed in Grade 5 at 2.44%. Neither group at any grade level reached even the minimum percentage of

identification commonly reported for dyslexia identification (i.e., 5-17%). Further, the prevalence of dyslexia for the sample as a whole fell well below the minimum 5% reported by Shaywitz in 1998.

Table 10

Dyslexia Identification by Grade Level and EL Status 2013-14

Grade Level	Total Students	Total Monolingual	Total ELs	Monolinguals with Dyslexia	%	ELs with Dyslexia	%
Kindergarten	389,886	192,434	74,177	0	0	0	0
Grade 1	407,179	294,252	112,927	413	0.14	76	0.07
Grade 2	391,973	285,340	106,633	3,821	1.34	537	0.50
Grade 3	387,236	286,661	100,575	8,292	2.89	1,171	1.16
Grade 4	380,816	296,054	84,762	10,817	3.65	1,688	1.99
Grade 5	380,151	309,667	70,484	11,249	3.63	1,723	2.44
Total	**2,337,241**	**795,337**	**253,238**	**39788**	**2.08**	**5196**	**0.95**

2019-20 School Year

Similarly, data from the 2019-20 school year (n=2,355,447) was examined for representation of dyslexia in the sample as shown in Table 11. The number of student identified with dyslexia (n=86,977) was divided by the total number of students (N=2,355,447) for an overall prevalence of 3.7%. When divided between monolinguals and ELs, there were 33,968 monolinguals designated as dyslexic, resulting in a rate of 4.2%. Finally, 6,260 ELs were identified with dyslexia divided by the total (N=2,355,447) for a percentage of 2.3.

Table 11

Students Identified with Dyslexia 2019-20

	Total Students	Identified w Dyslexia	Rate of Identification
Monolinguals	1,767,017	74,420	4.2%
English Learners	588,430	12,557	2.1%

Total	2,355,447	86,977	3.7%

Gender. The 2019-20 data were also explored to find trends related to males versus females identified with dyslexia to compare to the results from 2013-14. As shown in Table 12, the data was again investigated to highlight trends in dyslexia identification between males and females, as well as between males and females who were also ELs. Of the overall number of students identified with dyslexia, 56% were male and 44% female. When examining ELs specifically, 59% were male and only 41% were female. ELs that were male account for 8.5% of the total number of students identified with dyslexia, while females who were also ELs account for only 5.96%. The rate of identification of dyslexia in males based on the population doubled from 2013-14 to 2%. The overall total for females with dyslexia also increased to 1.6%. The number of males who were also ELs (n=7,377) was divided by the total number of students (N=2,355,447) to find the rate of identification which resulted in .31%. Finally, the number of females who were also ELs (n=5,180) was divided by the total number of students (N=2,355,447) for a rate of identification of .22%. While the overall numbers have increased from the 2013-14 school year, males continue to be identified at a higher rate than females. The same is true for males and females who are also ELs.

Table 12

Dyslexia Identification by Gender 2019-20

	Monolingual	**English Learner**	**Total**	**Rate of Identification for ELs (%)**
Male	41,064	7,377	48,441	.31
Female	33,356	5,180	38,536	.22
Total	74,420	12,557	86,977	3.69

Socioeconomic status. In 2019-20, approximately 61% of students in Texas receive free and reduced lunch indicating low socioeconomic status. There are 588,430 ELs in the sample and 85% of those students receive free and reduced lunch. 59% of all students identified with dyslexia were also qualified as low SES. With 86,977 students in the sample identified with dyslexia, only 13% are also classified as both EL and low SES, which is similar to the 2013-14 sample and again seems low with 85 % of ELs receiving free and reduced lunch.

Ethnicity. Data was also analyzed to determine the role of ethnicity in dyslexia identification for the 2019-20 school year, demonstrated in Table 13. The majority of students in the sample were designated as Hispanic/Latino representing 52% of the overall sample, a slight decrease from the 2013-14 school year. Dyslexia identification for this population in 2019-20, however, increased from 1.4 to 3.2%. Caucasian students represented only 28% of the overall sample with a rate of dyslexia identification at 5.5%, an improvement from the 2.5% in 2013-14. African American students account for 12% of the overall sample with an increase from 1.6 to 3.1% from the comparison year. It is also worth noting that the percentage for African American students is comparable to that of Hispanic/Latino students although they account for only 12% of the overall sample of students. 5% of the sample includes Asian students with a percentage of .14 identified with dyslexia. Finally, students from the 'other' category comprised 3.5% of the overall sample with 3.5 % of this category being identified with dyslexia, increasing from 1.6% in 2013-14.

Table 13

Students with Dyslexia by Ethnicity 2019-20

Ethnicity	Identified with Dyslexia	No Dyslexia Identification	Total Students	% of total population	%
Caucasian	35,589	612,214	647,723	28	5.5

Hispanic/Latino	39.670	1,191,734	1,231,404	52	3.2
African American	8,957	283,233	292,190	12	3.1
Asian	150	106,451	106,601	5.0	.14
Other	2,691	74,838	77,529	3.0	3.5
Total	86,977	2,268,470	2,355,447	100	3.7

Language. The data were also evaluated to investigate dyslexia identification related to a student's first language. Contrary to ethnicity, the majority of students (n=1,662,285) in the overall sample indicated English as their first language at 71%. As shown in Table 14, students speaking English and identified with dyslexia account for 4.4 %, an increase of 1.45% in 2013-14. Approximately 25% of the overall sample identified Spanish as their first language. Students whose first language is Spanish and are assigned a dyslexia status account for .58% of the sample. The 'other' category accounts for 3.2 % of the population and includes a mere 10 students identified with dyslexia, representing less than .001%. There were no students identified with dyslexia for any other language found in the data for 2019-20.

Table 14

Students with Dyslexia by Language 2019-20

Language	Identified with Dyslexia	No Dyslexia Identification	Total Students	% of total population	%
English	73,378	1,588,907	1,662,285	71	4.4
Spanish	13,589	583,216	596,805	25	.58
Korean	0	2,521	2,521	.11	0
Mandarin	0	5,903	5,903	.25	0
Vietnamese	0	12,710	12,710	.54	0
Other	10	75,213	75,223	3.2	<.001
Total	86,977	2,268,470	2,355,447	100	3.7

Grade level. The sample was again broken down by the number of students identified with dyslexia per grade level. While no students in kindergarten were identified with dyslexia for the 2013-14 school year, Table 15 reports that 17 students were identified in 2019-20. Comparable to 2013-14, the percentage of students increased as grade level increased with the highest number of students identified in Grade 5 at 6.23%. Additionally, percentages for Grades 3, 4, and 5 met the minimum percentage of identification expected in the population reported by Shaywitz (1998) of 5% although the overall percentage (3.70%) fell below.

Table 15

Dyslexia Identification by Grade Level 2019-20

Grade Level	Total Students	Students with Dyslexia	%
Kindergarten	381,948	17	<0.001
Grade 1	388,750	2,408	0.62
Grade 2	385,625	13,590	3.52
Grade 3	388,353	20,950	*5.39
Grade 4	396,805	24,214	*6.10
Grade 5	413,966	25,798	*6.23
Total	**2,355,447**	**86,977**	3.70

Note. *Percentage falls in the range of expected prevalence reported by Shaywitz (1998) of 5-17%.

Similar to 2013-14 results, identification by grade level was further separated by monolinguals versus ELs. Percentages were calculated to determine differences in dyslexia identification between the two groups across grade levels. The percentage of students identified for both groups increased with grade level, as shown in Table 16. Consistent with other findings, monolingual students were identified with dyslexia in greater number overall, as well as recognized at an earlier grade level than their EL peers. Percentages of monolingual students with dyslexia were double or more than double the percentage of ELs across all grades. The

highest percentage of monolingual students for 2019-20 was identified in Grade 5 at 8.48% while the highest percentage for ELs was observed in Grade 5 at 3.96%. The prevalence of dyslexia for monolinguals in grades 3, 4, and 5 fell within the range reported by Shaywitz (1998); however, the percentages for ELs were consistently below this range. Consequently, the overall prevalence of dyslexia for the total sample was also below the expected percentage of identification at 3.7%.

Table 16

Dyslexia Identification by Grade Level and EL status 2019-20

Grade Level	Total Students	Total Monolingual	Total ELs	Monolinguals with Dyslexia	%	ELs with Dyslexia	%
Kindergarten	381,948	288,219	93,729	17	0.01	0	0.00
Grade 1	388,750	287,402	101,348	2096	0.73	312	0.31
Grade 2	385,625	286,169	99,456	11,603	4.05	1987	2.00
Grade 3	388,353	287,937	100,416	17,941	6.23	3009	3.00
Grade 4	396,805	298,844	97,961	20,751	6.94	3,463	3.54
Grade 5	413,966	318,446	95,520	27,012	8.48	3786	3.96
Total	2,355,447	1,767,017	588,430	79,420	4.49	12557	2.13

Research Question 2: Factors that Predict Dyslexia Identification

To answer RQ2 [How has the prevalence changed for English Learners since it was first reported during the 2013-14 school year? And what factors contribute to a dyslexia designation for an English Learner (e.g., ethnicity, SES, gender, campus)] a series of hierarchical linear models (HLM; Raudenbush & Bryk, 2002) was used to control for the nested nature of the data, with students being nested within schools and to explore the influence of student and school-level factors on the identification of dyslexia for ELs. Intraclass correlations (ICC) were also calculated for both school years to determine the variability among schools.

Estimating the probability of dyslexia status based on certain factors was examined for each individual school year reported including four student-level predictors as fixed effects and one school level predictor as a random effect. The dependent variable in the multilevel logistic regression model was the student's assigned dyslexia status from PEIMS. It was coded as a dichotomous variable with 1 for dyslexia and 0 otherwise. The associated regression equation is as follows using the notation for the combined equation (Raudenbush & Bryk, 2002).

(1) **Level 1:** $\mathbf{Y_{ij} = \beta_{0j} + \beta_{1j}EnglishLearner_{ij} + \beta_{2j}SES_{ij} + \beta_{3j}Gender_{ij} + \beta_{4j}Ethnicity_{ij} + e_{ij}}$

Y_{ij} is dyslexia identification for student *i* in school *j*, β_{0j} is the student specific intercept, β_{1j} is the regression coefficient that captures the effect that being an English Learner has on dyslexia identification, β_{2j} is the regression coefficient that captures the effect that SES has on dyslexia identification, β_{3j} is the regression coefficient that captures the effect that being male has on dyslexia identification, β_{4j} is the regression coefficient that captures the effect that a student's ethnicity has on dyslexia identification, and e_{ij} is the error term at the student level.

Level 2A: $\mathbf{\beta_{0j} = \gamma_{00} + U_{0j}}$

The adjusted mean score in a school is further modeled as the mean score across all schools plus a residual (i.e., school random effect associated with the intercept).

$$\textbf{Dyslexia Identification} = \gamma_{00} + \gamma_{01}EnglishLearner_{ij} + \gamma_{02}SES_{ij} + \gamma_{03}Gender_{ij} + \gamma_{04}Ethnicity_{ij} + u_{0j}$$

The four separate student-level predictors were created by dummy coding each student in a school as a 1 if the student (a) is identified in PEIMS as dyslexic (1 for dyslexic, 0 for no), (b) identified as an English learner (1 for yes, 0 for no), (c) was male (1 for male, 0 for no), and (e) received free/reduced lunch (1 for yes, 0 for no). Ethnicity was coded as a categorical variable with Caucasian as the reference category labeled as 0, Hispanic as 1, African American as 2, Asian as 3, and other as 4.

The school-level variable was the student's campus, coded as a string variable that represented students nested in schools. Regression coefficients for each variable captured the effect of that predictor on dyslexia identification for student *i* in school *j*. The estimates represent whether EL status, SES, gender, or ethnicity predict the likelihood of dyslexia identification for student *i* in *j* school. The model also estimated the role of individual ethnic identities (e.g., Hispanic, African American, Asian, other) on the likelihood of dyslexia identification in the sample. The estimates for the school-level predictor represents the role of campus in dyslexia identification.

2013-14

The model was first run without predictors to assess the variation of the log odds from one cluster to another (Sommet & Morselli, 2017). To estimate the likelihood of a student who is also an EL being identified with dyslexia, it was necessary to analyze the likelihood of any student in the sample being identified with dyslexia. The model was first analyzed for the 2013-14 school year with the sample representing students (N=2,337,241) nested in schools (K= 5,099). The range of observations per group is from 1 to 1,615 with an average of 458.4. Estimates for the intercept, standard error, *z* statistics, associated *p* values, and 95% confidence intervals were calculated. Additionally, an intra-class correlation (ICC) was calculated to

determine the proportion of total variance in the outcome variable that can be explained by the between-group variance. The ICC was .293 which means that between-school differences accounted for 29.3% of the variance in the identification of students with dyslexia.

The intercept (γ_{oo}), or log-odds value for this model was -4.56 with an associated odds ratio of .01 (z = -237.27, p = .000, 95% CI [-4.60, -4.53]), suggesting that a student has a 1% chance of being classified as dyslexic for the 2013-14 school year. The log-likelihood ratio test comparing the null model with the ordinary logistic regression yields a reduction of -188226.31 (chi2(2) = 26568.03, p < .001, CI [1.29, 1.45]) demonstrating that the between-school variance (σ_u^2 =1.37) is statistically significant with a standard error of .04.

To estimate the likelihood of an EL being identified with dyslexia, EL was added into the model as a predictor. Fixed effects are considered significant when the 95% confidence interval (CI) does not contain 1 (Sommet & Morselli, 2017). All p-values were significant (p<.001), likely due to the large sample size. To reinforce the statistical significance of the results, CIs were referenced. Results produced an intercept (γ_{oo}) of -4.42 with an associated odds ratio of .01. The odds of a student who is an EL being identified with dyslexia is approximately half the odds 51% (OR = .49) less than that of a monolingual student receiving a dyslexia identification (z = -42.88, P > z = .000, 95% CI [-.754, -.688]). Therefore, ELs are less likely to receive a dyslexia identification when compared to students who are monolingual. The ICC was .281 which means that between-school differences accounted for 28.1% of the variance in the identification of students with dyslexia. The between-school variance (σ_u^2 =1.29) is statistically significant with a standard error of .038.

Other predictors (i.e., ethnicity, gender, and SES) were added to the model as fixed effects to examine their influence on dyslexia identification with specific consideration for ELs.

A total of 2,265,737 observations in level 1 is nested in 5,097 schools at level 2. The range of observations per group is from 1 to 1,615 with an average of 458.4. Estimates for the intercept, standard error, *z* statistics, associated *p* values, and 95% confidence intervals were calculated. Again, *p*-values were significant (p<.001), likely attributed to the large sample size, therefore, CIs were referenced to determine statistical significance. Based on the criteria regarding 95**%** CI, all variables were considered significant for dyslexia identification whether negative or positive as no CI intervals included 1. The intercept (γ_{oo}) is -4.54, which is significant (*z* = -204.47, P>|z| = .000, 95% CI [-4.58, -4.49]), as shown in Table 17. The odds ratio demonstrates that the odds of a student being identified with dyslexia across all schools is .011 which can be interpreted to mean that a student is 98.9% less likely to be identified with dyslexia. The log-likelihood ratio test comparing the null model with the ordinary logistic regression yields a reduction of -184937.57 (chi2(2) = 23991.40, $p < .001$), demonstrating that the between-school variance (σ_u^2=1.25, CI [1.18, 1.32]) is significant. Additionally, an intra-class correlation (ICC) was calculated to determine the proportion of total variance in the outcome variable that can be explained by the between-group variance. The ICC was .275 which means that between-school differences account for 27.5% of the total variance in students' dyslexia identification.

Table 17

Fixed Effects and Odds Ratios Predicting Dyslexia 2013-14

					95% Confidence Interval for Odds Ratio	
Fixed effects	**Estimates**	**SE**	***z***	**Odds Ratio**	**Lower**	**Upper**
Intercept (γ_{oo})	-4.54	.022	-204.47	.011	-4.58	-4.49
Student covariates						
English Learner	-.688	.018	-38.20	.503	-.723	-.652
SES	.303	.013	22.99	1.35	.277	.328
Gender	.338	.010	32.38	1.40	.318	.359

Ethnicity						
Hispanic/Latino	-.332	.015	-22.54	.718	-.360	-.303
African American	-.483	.021	-23.55	.617	-.523	.-.443
Asian	-4.83*	.278	-17.37	.008*	-5.37	-4.28
Other	-.494	.035	-14.10	.610	-.563	-.425
Random effects	Estimate	SE				
School	1.25	.037			1.18	1.32

Note. p = <.001 for all values; *indicates strong relationship

A student designated as an EL is 49.7% (OR=.503) less likely to be given a dyslexia identification than their monolingual peers The odds of a male student being identified with dyslexia is 1.40 times, or 40% greater odds over a female student being identified, and a student who receives free and reduced lunch (SES) is 1.35 times, or 35%, more likely to receive a dyslexia identification than a student not receiving free and reduced lunch. Ethnicity was examined specifically between Hispanic/Latino, African American, Asian, and other. Hispanic/Latino, African American, Asian, and other (e.g., Pacific Islander, Native American) were associated with odds ratios of .718, .617, .008, and .610 respectively. Hispanic/Latino students are 28.29% less likely to possess a dyslexia identification than their Caucasian peers. Additionally, African American students are even less likely to be identified at 38.3%. This is similar to students in the *other* category who are 39% less likely to have a dyslexia identification than students who are Caucasian. The relationship between students who are Asian and the estimated likelihood of dyslexia identification was strong based on the criteria from Haddock (1998), demonstrating that students who are Asian are 99.2% less likely to be identified with dyslexia. Taken together, these results indicate that students with the represented ethnic identities are less likely overall to have a dyslexia identification when compared with their Caucasian peers.

2019-20

The same approach was used to analyze the data from the 2019-20 school year. The model was first run without predictors to assess the variation of the log-odds from one cluster to another (Sommet & Morselli, 2017). There was a total of 2,355,447 observations in level 1 is nested in 5,249 schools at level 2. The range of observations per group is from 1 to 1,612 with an average of 448.7. Estimates for the intercept, standard error, *z* statistics, associated *p* values, and 95% confidence intervals were calculated. The intercept (γ_{oo}) is -3.51, which is significant (z = -279.45, P>|z| = .000, 95% CI [-3.53, -3.48]). This indicates that the overall odds of being identified with dyslexia across all schools is -3.36. The odds ratio for the intercept was .03 which is the odds of a student being identified with dyslexia. A student has approximately 97% less chance of receiving a dyslexia identification across all students in the sample. Between-school variance (σ_u^2) is .671 which is the variance in the intercepts across all schools. The log-likelihood ratio test comparing the null model with the ordinary logistic regression yields a reduction of -357113.76 (chi2(2) = 30321.27, $p < .001$). Additionally, an intra-class correlation (ICC) was calculated to determine the proportion of total variance in the outcome variable that can be explained by the between-group variance. The ICC was .169 which means that schools account for 16.9% of the total variance in students' dyslexia identification.

To estimate the likelihood of a student who is also an EL being identified with dyslexia, EL was again added as a predictor in the model. Results produced an intercept (γ_{oo}) of -3.37 with an associated odds ratio of .03 which was statistically significant (z = -273.61, $p < .001$, 95% CI [-3.40, -3.35]). The coefficient for EL was -.659 with an odds ratio of .517 indicating that the odds of a student who is an EL being identified with dyslexia 48.3% less than a monolingual student receiving a dyslexia identification (z = -60.83, $p < .001$, 95% CI [-.680, -

.638]). Therefore, there are decreased odds for any student receiving a dyslexia identification; however, they decrease even more for a student who is also an EL. Between-school variance (σ_u^2) is .627 which is the variance in the intercepts across all schools. The log-likelihood ratio test comparing the null model with the ordinary logistic regression yields a reduction of -355079.06 [chi2(2) = 28389.24], $p < .001$], demonstrating that the between-school variance ($\sigma_u^2 = .627$) is significant. The ICC was .160 which means that between-school differences accounted for 16% of the variance in the identification of students with dyslexia. Although the odds were still negative, the likelihood of receiving a dyslexia identification as an EL increased from 2013-14 to 2019-20.

Finally, the other predictors (i.e., ethnicity, gender, and SES) were added to the model as fixed effects to examine their influence on dyslexia identification with specific consideration for ELs, presented in Table 18. A total of 2,355,447 observations in level 1 is nested in 5,249 schools at level 2. The range of observations per group is from 1 to 1,612 with an average of 448.7. Estimates for the intercept, standard error, *z* statistics, associated *p* values, and 95% confidence intervals were calculated. The intercept (γ_{oo}) is -3.36 with an odds ratio of .034, which is significant (z = -231.62, p <.001, 95% CI [-3.83, -3.33. The odds ratio demonstrates that a student's odds of being identified with dyslexia across all schools is decreased by 96% (OR =.04). The log-likelihood ratio test comparing the null model with the ordinary logistic regression yields a reduction of -350789.11 ([chi2(2) = 25889.80], $p < .001$), demonstrating that the between-school variance ($\sigma_u^2 = .597$, CI [.567, .628]) is significant. Additionally, an intra-class correlation (ICC) was calculated to determine the proportion of total variance in the outcome variable that can be explained by the between-group variance. The ICC was .154 which

means that between-school differences account for 15.4% of the total variance in students' dyslexia identification.

Table 18

Fixed Effects and Odds Ratios Predicting Dyslexia 2019-20

					95% Confidence Interval for Odds Ratio	
Fixed effects	**Estimates**	**SE**	z	**Odds Ratio**	**Lower**	**Upper**
Intercept (γ_{oo})	-3.36	.014	-231.62	.035	-3.83	-3.33
Student covariates						
English Learner	-.631	.012	-54.58	.532	-.654	-.609
SES	.189	.009	21.44	1.21	.172	.206
Gender	.191	.007	27.14	1.21	.178	.205
Ethnicity						
Hispanic/Latino	-.247	.010	-25.29	.781	-.266	-.228
African American	-.511	.012	-36.71	.600	-.539	-.484
Asian	-3.50*	.083	-42.33	.030*	-3.66	-3.34
Other	-.468	.021	-22.51	.626	-.508	-.427
Random effects	Estimate	SE	Z			
School	.597	.016			.567	.628

Note. p = <.001 for all values; *indicates strong relationship

A student designated as an EL is 46.8% less likely to be given a dyslexia identification than their monolingual peers. The odds of a male student being identified with dyslexia is 1.21 times greater than the odds of a female student, and a student who is classified as low socioeconomic status (SES) is 1.21 times more likely to receive a dyslexia identification than a student not receiving free and reduced lunch. Ethnicity was examined specifically between Hispanic/Latino, African American, Asian, and other. Hispanic/Latino, African American, Asian, and other (e.g., Pacific Islander, Native American) were associated with odds ratios of .781, .600, .030, and .626 respectively, indicating students with these ethnic identities remain less likely to have a dyslexia identification when compared with their Caucasian peers in 2013-

14. The relationship between students who are Asian and the estimated likelihood of dyslexia identification remained negative and strong based on the criteria from Haddock (1998), demonstrating that students who are Asian are the least likely to be identified with dyslexia across both years.

Research Question 3: Influence of Year on Dyslexia Identification

The purpose of research question 3 was to investigate what changes in ELs identified with dyslexia can be observed between 2013-14 and 2019-20 given the implementation of mandatory screening and state legislation regarding the identification of students with dyslexia. When comparing independent statistical results to observe changes from 2013-14 to 2019-20, there are some noteworthy observations to acknowledge. Table 19 demonstrates the likelihood of a student being identified with dyslexia overall improved slightly from year 1 to year 2, although still negative. In addition, the likelihood of a student who is also an English Learner receiving a dyslexia identification increased, although remaining negative. Males continue to be statistically more likely to be identified with dyslexia than females with a slight decrease from year 1 to year 2. Furthermore, the likelihood of a student of an ethnicity other than Caucasian remained negative; however, the odds were slightly improved from year 1 to year 2, with the exception of students who are African American. The odds of a student who is African American being identified with dyslexia decreased from year 1 to year 2 meaning that a student who is African American was less likely to be identified in 2019-20.

Table 19

Comparison of Log Odds and Odds ratios from Years 1 and 2

	2013-14		**2019-20**	
Fixed effects	**Estimates**	**Odds Ratio**	**Estimates**	**Odds Ratio**
Intercept (γ_{oo})	-4.54	.011	-3.36	.035
Student covariates				

English Learner	-.688	.503	-.631	.532
SES	.303	1.35	.189	1.21
Male	.338	1.40	.191	1.21
Ethnicity				
Hispanic/Latino	-.332	.718	-.247	.781
African American	-.483	.617	-.511	.600
Asian	-4.83*	.008*	-3.50*	.030*
Other	-.494	.610	-.468	.626
Random effects	Estimate	SE	Estimate	SE
School	1.25	.037	.597	.016

Note. p = <.001 for all values, no 95% CI intervals included 1; *indicates strong relationship

For further investigation, the data sets from both 2013-14 and 2019-20 were combined and coded by Year, with 2013-14 as the reference group, to determine changes between groups and the likelihood of a dyslexia diagnosis for ELs depending on the year of identification. A model was examined including five student-level predictors as fixed effects and two school-level predictors as random effects. The dependent variable in the multilevel logistic regression model was again the student's assigned dyslexia status from PEIMS. It was coded as a dichotomous variable with 1 for dyslexia and 0 otherwise. The associated regression equation is as follows using the notation for the combined equation (Raudenbush & Bryk, 2002).

(2) Level 1: $\mathbf{Y_{ij} = \beta_{0j} + \beta_{1j}EnglishLearner_{ij} + \beta_{2j}Year_{ij} + \beta_{3j}SES_{ij} + \beta_{4j}Gender_{ij} + \beta_{5j}Ethnicity_{ij} + e_{ij}}$

Y_{ij} is dyslexia identification for student *i* in school *j*, β_{0j} is the student specific intercept, β_{1j} is the regression coefficient that captures the effect that being an English Learner has on dyslexia identification, β_{2j} is the regression coefficient that captures the effect that the year has on dyslexia identification, β_{3j} is the regression coefficient that captures the effect SES has on dyslexia identification, β_{4j} is the regression

coefficient that captures the effect gender has on dyslexia identification, β_{5j} is the regression coefficient that captures the effect that a student's ethnicity has on dyslexia identification, and e_{ij} is the error term at the student level.

Level 2A: $\beta_{0j} = \gamma_{00} + U_{0j}$

The adjusted mean score in a school is further modeled as the mean score across all schools plus a residual (i.e., school random effect associated with the intercept).

$$\textbf{Dyslexia Identification} = \gamma_{00} + \gamma_{01}\textbf{EnglishLearner}_{ij} + \gamma_{02}\textbf{Year}_{ij} + \gamma_{03}\textbf{SES}_{ij} + \gamma_{04}\textbf{Gender}_{ij} + \gamma_{05}\textbf{Ethnicity}_{ij} + \gamma_{10}\textbf{Campus}_{ij} + \gamma_{20}\textbf{Year}_{ij} + u_{0j}$$

The model was first run without predictors to assess the variation of the log odds from one cluster to another (Sommet & Morselli, 2017). To estimate the likelihood of a student who is also an EL being identified with dyslexia, it was necessary to analyze the likelihood of any student in the sample being identified with dyslexia. The model was analyzed for both school years with the sample representing students (n=4,692,688) nested in schools (k= 5,249). Estimates for the intercept, standard error, *z* statistics, associated *p* values, and 95% confidence intervals were calculated. Additionally, an intra-class correlation (ICC) was calculated to determine the proportion of total variance in the outcome variable that can be explained by the between-group variance. The ICC was .137 which means that between-school differences accounted for 13.7% of the variance in the identification of students with dyslexia.

The intercept (γ_{oo}), or log-odds value for this model was -3.78 with an associated odds ratio of .02 (z = -352.29, P > z = .000, 95% CI [-3.80, 3.76]), suggesting that a student has a 2% chance of being classified as dyslexic. The log-likelihood ratio test comparing the null model

with the ordinary logistic regression yields a reduction of -564212.84 [chi2(2) = 37253.52, $p <$ .001], demonstrating that the between-school variance ($\sigma_u^2 =$.524) is statistically significant with a standard error of .01.

Year was added as a predictor to determine the likelihood of a dyslexia identification using Year 1 (2013-14) as the reference group. The intercept (γ_{oo}) was -5.05 which is significant (z = -335.20, P>|z| = .000, 95% CI [-5.08, -5.02]). This indicates that the overall odds of being identified with dyslexia across all schools is -5.05. The odds ratio for the intercept was .01 which reveals that the odds of a student being identified with dyslexia is approximately 1% across all students in the sample. The associated odds ratio for Year was 2.22 (z = -335.20, P>|z| = .000, 95% CI [-5.08, -5.02]) revealing that a student has 2.22 times the odds to be identified with dyslexia in year 2 versus year 1.

Between-school variance (σ_u^2) is .492 which is the variance in the intercepts across all schools. The log-likelihood ratio test comparing the null model with the ordinary logistic regression yields a reduction of -556230.26 [chi2(2) = 35108.93, $p <$ .001]. Additionally, an intra-class correlation (ICC) was calculated to determine the proportion of total variance in the outcome variable that can be explained by the between-group variance. The ICC was .130 which means that schools account for 13.0% of the total variance in students' dyslexia identification.

Finally, the combined model was run as noted in Table 20. Student-level predictors (i.e., SES, Gender, Ethnicity) and school-level predictors (i.e., campus, year) were added to the model to examine their influence on dyslexia identification with specific consideration for ELs with total of (n=4,692,688) nested in schools (k= 5,249). Estimates for the intercept, standard error, z statistics, associated p values, and 95% confidence intervals were calculated. The intercept (γ_{oo}) is -5.16 with an odds ratio of .006, which is significant (z = -193.74, $p <$.001, 95% CI [-5.21, -

5.11]). The odds ratio demonstrates that a student's odds of being identified with dyslexia across all schools decreases by 99.4% (OR =.006). Further, the likelihood of a student being identified with dyslexia increases 2.29 times in 2019-20 (z = 55.96, p <.001, 95% CI [.801,.860]). If a student is also identified and an EL, the likelihood of dyslexia identification decreases .648 (OR = .511), approximately half when compared to their monolingual peers. SES increases the odds of identification 1.25 times that of student's not designated low SES, and male students are 1.27 times more likely than females to receive a dyslexia diagnosis.

Table 20

Likelihood of Dyslexia Identification Year as a Predictor

					95% Confidence Interval for Odds Ratio	
Fixed effects	**Estimates**	**SE**	z	**Odds Ratio**	**Lower**	**Upper**
Intercept (γ_{oo})	-5.16	.027	-193.74	.006	-5.21	-5.11
Student covariates						
Year	.830	.015	55.96	2.29	.801	.860
English Learner	-.648	.010	-66.66	.511	-.667	-.629
SES	.226	.007	30.94	1.25	.212	.240
Gender (Male)	.237	.008	40.63	1.27	.226	.249
Ethnicity						
Hispanic/Latino	-.273	.008	-33.75	.761	-.289	-.257
African American	-.499	.012	-43.35	.607	-.521	-.476
Asian	-3.70	.079	-46.76	.025*	-3.85	-3.54
Other	-.476	.027	-26.66	.621	-.511	-.441
Random effects	Estimate	SE				
School	2.20	.067			2.07	2.33
Year	.747	.023			.704	.793

Note. All p-values were significant therefore confidence intervals were referenced for significance. * indicates a strong relationship

When running the model, ethnicity was coded to calculate odds ratios for specific ethnicities in the data set. This produced some noteworthy results. Students who are Hispanic are 23.9% (OR = .761) less likely to be identified with dyslexia than their Caucasian peers. African American students are 39.3% (OR = .607) less likely to be identified with dyslexia than their Caucasian peers, while students who are Asian have only a 2.5% chance (OR = .025) of receiving a dyslexia diagnosis. Students in the *other* category fall between students who are Hispanic and African American with approximately a 37.9% chance of being identified with dyslexia.

Additionally, the variance for the random coefficient of the year variable *at* the school level was .747, while the between-group variance was 2.19. An intra-class correlation (ICC) was calculated to determine the proportion of total variance in the outcome variable that can be explained by the between-group variance. The ICC was .400 which means that between-school differences account for 40% of the total variance in students' dyslexia identification.

Grade Level as a Predictor for Dyslexia Identification

The sample data was analyzed to examine trends between years related to grade level. As early identification of dyslexia is key to closing the gap for reading difficulties (Colenbrander et al., 2018), it was crucial to examine at what grade level a student was most likely to be identified with dyslexia. A series of Hierarchical Linear Models (HLM; Raudenbush & Bryk, 2002) was used to control the nested nature of the data, with students nested within schools. Using a multilevel logistic regression to determine the role of grade level in dyslexia identification for ELs, English Learner, year and grade level were input at level 1 to predict the likelihood of a dyslexia identification for ELs at a specific grade level compared to their monolingual peers. Year was coded as "1" for the first-year dyslexia was reported by public schools to TEA through

the PEIMS system (2013-14) and served as the reference group. 2019-20 was coded as "2". English Learner was dummy coded, with "1" being yes and "0" being no. Grade level was dichotomously coded with kindergarten being the reference group due to the low numbers of students identified across both years in the data set (2013-14 n = 5; 2019-20 n = 17) Kindergarten was coded as 0, Grade 1 as 1, Grade 2 as 2, Grade 3 as 3, Grade 4 as 4, and Grade 5 as 5. The following model was run using Stata 17 (Stata Corp, 2021).

(3) Level 1 (student level): $\mathbf{Y_{ij} = \beta_{0j} + \beta_{1j}Year_{ij} + \beta_{2j}EnglishLeaner_{ij} + \beta_{3j}Grade_{ij} + e_{ij}}$

Y_{ij} is the average odds of receiving a dyslexia diagnosis score for for *i* in school *j*, β_{0j} is the school-specific intercept, $Year_{ij}$, English $Learner_{ij}$, and $Grade_{ij}$ are the student characteristic variables for student *i* in school *j*, β_{1j} is the regression coefficient that captures the effect that Year has on dyslexia identification, β_{2j} is the regression coefficient that captures the effect that English Learner status taught has on dyslexia identification, β_{3j} is the regression coefficient that captures the effect that grade level has on dyslexia identification, and e_{ij} is the error term at the student level.

Level 2A (school level): $\mathbf{\beta_{0j} = \gamma_{00} + U_{0j}}$

The adjusted mean score in a school is further modeled as the mean score across all schools plus a residual (i.e., school random effect associated with the intercept).

Dyslexia Identification $\mathbf{= \gamma_{00} + \gamma_{01}Year_{ij} + \gamma_{02}EnglishLearner_{ij} + \gamma_{03}Grade_{ij} + \gamma_{10}Campus_{ij} + \gamma_{20}Year_{ij} + U_{0j} + e_{ij}}$

The intercept (γ_{oo}) is -7.22 with an odds ratio of .001, which is significant (z = -219.44, p <.001, 95% CI [-7.29, -7.16]), as shown in Table 21. The odds ratio demonstrates that a student's odds of being identified with dyslexia across all schools decreases by 99.9% (OR =.001). However, the likelihood of a student being identified with dyslexia increases 2.19 times in 2019-20 (z = 53.35, p <.001, 95% CI [.76,.81]). If a student is also identified as an EL, the likelihood of dyslexia identification decreases .670 (OR = .51), approximately half when compared to their monolingual peers. Variance for the random coefficient of year at the school level was .722, while the between-group variance was 2.22. The ICC was .424 which means that between-school differences account for 42.4% of the total variance in students' dyslexia identification.

Table 21

Dyslexia Identification by Grade Level with Year as a Predictor

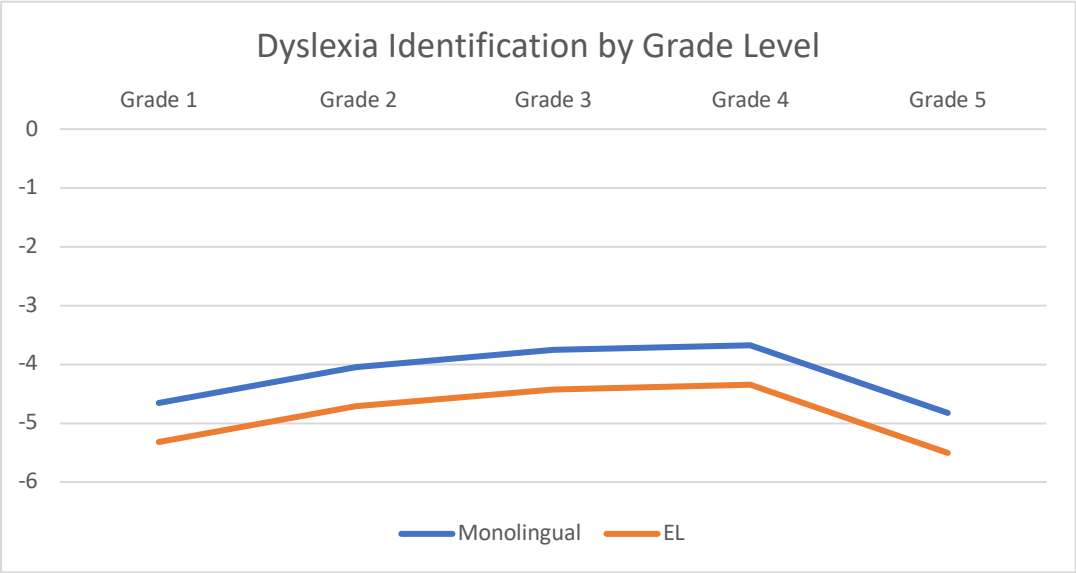
					95% Confidence Interval for Odds Ratio	
Fixed effects	**Estimates**	**SE**	z	**Odds Ratio**	**Lower**	**Upper**
Intercept (γ_{oo})	-7.22	.033	-219.44	.001	-7.29	-7.16
Student covariates						
Year	.785	.015	53.35	2.19	.756	.814
English Learner	-.670	.009	-73.25	.511	-.688	-.652
Grade Level						
Grade 1	1.78	.022	80.25	5.94*	1.74	1.83
Grade 2	2.39	.022	111.21	10.96*	2.35	2.44
Grade 3	2.68	.021	125.47	14.53*	2.63	2.72
Grade 4	2.76	.021	129.40	15.86*	2.72	2.81
Grade 5	1.61	.023	70.94	4.98*	1.56	1.65
Random effects	Estimate	SE				
School	2.22	.067			2.10	2.36
Year	.722	.022			.680	.767

Note. All p-values were significant therefore confidence intervals were referenced for significance.

Grade level statistics produced some notable outcomes. The likelihood of a student being identified with dyslexia increases with each grade level. As previously stated, a fixed effect is considered significant when the 95% confidence interval does not contain 1 (Sommet & Morselli, 2017) and a strong relationship is indicated if the log odds value is positive and the associated odds ratio is 3 or more, or if the log odds value is negative and the associated odds ratio is less than 0.33. Dyslexia identification and grade level demonstrated a strong relationship across all log odds values with Grade 4 being the most likely grade for a student to be identified with dyslexia (OR = 15.86). In Grade 5, the odds ratio (OR = 4.98) remained significant, but trended downwards to a likelihood less than that of Grade 1 (OR = 5.94). Figure 3 provides a visual representation of the log odds coefficients for both monolinguals and ELs with the fixed effects of Year and Grade Level as predictors in the equation. The likelihood of an EL being identified with dyslexia at any grade level is approximately 49.9% less (OR = .511) than their monolingual peers across all grade levels measured.

Figure 3.

Likelihood of Dyslexia Identification by Grade Level



Research Question 4: Dyslexia Identification for ELs in Schools

To better understand the factors that contribute to dyslexia identification in Texas, an eight-question survey was created and shared via email through publicly available district websites to district personnel charged with identifying dyslexia in their schools. Exemption through IRB (TAMU: IRB2021-1557M) was obtained prior to the delivery of the survey. Using the Directory of Texas Public Schools and Charters published in 2020, websites for districts were used to identify appropriate personnel. A link to the anonymous survey was emailed to purposively sampled personnel so that results could not be connected to the participant. Purposive sampling was used because of the need to recruit participants who are employed to specifically conduct assessments for identifying dyslexia. In addition, the survey was shared widely through social media groups specifically for LSSPs, Educational Diagnosticians, and Reading Specialists in Texas. The survey included informed consent and a description of the project before consenting to participation. Upon consent, the participant was taken to the survey.

The survey consisted of six multiple-choice questions and two short-answer questions as shown in Table 22. Assessments commonly associated with dyslexia evaluations were identified

and used as answer choices. A wide range of choices was provided for participants that corresponded to the *Tests and Other Evaluation Materials* and *Areas for Evaluation* sections from the Texas Dyslexia Handbook (TEA, 2021a. pp. 27-29). Participants also had the opportunity to enter assessments that were not listed as 'other' in short answer form. A similar approach was used for the question regarding identification criteria (TEA, 2021a. p. 3). A short answer question was included to investigate procedures related to identifying ELs when tests are not available in their first language. The remaining questions were to gather information related to district personnel employed specifically to conduct dyslexia evaluations and to see what type of school the participant was associated with.

Table 22

Survey Items

Survey Question	Answer Choices
1. What state are you associated with?	(e.g., Alabama, Michigan, Texas) short answer
2. What is your role in dyslexia identification?	LSSP Educational Diagnostician Special Education (district) Special Education (campus) Dyslexia (district) Dyslexia (campus) Reading Specialist/CALT/LDT 504 Coordinator (district) 504 Coordinator (campus) Other
3. What assessment instruments are typically used in the identification of dyslexia in your district (e.g., Woodcock-Johnson IV Cognitive, CTOPP-2, GORT-5)? [Select all that apply.]	Woodcock Johnson WRMT Woodcock Johnson IV Cognitive Woodcock Johnson IV Achievement/Oral Lang. Test of Word Reading Efficiency (TOWRE) Comprehensive Test of Phonological Processing Gray Oral Reading Test V (GORT-V) Wechsler Intelligence Scale for Children (WISC-V) Wechsler Intelligence Scale for Children (WISC-V) Spanish* Wechsler Abbreviated Scale of Intelligence (WASI-2) Kaufman Assessment Battery for Children (KABC-2) Woodcock-Munoz Spanish Batería III Spanish* Kaufman Test of Educational Achievement (KTEA-3) Phonological Awareness Screening Test (PAST)

Table 22 Continued

Survey Question	Answer Choices
	Test of Nonverbal Intelligence (TONI-4) Phonological Awareness Test 2: Normative Update (PAT-2: NU) Tejas Lee* Test of Written Spelling (TWS-5) Wechsler Individual Achievement Test – 4 Woodcock Muñoz Language Survey 3 (WMLS-3)* Curriculum Based Measures (CBM) STAAR Istation** NWEA Map** Star Renaissance** Other
4. What criteria are used to make a determination of dyslexia for monolinguals and ELs (i.e., IQ, RAN, listening vs. reading Comprehension, other)? [Select all that apply.]	IQ Discrepancy between measures Deficit in Phonological/Phonemic Awareness Comparison between listening and reading comprehension Unexpectedness Weakness in Rapid Automatized Naming (RAN) Weakness in processing speed Family history of dyslexia Response to Intervention (RTI) or Multi-Tiered Systems of Support (MTSS) Medical Records Teacher Input Parent Input Outside Evaluations Attendance Other
5. Do you believe that IQ should be considered a factor in the identification of dyslexia?	yes, no, maybe
6. How are ELs addressed with regard to dyslexia identification? (Do they receive testing in their first language and English? What is the process when testing in their first language (i.e., Mandarin, Korean, Arabic) is not available?	short answer
7. Who is responsible for testing for dyslexia in your school district (e.g., LSSP, Educational Diagnostician)?	Licensed Specialist in School Psychology (LSSP) Educational Diagnostician Special Education (district level) Special Education (campus level) Dyslexia/504 (district level) Dyslexia/504 (campus level)

Table 22 Continued

Survey Question	Answer Choices
	Reading Specialist/CALT/LDT 504 Department (district level) 504 Coordinator (campus level) Other
8. What type of school are you associated with?	public, charter, private

Note. * denotes assessments for students who are tested in Spanish. ** indicates computer-based assessments.

Survey Results

Approximately 180 responses were recorded; however, when the data was exported and inspected, 37 responses were incomplete. These responses were removed, and the remaining responses were coded for analysis. The initial survey question queried what state the participant was from to ensure that the data obtained through the survey matched the student-level data analyzed for the state of Texas. Results were coded 1 if Texas and 2 if other. Out of 143 responses, 138 indicated Texas as their home state, 3 indicated other states (i.e., Kansas, Mississippi, and Connecticut), and two gave no response to this particular question. Results were analyzed by variable to observe significant differences between measures, criteria, personnel, type of school, and beliefs about IQ. While the sample size is small, it is of practical significance to examine for consistencies across states. There were no differences in criteria referenced for identifying dyslexia or the type of personnel responding to the survey. Three respondents from other states represented public schools, one was from a public charter, and the last from a private school.

The main differences between in state and out-of-state participants emerged in the measures they employ. The *Comprehensive Test of Phonological Processing* (CTOPP-2) is a common assessment used by all participants, including those from other states to measure the

phonological and phonemic awareness abilities that often contribute to reading difficulties. The *Gray Oral Reading Test* (GORT-V) is another commonly used assessment across both groups that measures reading fluency and comprehension. Out of state participants, however, listed some assessments not found among responses from Texas subjects. These included the *Rapid Automatized Naming/Rapid Alternating Stimulus Test* (RAN/RAS), *Test of Auditory Processing Skills* (TAPS), and the *Clinical Evaluation of Language Fundamentals* (CELF-5). The most notable observation among measures was that of the four assessments listed for ELs who speak Spanish, only one participant acknowledged an assessment used for ELs – the *Woodcock Muñoz Language Survey 3* (WMLS-3). Given the states that responded (i.e., Kansas, Mississippi, Connecticut), this is understandable, yet no other measures that would be used for ELs were suggested.

For the final analysis, only responses marked Texas (N=138) were retained. In addition, Stata17 (Stata Corp, 2021) was used to draw a randomized sample from the remaining participants to prevent bias in the findings. A randomized sample of 73% of the total (N=138) was drawn leaving a sample of 101 survey respondents. 73% was chosen to keep the sample size close to 100.

Dyslexia Identification in Texas

The survey first asked what role the participant had related to dyslexia identification. The majority of the respondents in the sample were Educational Diagnosticians (n=37), with the second-highest response being Reading Specialists (n=31). Ten were Licensed Specialists in School Psychology, while seven were employed as district Dyslexia Specialists. Five participants were campus Dyslexia Specialists, one represented district Special Education, and 10 indicated ‘other’. Those that responded ‘other’ ranged from District Assessor to District

Director of Curriculum, and even included a representative from the state education agency. Several participants served in multiple roles at the district level as Educational Diagnosticians who are also certified as Dyslexia Therapists. Additionally, there was one classroom teacher and one licensed Clinical Psychologist in private practice.

Participants were also asked to provide the type of school they were associated with. The student-level data associated with this project was acquired from public and public charter schools, therefore it was important to ensure that the participants were providing information that corresponded with public schools or public charters. 95% of responses (n=96) indicated being a part of a public or public charter school. 4% of the participants (n=4) are associated with private schools, with the remaining 1% representing a licensed psychologist in private practice.

Assessment Measures

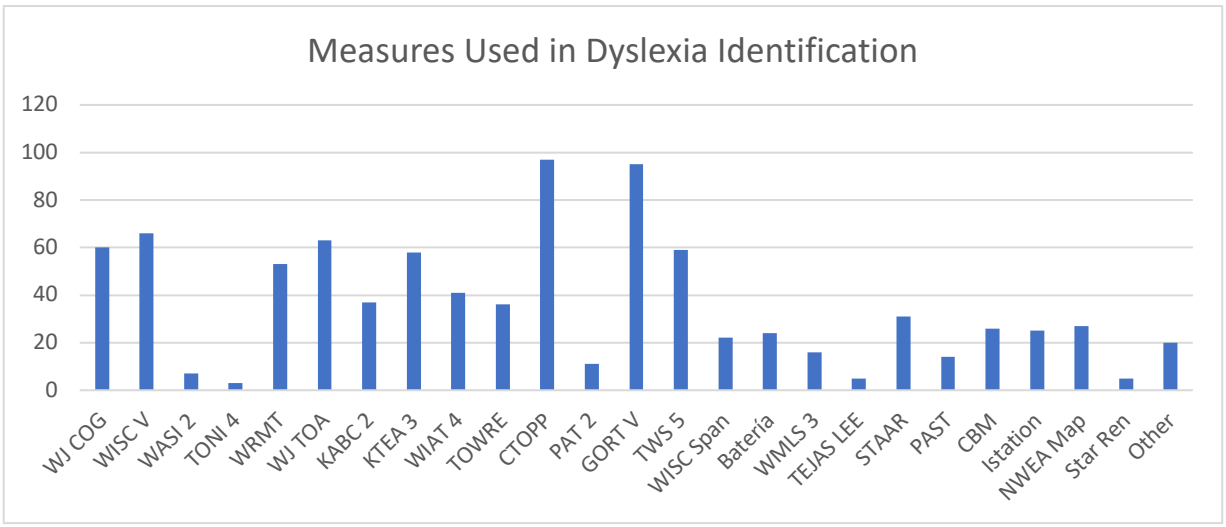
In an effort to understand how students are identified, it was important to recognize the measures used in evaluations, as well as the criteria employed for identification. Participants were provided with a list of commonly used dyslexia assessments and guided to choose all that applied to their situation. An opportunity to enter assessments not found on the list was also provided. According to the *Texas Dyslexia Handbook*, evaluators are encouraged to utilize a wide range of formal and informal data when making a determination. The list provided to participants included a wide range of both formal assessments that require credentials to be purchased and training to be administered, as well as several informal assessments. The list also provided computer-based assessments that are currently used for dyslexia screening and benchmark testing for progress monitoring.

In Figure 4, the distribution of the frequency of measures has been arranged by purpose from left to right. The first four listed are used to determine cognitive processes including full-

scale IQ, as well as other cognitive measures that provide insight into a child's performance. The next five measures (i.e., WRMT, Woodcock-Johnson IV Tests of Achievement, Kaufman Assessment Battery for Children, Kaufman Test of Educational Achievement, Wechsler Individual Achievement Test) evaluate listening, speaking, reading, writing, and math skills. The Test of Word Reading Efficiency (TOWRE), CTOPP-2, Phonological Awareness Test (PAT), GORT-V, and Test of Written Spelling (TWS) measure specific reading constructs such as decoding, phonological and phonemic awareness, fluency, comprehension, and written spelling. There are four tests that are administered to students who speak Spanish (i.e., WISC-V, Batería, Woodcock-Muñoz Language Survey, Tejas Lee) that cover a wide range of abilities including cognitive processes, along with listening, speaking, reading, and writing skills. The remaining measures listed are district or campus level measures used for progress monitoring or benchmark data collected over time to demonstrate student growth.

Figure 4.

Measures Used in Dyslexia Identification



The most common assessment identified by respondents was the CTOPP-2 with all but four participants indicating using the CTOPP-2 in their evaluations. The GORT-V was the second most referenced assessment, with 74% of participants identifying it in their responses. The most used cognitive measures used were the Woodcock-Johnson IV Cognitive and the Wechsler Intelligence Scale for Children (WISC-V). The measures that target students who speak Spanish were used less than most other measures when considering that many of these assessments measure similar constructs and it is a matter of choice. Some of the other measures listed are offered in Spanish (e.g., STAAR, IStation, NWEA Map), but students must qualify for testing in Spanish based on a determination by the Language Proficiency Assessment Committee (LPAC; TEA, 2021b). The most common combination of assessments observed in the survey results included the WISC-V for cognitive processes, the WJ IV Tests of Achievement and Oral Language for listening, speaking, reading, writing, and math, the CTOPP-2 for phonological processing, and the GORT-V to assess fluency and comprehension. Using these measures can provide a comprehensive picture of a students' abilities when making a determination of dyslexia.

Survey participants listed approximately 22 measures other than those provided. These measures ranged from formal cognitive tests such as the Reynolds Intellectual Assessment Scales-Second Edition (RIAS-2) to less formal assessments like DIBELS/IDEL. Other computer-based measures (e.g., mClass) were included; however, many of these are teacher delivered versus the student completing them independently. The main observation here being that with a sample size of only 101 respondents, there were a total of 45 different measures (24 provided, 22 provided by survey participants) referenced and used in some combination. Subjects reported using anywhere from 1-2 tests to as many as 14 in an evaluation. More tests

were typically reported by Educational Diagnosticians or LSSPs who are attempting to gain a full profile of a student's abilities when conducting a Full Individual and Initial Evaluation (FIIE) under special education. In addition, districts often provide test materials for these roles whereas Reading Specialists might not have access to such assessments.

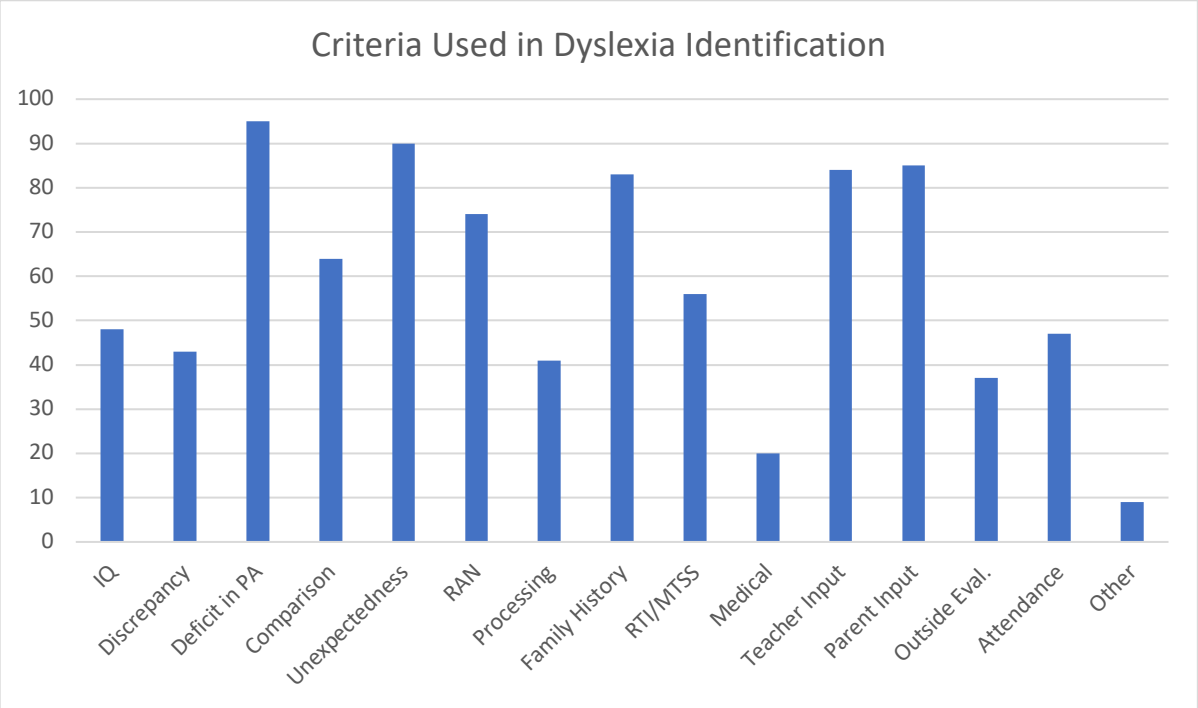
Criteria Used in Identification

Moreover, the *Texas Dyslexia Handbook* outlines the interpretation of data sources for identification through the use of the following questions: 1) Do the data show the following characteristics of dyslexia related to a) difficulty with accurate and/or fluent word reading, b) poor spelling skills, or c) poor decoding ability? 2) Do these difficulties (typically) result from a deficit in the phonological component of language? and 3) Are these difficulties unexpected for the student's age in relation to the student's other abilities and provision of effective classroom instruction? (p. 31). According to the International Dyslexia Association (2009), a child's educational background and family history, along with information regarding their oral language skills, word recognition, decoding, spelling, phonological processing, fluency, reading comprehension, and vocabulary knowledge should be included. Per the definition, cognitive processes such as RAN, processing speed, and working memory should also be given consideration so the evaluator has a preponderance of evidence from which to make an accurate determination. These are often associated with measures of IQ, although RAN, processing speed, and working memory are sufficient measures of cognitive abilities. Medical criteria typically include vision and hearing screenings among other diagnoses that may be present and contribute to a reading difficulty. Based on these guidelines and other factors typically referenced, fourteen different criteria were provided for participants to choose from with the option of choosing more than one and offering others via a short answer option, shown in Figure

5. As the emphasis has been placed on phonological awareness and strengths and weaknesses related to unexpectedness in recent years, those two criteria were the most reported by participants. In addition, parent and teacher input are also significant factors as they provide anecdotal evidence and insight to the learning opportunities a student has received.

Figure 5.

Criteria Used in Dyslexia Identification



IQ in Dyslexia Identification

There has been debate surrounding whether measures of IQ should be utilized when evaluating for dyslexia as a result of the wording of the IDA definition stating "in relation to other cognitive abilities" (IDA, 2019, p. 2). The most recent iteration of the *Texas Dyslexia Handbook* lists cognitive measures such as phonological and phonemic awareness, as well as rapid naming of symbols or objects (TEA, 2021. p. 29), which no mention of IQ measures. To investigate current opinions on the matter, a question about beliefs on the topic was included.

Results from the sample indicated that 16 did not feel IQ should be measured in dyslexia identification, while 41 participants responded that IQ should be reported. The highest number of respondents in the sample (n=44) selected "maybe", indicating they were unsure about the use of IQ in dyslexia identification.

Dyslexia Evaluations for English Learners

Using qualitative methods alongside quantitative analysis affords the opportunity for an informed conversation from both numbers and anecdotal evidence allowing for the investigation of educational issues that benefit all involved in improving outcomes for students.

As ELs were the main focus of this research, it was critical to also examine the way evaluators handle situations when presented with a student who requires testing in both their first language and English, especially when testing materials are not available in their first language. Survey participants were asked to provide a short answer response to the following question: How are ELs addressed with regard to dyslexia identification? (Do they receive testing in their first language and English? What is the process when testing in their first language (i.e., Mandarin, Korean, Arabic) is not available?

Qualitative analysis of the responses was conducted using the constant-comparison method (Glaser & Strauss, 1987) connecting common responses to create codes. The codes were then evaluated to identify categories that might connect those codes together. In a first pass-through of the data, responses were coded for instances that related to testing students in their first language and/or English. Survey respondents provided a brief response with details regarding testing for ELs in their schools. Each response was grouped with similar responses and further inspected to determine categories that could describe each group. As a result, each set was labeled with the following categories: testing in English only, testing in the first language

only, testing in both languages, testing of language dominance, testing on a case-by-case basis, and other.

A second pass-through of the survey responses was conducted to ensure the responses were in an appropriate category and to highlight notable responses that emphasize themes present in the data. Upon review of the categories, similar ideas were found in both the language dominance category and the first language category, therefore these two categories were collapsed into one called Language Dominance. In addition, only three responses were identified under the case-by-case category, so it was combined with the 'other' category and renamed Special Situations. Finally, a third pass through the data provided four overarching themes for the final analysis.

Theme 1: Language Dominance. There were several codes observed in the responses in which participants acknowledged language when making decisions regarding testing. Language dominance, testing in first language, language proficiency, and use of a translator were common across all responses in the Language Dominance theme. Multiple responses indicated that students were assessed to reveal language dominance prior to administering a formal evaluation. Several responses indicated that once language dominance was assessed, the student was tested only in the dominant language if an evaluator was available. Other responses made mentioned bilingual diagnosticians with the majority being speakers of Spanish. Two responses noted specific languages other than Spanish (e.g., Vietnamese, Arabic). Interestingly, one respondent stated:

> Language Dominance is established by the bilingual diagnostician. Once language dominance is established, assessment in the dominant language is completed, both cognitive and achievement. If the student is co-dominant, both cognitive and achievement

> assessments will be completed in English. For languages other than Spanish and Vietnamese, interpreters are used to translate during assessment sessions.

A similar response from another participant highlighted that:

> First, we test in [the] dominant language [using] IPT (IDEA Oral Language Proficiency Test) /PVAT (Picture Vocabulary Acquisition Test), then we test low areas in English to rule out language acquisition issues. We use KABC (Kaufman Assessment Battery for Children) for IQ for Arabic or more difficult languages to test.

Three additional respondents made mention of these specific assessments for language dominance along with the Culture-Language Interpretive Matrix (C-LIM).

Other responses noted that students were assessed for performance in their first language (i.e., Spanish only achievement test) and then given some tests in Spanish with other tests (e.g., Woodcock-Johnson Cognitive) in English. For example:

> Spanish EL's achievement [are] tested in Spanish first to see if there are academic deficits; depending on years in [the] US, either English Cog[nitive] testing completed with weaknesses followed up in native language with a translator or English testing completed using C-LIM consideration with interpreting data.

Most notably were responses that emphasized possessing personnel or assessments to test in Spanish, but when students speaking other languages were presented, they were tested only in English and use other anecdotal evidence to make a determination. Although provisions for such a situation were made in the *Texas Dyslexia Handbook* (2018) in bold print stating, “If there is not a test in the native language of the student, informal measures of evaluation such as reading a list of words and listening comprehension in the native language may be used,” (TEA, 2018. p. 29) however, no reference to these guidelines was included in any response on the survey.

Nine participants pointed to the use of a translator when a student needed to be tested in a language other than English. Specifically, two responses highlighted the use of either a local university or military base staffed with personnel who speak a wider variety of languages than those in the public school system, highlighting that:

> Outside district resources may be acquired if in-district staff cannot meet primary language needs. Otherwise, the materials and procedures selected for assessing the child's academic, developmental, and functional skills should not be impacted by the child's lack of English proficiency, according to state guidelines.

Finally, other assessments were mentioned to be utilized in establishing language dominance: Woodcock-Johnson IV Oral Language test (WJIV-OL), Cognitive Academic Language Proficiency (CALP), Bilingual Verbal Ability Test (BVAT), and Kaufman Brief Intelligence Test (KBIT). The intended use of these tests is to determine language proficiency in English or academic English, as well as verbal and non-verbal intelligence. None of these tests were specifically designed to examine language dominance, nor do they provide assessment opportunities in languages other than Spanish.

Theme 2: Testing in Both Languages. Common codes highlighted across responses for testing in both languages included phrases such as "testing in both first language and English", "both languages are tested", or "bilingual evaluation". When responses included "bilingual assessors" or "bilingual diagnostician", they were categorized as both languages under the assumption that they have knowledge, materials, and training to test in both Spanish and English, but not necessarily in other languages. The majority of responses that included testing in both languages specified that this is the case only when the student's second language is Spanish. Many noted that this is due to the fact that assessments are not available in other languages, nor

is their staff equipped to serve students in languages besides English requiring them to rely on translators or, in one case, a local university.

One participant highlighted they only test in Spanish, but no other languages, while others communicated uncertainty about the testing process regarding languages other than English and Spanish:

> ELs are tested in both languages if they speak both languages. For students that barely speak English, they are tested only in Spanish. I don't know what my district does for students whose first language is not Spanish or English. I know we would find a way to help these children. It has not been an issue yet at my school.

Another respondent stated a similar sentiment, "They are tested in their home language and in English. I am unsure of what the process is if their home language is unavailable." Others acknowledged the use of a translator to help with the "native language part of the assessment" when staff was unable to meet the student's language needs. Similar to the Language Dominance theme, one respondent cited the use of a local university to support testing in both languages when school personnel were not equipped to meet the student's language needs.

The use of certain assessments was also included in many responses under this theme to determine language proficiency levels prior to testing in a first language and English. The Clinical Evaluation of Language Fundamentals – Spanish (CELF – Spanish), C-LIM, WMLS, and CALP were listed as measures used to evaluate a student's language proficiency before conducting assessments for reading ability.

Theme 3: Testing in English Only. Responses that were placed under this theme specifically stated that students were only tested in English. The most common codes either stated "testing in English only" or "do not receive testing in their first language". Two

participants stated that there are insufficient instruments to make a dyslexia determination for ELs; however, it was not evident if this was a generalization or in their particular district. Interestingly, one participant compared their previous district's process to their current approach stating:

> At my prior campus, we had bilingual dyslexia therapists who were able to test students in Spanish using the Woodcock-Munoz-Batería. At my current district, we do not have anyone to test in Spanish, so they would be tested only in English. Bilinguals may not be low in phonological awareness, so we always look at the Rapid Naming as well.

Theme 4: Special Situations. Finally, there were a few responses that did not fit with the other themes, yet were of practical significance to include and thus, were classified as Special Situations. Many participants highlighted that dyslexia identification is conducted on a case-by-case basis depending on the students. One participant indicated using teacher input and comparative data among peers when tests were not available to properly identify ELs, while another stated they had never tested an EL for dyslexia. Another respondent emphasized the fact that most of their ELs do not read or write in their first language so they must rely on a variety of data to gather a full picture of a student's strengths and weaknesses.

Lastly, two participants cited that they provide instruction in Spanish and English prior to making a referral for an evaluation. Another emphasized waiting until they have adequate language skills to make a determination, pointing out:

> In my role at the campus level, I observed that [ELs] were under-identified because when their scores were low on CTOPP/GORT, I would be told that their low scores could be due to lack of English, so until the English improved, they would not be considered for a dyslexia diagnosis.

While these survey responses produced overall consistent themes, there were conditions in which seemingly arbitrary rules were applied such as using an English oral language assessment to determine language dominance or testing in both languages only if the student was receiving instruction in both languages. Several responses emphasized that when students spoke a first language other than Spanish, they were only tested in the language of instruction or the "academic language" (i.e., English).

Conducting Assessments

Finally, information regarding what personnel is employed to provide dyslexia evaluations was collected. The majority of responses pointed to an Educational Diagnostician being responsible for identifying dyslexia in their district. Others noted to be tasked with dyslexia evaluations were Reading Specialists, District Dyslexia Specialists, Licensed Dyslexia Therapists, and LSSPs conducting FIIEs. One respondent stated that a team of the diagnostician, dyslexia teacher and an administrator work together to make a dyslexia designation which is addressed in the *Texas Dyslexia Handbook* (2021) under the sub-heading *Data Driven Meeting of Knowledgeable Persons*. Nevertheless, in light of recent updates to the handbook, the process now requires that a student who is suspected of having dyslexia may qualify with a disability under the Individuals with Disabilities Education Act (IDEA), districts must now follow procedures for conducting an FIIE under the IDEA.

CHAPTER V
DISCUSSION

The purpose of this study was to (1) determine the prevalence of dyslexia for ELs, (2) examine what factors may contribute to their identification, (3) ascertain shifts in identification between the first year dyslexia was reported in public schools in Texas (2013-14) and the most recent school year prior to the COVID-19 pandemic (2910-20), and (4) understand what criteria and assessments are being used in making a determination of dyslexia for ELs. In recent years, much work has been done to establish processes to ensure that students are being identified with dyslexia; however, students who speak languages other than English are often overlooked due to the influence of language acquisition in learning to read. It is well documented that dyslexia exists across languages and around the world (Goswami, 2003,2006; Zeigler & Goswami, 2005), therefore, this study sought to investigate the gap between the identification of monolinguals and ELs with dyslexia, as well as consider other factors that might contribute positively or negatively to this process.

Dyslexia is commonly reported in the United States with a prevalence between 5 and 17%, some estimates even report up to 20% (Odegard, et al., 2020; Shaywitz, 1998; Wagner, 2020). Lavín et al. (2020) highlighted the dearth in the literature regarding ELs with a learning disability (e.g., dyslexia), estimating that the number is much higher than is reported. In addition, ELs with a learning disability are often observed as difficult to teach reinforcing an image of that population as less capable despite intervention research that supports positive outcomes when adapted to meet their needs (August & Shanahan, 2006; Kim & Linan-Thompson, 2013). The overarching question addressed in this study was: how does identification of dyslexia for ELs differ from that of monolinguals and what factors play a role in the discrepancy between the two? As our population is becoming increasingly diverse, answers to these questions are

essential to inform our ability to intervene for students who present with reading difficulties regardless of their home language. Factors such as gender, ethnicity, SES, and grade level seem to play a role in the likelihood of a dyslexia designation. Additionally, the process and assessments used to identify ELs with dyslexia present issues that must also be addressed if schools are to provide an equitable and efficient procedure for all students that best meets their individual needs. Given that reading is a linchpin skill for success in life and work, examining ways to improve outcomes for all students is imperative. As ELs are often under-identified for dyslexia and learning disabilities (Lavín et al., 2020), this study set out to highlight this gap and identify contributing factors that can be addressed in assessment, evaluation, and intervention.

The participants in this study consisted of two samples across two school years. The first sample (n= 2,337,241) was collected as it was the first year dyslexia was required to be reported through the PEIMS system, used by the Texas Education Agency to collect educational data. As a result of the implementation of a mandatory dyslexia screener in 2017 for all Kindergarten and Grade 1 students along with the revisions to the *Texas Dyslexia Handbook*, this study sought to evaluate shifts across time using a second sample (n=2,355,447) for comparison on SES, gender, ethnicity, and language using descriptive statistics, as well as multilevel logistic regression to determine the likelihood of a dyslexia identification for students given these predictors. Language was not incorporated in the final model due to the collinearity between EL status and language. The student data from both samples were combined (n=4,692,688) across 5,294 campuses (i.e., public and public charter schools) and analyzed again using multilevel logistic regression to determine the likelihood of dyslexia identification with year and grade level as predictors.

Furthermore, school employees were surveyed to determine what criteria and assessments were used to identify dyslexia, as well as explore what assessments and procedures were used to evaluate ELs. Of the 180 survey responses, 138 of the survey responses were complete and reported being associated with schools in Texas. Five responses were removed for being incomplete or connected to states other than Texas. To eliminate bias in the results, a randomized sample was taken of the final 138 responses leaving 101 for final analysis. Multiple choice survey items were evaluated individually to determine what criteria and assessments were most used. Qualitative analysis was conducted on the short answer question related to the process for identifying ELs. Four themes emerged in the data related to testing. Many diagnosticians assessed for language dominance to know what language to test in prior to the formal assessment. Others tested students in both their first language (i.e., predominantly Spanish) and English, while some tested only in English regardless of language dominance. Overall, the results demonstrated a wide range of approaches across respondents. Similar criteria were used when making decisions regarding dyslexia (i.e., phonological processing, listening vs. reading comprehension, strengths and weaknesses), however, the evaluators, tests, and approaches varied greatly.

Conclusions

The research questions and results of this study provide some potentially important findings for the identification and prevalence of dyslexia among ELs. Descriptive statistics provided insight into the overall rates of identification for both monolinguals and ELs across both school years. The first year dyslexia reporting was mandated by TEA, the prevalence of dyslexia for 2013-14 across all students was found to be 1.7%, but only .95% for ELs. Following the implementation of state laws and reinforcement of the *Texas Dyslexia Handbook*, the

identification for both monolinguals and ELs doubled, but that of ELs is approximately half of the percentage (2.1%) for English speaking peers (4.2%) indicating that under-identification remains for both populations when following the percentages published by Shaywitz (1998). Further, the likelihood of receiving a dyslexia diagnosis was negative for all students and decreased further if a student was an EL, even more, if they were an ethnicity other than Caucasian. Moreover, a considerable gap exists between the two populations that must be addressed. With almost one-quarter of U. S. Children (10 million) speaking a language other than English at home, closing the opportunity gaps for ELs must be viewed as a priority in education policy and practice (Escamilla et al., 2022).

In fact, ELs were identified at a slower rate and later age than their monolingual peers. As Hernandez (2011) pointed out, students who do not read proficiently by Grade 3 are less likely to graduate from high school. In addition, early identification of dyslexia is imperative to provide the greatest opportunity for success possible (Colenbrander et al., 2018; Schatschneider & Torgeson, 2004; Snowling, 2013). The greatest odds for students in the present study to be identified with dyslexia was Grade 4; seemingly too late. House Bill 1886 passed in 2017 established an early screening process for all students in grades K and 1 for dyslexia; however, two years following the implementation of this bill, identification was still most likely to occur at Grade 4 and monolingual students continued to be identified earlier and in greater percentages compared to ELs. While identification occurred earlier for the sample as a whole in year 2, there was not a significant increase between kindergarten and first grade that would be expected given the state mandate for screening. One possible explanation is that referrals for testing require a process for data gathering, as well as assessment and report writing. According to Texas education code (TEA, 2019) when a request or referral for an evaluation is made in writing, a

school has 15 days to respond following a written request for an evaluation, followed by 45 days to conduct the assessment. The school then has 30 days to schedule an ARD. This means a school has approximately 18 weeks to finalize a determination, which is approximately half the school year. If a student is referred for testing late in the school year, this timeline pauses for the summer and begins with the following school year. Thus, students may be identified through screening, yet take another school year to be identified in the PEIMS system as a student with dyslexia.. With the additional nuances that arise when a student is also an EL, this process can be even more time-consuming and hinder the student from receiving much-needed interventions.

There has been debate over the years that males are identified with dyslexia in greater numbers than females. Research has been published both proving and disproving this idea, thus the study also attempted to examine this notion in the data set. Descriptive statistics showed that males were more likely to be identified than females across both years. The same was true when looking specifically at ratios for ELs. Although the ratio shifted slightly between year 1 and year 2, males remained more likely to be identified with dyslexia than females. Results of the regression analysis reinforced this outcome, demonstrating the likelihood of a male being identified with dyslexia to be 40% higher than females in 2013-14 and 21% higher in 2019-20. According to Shaywitz (2020) this can be due to the existence of bias on the part of the teacher that can often be attributed to behavior more commonly observed in boys than in girls. Although dyslexia has been reported to be equal among both boys and girls by a number of studies (Harlaar et al., 2005; Hawke et al., 2006, 2007; Stevenson, 1992), a greater percentage of males continue to be identified with dyslexia over females. The same is true for students who are male and EL as well. Males who are also identified as ELs with dyslexia, represent an even greater percentage than females of the same classification. Given these findings, it seems that females

who are also Els are the least likely to be identified with dyslexia in the sample. As differences persist between the groups in spite of research supporting equal prevalence among males and females, emphasis must be placed on this idea in preservice and in-service training for diagnosticians and LSSPs. Also, teachers must be made aware of this possible bias and provided with information regarding the characteristics of dyslexia to recognize its symptoms and make appropriate referrals regardless of gender.

Based on the Componential Model of Reading, ecological factors such as home environment and dialect play a role in a student's ability to read (Aaron et al., 2008; Joshi & Aaron, 2012). Socioeconomic status is a factor of the home environment and students who come from a low SES background are often identified at risk for reading difficulties. Results of the regression showed students who received free and reduced lunch were 35% more likely in year 1 and 21% more likely in year 2 to be identified with dyslexia than the comparison group. This could be attributed to the fact that students who are identified with free and reduced lunch are often more likely to struggle with reading and represent a higher percentage of the sample (61-63%). In addition, students who are both EL and low SES represent the majority of ELs identified with dyslexia at 90% for year 2.

Moreover, a student's ethnicity, when compared with Caucasian, provided insight into gaps that exist in dyslexia identification between specific ethnic identities. Replicating the results of Odegard et al. (2020), students who are Hispanic or African American are less likely to be identified with dyslexia (p. 375). The same is true for students who are Asian or grouped in the *other* category. First, while identification for most ethnicities improved from year 1 to year 2, the overall likelihood of a dyslexia identification for all ethnicities besides Caucasian (i.e., Hispanic/Latino, African American, Asian, other) remained negative, signaling the need to

provide training for diagnosticians regarding orthographic depth and language varieties, and to identify ways to support schools who have students that speak a first language other than Spanish.

For African American students specifically, the likelihood of identification actually decreased from year 1 to year 2. One possible explanation could be due to the fact that many students come from a background of African American English (AAE) that is recognized as a language variety (or dialect). Research has established that using two languages that are similar, yet distinct (e.g, AAE and General American English) can impede learning new language skills such as reading and writing as much as using two languages (Washington & Seidenberg, 2021). It is possible that students who come from an AAE background are not seen as English Learners of the language encountered in academic settings - General American English (GAE). As AAE is governed by rules and patterns, these students are overlooked as ELs and expected to perform as monolinguals when in reality, they require systematic and explicit instruction in the patterns of English to make adequate progress in learning to read. As African American students have a lower chance of identification than even ELs, further investigation is needed to examine why and how we can improve identification for not just other languages but other language varieties as well. As Washington & Seidenberg (2021) suggested expanding teachers' knowledge of language variety to address this issue, we must also extend this charge to those responsible for evaluating students with dyslexia and other learning disabilities. Furthermore, including AAE as a language variety and offering language supports to these students in classrooms could serve to remediate some difficulties and identify those with true dyslexia versus a language-related issue.

Furthermore, students who are Asian were the least likely to be identified with dyslexia. While these students represent only 4.5% of the total sample in 2019-20, these students must be

afforded the same opportunities for identification regardless of the size of their population or the ability of the school district. For Chinese language dyslexia, the prevalence is reported anywhere from 3-12.6% (Lin et al., 2020). Similar to findings regarding testing for ELs in Texas, prevalence rates varied due to varying methods, tests, and definitions. Prevalence in the present sample for Asian students as a whole was 0.14% demonstrating that under-identification is present for this population as well.

Results of the survey regarding evaluation for ELs and the personnel responsible for carrying out these evaluations demonstrated some inconsistencies related to this process that require attention. Texas has led the charge in its adoption of laws and the *Texas Dyslexia Handbook* that created provisions for dyslexia identification and intervention. Most recently, language was added to the section titled *Procedures for the Evaluation and Identification of Students with Dyslexia* specifically for evaluators of ELs. Special stipulations were included for evaluators of ELs stating that those "involved in the evaluation [and] interpretation of evaluation results" (TEA, 2021. p. 28) must have specific knowledge related to second language acquisition theory; understanding of transparent, syllabic, Semitic, and morphosyllabic languages; knowledge of a students' first and second language; as well as understanding how to interpret students' "oral language proficiency in two or more languages in relation to the results of the tests measuring academic achievement and cognitive processes" (TEA, 2021a. p. 28). They must also be able to incorporate academic data alongside socioeconomic factors into their interpretation requiring a depth of knowledge and experience with specific understanding of reading development. This will necessitate specialized training and supervision by a professional knowledgeable in reading, reading disabilities, and reading assessment. One suggestion would

be for university programs training diagnosticians to partner with experts on literacy and language to ensure diagnosticians grasp the knowledge required for such a task.

The same is true for in-service diagnosticians and campus-level personnel. Based on survey responses as to who is testing students on a campus, a wide variety of responses highlight the need for consistency across campuses. Respondents stated that testing is conducted by Reading Specialists, Licensed Dyslexia Therapists (LDT), Certified Academic Language Therapists (CALT), and even a team of campus professionals, along with educational diagnosticians and LSSPs. Moving dyslexia evaluations under special education should bring consistency to this process; however, without specialized knowledge of literacy, ELs, and language development on the part of the evaluator, this may not close the gap between ELs and monolinguals. In addition, FIIEs require a great deal of time, and often, campuses do not serve the students until they have a diagnosis. In a report published by Stoker et al. (2019), time spent on dyslexia evaluations ranged anywhere between 90 and 120 minutes for approximately 72% of participants. In small districts that share evaluators or large, urban districts with many referrals for testing, this can become quite a task. Therefore, improving classroom instruction by training teachers in structured literacy approaches that support all students would support ELs progress in spite of a lengthy testing process.

Additionally, assessments that have been validated to measure the specific constructs needed to make a dyslexia determination are imperative. Not all tests are alike in that they measure different skills based on what the evaluator feels is important given their personal foundational theory. In many cases, districts utilize what they own whether it is the best option or not. As the GORT-V was one of the most commonly utilized assessments reported from the survey, Keenan and Betjemann (2009) reported that it lacks validity in measuring comprehension

as students were able to answer many of the comprehension questions without reading the passages. Further, Styck and Watkins (2013) used utility statistics to determine that assessments such as the CLIM or the CALP are being used to identify language dominance in ELs in a way that was not intended. Research is needed to establish what assessments are reliable and valid for the purpose, as well as what specific assessments should or should not be used for a dyslexia evaluation.

Overall, conclusions from the results of this study indicate that there remains much work to do regarding the identification of dyslexia for not only monolinguals, but especially ELs. Taken together, the findings point to a need for improved knowledge on the part of the evaluator and the need to consider a multifactorial model for evaluation (Catts & Petscher, 2021; Compton, 2021; Daniels & Share, 2018; Wagner, 2020) that accounts for language varieties, knowledge of orthographic depth, and its role in language acquisition to accurately identify students who have a language difficulty or reading difficulty to provide the most appropriate intervention. In addition, a reliable process for identification that translates across districts, as well as provides oversight for implementation will facilitate more consistent identification of dyslexia for ELs, as well as ensure a more equitable process for all students.

Recommendations

The Children's Right to Read Initiative asserted that every child should have the basic human right to read (International Literacy Association, 2019). Students who enter our schools in the United States should not be denied this right because of the language other than English spoken at home or the lack of training or materials on the part of the schools when faced with dyslexia or other learning disabilities. Increasing diversity in U.S. schools brings attention to the need for reform regarding the way we evaluate and identify ELs for dyslexia. Texas has recently

shifted dyslexia to be identified under special education; however, more is required for ELs to be identified in a fair and reasonable fashion. The current study points to the under-identification of dyslexia for all students in Texas, and ELs are identified at a slower pace and later age than their English-speaking peers, further influenced by their specific ethnicity. Given this finding, we must consider reform and research in several areas.

Preservice teachers in Texas are now required to pass a Science of Reading exam before entering the classroom. Similarly, more should be required of those evaluating and identifying ELs with dyslexia. Training in pre-service programs for diagnosticians and LSSPs that cover topics such as reading development, models of reading, orthographic depth, and multifactorial models for identifying dyslexia should be required for anyone who will conduct evaluations in a school. In addition, a special certification could be required for those who choose to specialize in reading evaluations or evaluations of ELs. Additionally, recent research has supported a variety of multifactorial models that can be employed in more accurately identifying dyslexia based on multiple factors or dimensions. Models such as the Constellation Model (Wagner et al., 2020), the Cumulative Risk and Resilience Model (Catts & Petscher, 2021), as well as the Componential Model of Reading (Aaron et al., 2008; Joshi & Aaron, 2012), and Lattice (Conner, 2016) models account for language differences that influence reading acquisition. Survey results revealed uncertainty among the majority of participants with regard to using IQ measures in dyslexia evaluations, yet many continue to rely on this method. Equipping evaluators with models that rely less on IQ discrepancies and more on a wide variety of contributing factors that promote or hinder reading development for all students will promote precision in dyslexia identification.

As a result of the survey, a clear procedure for identifying ELs is lacking across the state and a need for consistency is evident if the gap between monolinguals and ELs is to close. While some schools evaluate for language dominance, others test in both languages, and others still, test only in English. Issues with assessments used in identification must also be addressed. While formal, standardized assessments have been developed for our largest population of ELs that speak Spanish, our population is continually changing especially in more urban areas, therefore a clear and systematic approach is required to be equitable for all students entering our schools from a variety of language backgrounds. Districts have a great deal of autonomy, but in this case, clearer guidance is needed to ensure students are evaluated and identified consistently across contexts. The development of a procedure that can be delivered with fidelity across all districts, including a list of reliable and valid assessments that should be utilized, building reliability into the process and providing more accurate identification.

For any of these changes to be impactful, there must be implementation with ongoing supervision with expectations for participation. With the Texas Dyslexia Handbook providing exhaustive guidance on all processes for dyslexia and stipulations that cover ELs, it could serve as the foundation from which to build oversight and procedure into a more streamlined process for evaluating ELs for dyslexia. The field of education is often guilty of abandoning something that might work too soon only to adopt another unproven method. This swinging of the pendulum, so to speak, does not serve the field or students well and, therefore, could be improved using guidance from the field of implementation science and the way it relies on a framework of implementation and improvement cycles to ensure fidelity and progress. With the Texas Dyslexia Handbook serving as that framework, it provides an obvious opportunity from

which to build oversight and procedure into a more uniform and streamlined process for evaluating and identifying ELs for dyslexia in a cohesive and equitable manner.

As more states adopt dyslexia legislation, educators and families will view evaluators of dyslexia as the most knowledgeable on the topic. Further research is needed to explore training programs for diagnosticians and LSSPs for evidence of advanced courses in reading and language development specific to dyslexia and develop programs that incorporate required hours with supervision to ensure understanding to adequately interpret data and suggest appropriate interventions that will best serve students' progress. In addition, future studies should examine the best approach for testing students who speak languages other than English, as well as develop assessment tools to facilitate this process with reliability. Research should also seek to better serve our African American students as learners of academic English and provide appropriate support for their ultimate success as readers.

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