The University of Texas at Austin
Texas Education Review
College of Education

Journal Homepage: Texas Education Review
Published online: May 2024
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To cite this article: Simmons, M., Mikyung, S., & Hart, S. (2024). Dyslexia identification: Texas legislative trends in prevalence rate of students by school district locale. *Texas Education Review*, *12*(2), 6-24. https://doi.org/10.26153/tsw/51997

Dyslexia Identification: Texas Legislative Trends in Prevalence Rate of Students by School District Locale

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Abstract

State legislation serves as a guide and critical influence on the evaluation and identification of students with dyslexia across the United States. The state of Texas has numerous laws and regulations concerning dyslexia, guided by the Texas Administrative Code, Texas Education Code, Texas Occupations Code, and the Texas Education Agency's dyslexia handbook (National Center on Improving Literacy [NCIL], 2021). This article is an analysis of publicly available statewide data to assess the impact federal and state legislative policies have had on the prevalence rate of students with dyslexia in 839 urban and rural school districts in Texas. 839 school districts from the 2016-2017 to 2022-2023 school years were extracted from the Texas Education Agency's Public Education Information Management System. Researchers focused on the Office of Special Education Programs (OSEP) Corrective Action to the TEA (OSEP, 2018), the TEA state dyslexia handbook revisions (TEA, 2021), and the unique prevalence of rural school districts in Texas (Simmons et al., 2021). Analysis focused on implications for dyslexia evaluation and identification practices for school districts and evaluators within the state.

Keywords: dyslexia identification, education policy, school district locale

Introduction

Policy surrounding the identification of students with dyslexia and the provision of instructional support services to students identified as having dyslexia recently experienced critical public attention and landmark federal and state mandates for reform in the state of Texas. According to a review of current literature and existing education policy, 48 states have passed dyslexia-related legislation requiring dyslexia screening, dyslexia training for teachers, or dyslexia intervention (Rice & Gilson, 2023). State legislation serves as a guide and critical influence on the evaluation and identification of students with dyslexia across the United States. The prevalence of dyslexia (see Dyslexia Identification section for definitions) among students remains a current focus of researchers within the field, with estimates between 5% and 20% of the U.S. population has dyslexia (Rice & Gilson, 2023). Advocacy groups have pushed for the passage of state-level dyslexia legislation with the hope of addressing what many have viewed as the under-identification and under-treatment of dyslexia within school districts; however, current literature suggests this outcome may have not been achieved (Wagner et al, 2020). The state of Texas, has numerous laws and regulations concerning dyslexia, guided by the Texas Administrative Code (TAC), Texas Education Code (TEC), Texas Occupations Code (TOC), and the Texas Education Agency's (TEA) handbook for identifying and providing instructional services for students with dyslexia (National Center on Improving Literacy [NCIL], 2021). The state of Texas plays a role of national importance in dyslexia legislative trends as Texas-based decisions affects schools and children with dyslexia across the country in some cases (Odegard et al., 2020).

Researchers (Rice & Gilson, 2023) argue that the existence of these various laws and policies create confusion surrounding identification and interventions for students with dyslexia in the state of

Texas. Historically, in the state of Texas, school districts frequently identified and served students with dyslexia under Section 504 instead of the Individuals with Disabilities Education Act (IDEA; IDEA, 2019), and identification rates remained below prevalence estimates based on national rates (Odegard et al., 2020). In 2018, the Office of Special Education Programs (OSEP) began investigating and providing corrections for the TEA seeking to address the provision of special education services for all students, including students with dyslexia (OSEP, 2018). Furthermore, in 2021, the TEA updated the state dyslexia handbook with revised guidelines outlining the evaluation process, identification process and model for service delivery for students with dyslexia (TEA, 2021). The challenge of evaluation and identification of students with dyslexia in the state of Texas is further complicated by the percentage of school districts identified by the National Center for Education Statistics (NCES) as rural school districts (TEA, 2023a). Texas has more rural school districts than any other state in the United States; and rural school districts within the state face unique challenges in special education identification, such as access to service providers, funding, and resources (Simmons et al., 2021).

Dyslexia Identification

In the United States, dyslexia-specific processes for identification and instructional service delivery for students with dyslexia exist in at least 42 states; however, state-specific processes vary significantly in identification and practice (Petscher et al., 2019), leading to debate among school personnel over dyslexia-specific characteristics (Rice & Gilson, 2023). Results of previous studies suggest that differences in state dyslexia legislation across states and ambiguity within state legislation directly impacts 1) the number of students identified as having or being at risk for dyslexia, 2) the types of supports students with dyslexia receive, and 3) the implementation of dyslexia specific laws (Gearin et al., 2022). Nationally, three definitions of dyslexia are most recognized: 1) The First Step Action definition that originated in the U.S. Senate, 2) the International Dyslexia Association (IDA) Definition (Miciak & Fletcher, 2020), and 3) Vaughn and colleagues' most recent definition (Vaughn et al., 2024).

The First Step Act Definition states:

> Dyslexia means an unexpected difficulty in reading for an individual who has the intelligence to be a much better reader, most commonly caused by a difficulty in phonological processing (the appreciation of the individual sounds of spoken language), which affects the ability of an individual to speak, read, and spell. (Cassidy, 2019).

The IDA defines dyslexia as follows:

> Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge. (International Dyslexia Association, 2002).

Vaughn and colleagues define dyslexia as:

> Dyslexia is a learning disability that involves significant difficulties in reading and spelling single words accurately and with automaticity. These difficulties are observed despite the provision of generally effective reading instruction and supplemental interventions. Word reading and spelling difficulties in dyslexia are often associated with difficulties in phonological processing, but dyslexia is not identified when reading difficulties are the result of second language learning, problems with vision or hearing, or intellectual disability (Vaughn et al., 2024, p. 9).

In the state of Texas education evaluators are guided by TEC and the TEA's definition of dyslexia as outlined in the dyslexia handbook. TEC §38.003 defines dyslexia and related disorders in the following way:

> "Dyslexia" means a disorder of constitutional origin manifested by a difficulty in learning to read, write, or spell, despite conventional instruction, adequate intelligence, and sociocultural opportunity. "Related disorders" include disorders similar to or related to dyslexia, such as developmental auditory imperception, dysphasia, specific developmental dyslexia, developmental dysgraphia, and developmental spelling disability (TEC §38.003(d)(1)-(2), 1995).

The TEA dyslexia handbook defines dyslexia below:

> Students identified as having dyslexia typically experience primary difficulties in phonological awareness, including phonemic awareness and manipulation, single word reading, reading fluency, and spelling. Consequences may include difficulties in reading comprehension and/or written expression. These difficulties in phonological awareness are unexpected for the student's age and educational level and are not primarily the result of language difference factors. Additionally, there is often a family history of similar difficulties (TEA, 2021, p. 1).

Legislative History in Texas

State-specific dyslexia laws exist among 48 states with the intent to support the identification and delivery of instructional support services to students with dyslexia; however, these laws may contribute to unintended consequences in schools related to dyslexia (Rice & Gilson, 2023). In Texas, dyslexia laws date back as early as 1986, with the first dyslexia handbook written in 1992 (Rice & Gilson, 2023). In 2016, a series of investigative news reports were published that revealed systemic problems concerning Texas's continuous delayed identification and denial of services to students with disabilities, including students with dyslexia (Simmons et al., 2021). This public media coverage spurred a federal investigation by the OSEP that resulted in OSEP's findings that the TEA was in violation of the IDEA (OSEP, 2018). OSEP cited three findings of non-compliance, the most relevant among these to identification of students with dyslexia was the assertion that TEA failed to, "ensure that all students with disabilities were identified and evaluated" (OSEP, 2018).

School personnel, researchers, and policy makers (Odegard et al., 2020) indicate that the OSEP correct of action letter to the TEA served as a catalyst to frequent and significant state-based legislative change over the past six years. Table 1 outlines seven legislative state amendments to the TEC, the TAC, and four recent committee approved Texas state House and Senate bills. In addition

to these changes, the TEA issued updates to the Texas Dyslexia Handbook in 2021 containing explicit guidance on the processes for evaluating and identifying students within the state with dyslexia (TEA, 2021). This trend in aggressive legislative changes was punctuated in July 2023 with the Texas House committee approval of Texas House Bill 3928 (Texas H.B. 3928, 88th Legislature, 2023), a bill that significantly impacted local education agencies' (LEA) processes for evaluating and determining the presence of dyslexia among students. Among other provisions, the most noted requirements of the bill specific to dyslexia identification require the following: 1) If a student is suspected of having dyslexia, an LEA must distribute to parents a form developed by the TEA, explaining rights under the IDEA that may be additional to those under Section 504 of the Rehabilitation Act of 1973, 2) an LEA must determine the qualifications and training requirements for a required admission, review, and dismissal (ARD) committee member when a student is suspected of, and is later identified with, dyslexia (TEA, 2023b).

Table 1

Texas State Dyslexia Legislation from 2018 – 2023

TEC §21.044(c)(2)	Outlines the curriculum requirement for teacher preparation programs to include the characteristics of dyslexia, identification of dyslexia, and multisensory strategies for teaching students with dyslexia (TEA, 2021).
TEC §21.054(b) 19 TAC §232.11(e)	Mandate continuing education requirements for educators who teach students with dyslexia (TEA, 2021).
TEC §28.021(b)	Establishes guidelines for districts when measuring academic achievement or proficiency of students with dyslexia (TEA, 2021).
TEC §38.003(a)	Requires students to be screened or tested, as appropriate, for dyslexia and related disorders at appropriate times in accordance with a program approved by the State Board of Education (SBOE). Screening must occur at the end of the school year for each student in kindergarten and first grade (TEA, 2021).
TEC §38.0032	Requires the TEA to annually develop a list of training opportunities regarding dyslexia that satisfy continuing education requirements for educators who teach students with dyslexia (TEA, 2021).
TEC §42.006(a-1)	Requires school districts and open-enrollment charter schools to report through the Texas Student Data System (TSDS) and Public Education Information Management System (PEIMS) the number of enrolled students who have been identified as having dyslexia (TEA, 2023b).
Texas House Bill 3, 2019	Increased rate of funding the LEA receives for placing a special ed. student in a general ed. setting (Texas H.B. 3, 86th Legislature, 2019).
Texas Senate Bill 500, 2019	Increased supplemental spending in response to decreased funding for special ed. students that occurred during 2012, 2017-2019 (Chevalier, 2019).
Texas Senate Bill 139, 2019	Required the TEA to provide notice to families of students receiving special ed. services detailing elimination of, "8.5% cap" (Texas S.B. 139, 86th Legislature, 2019)

Rural Education in Texas

According to the U.S. Department of Education's National Center for Education Statistics, Texas has more than 2,000 campuses classified as being in rural areas (TEA, 2019). This state characteristic impacts access to service providers, funding, resources, and professional development, with special educators in rural school districts tending to have decreased access to post-baccalaureate education than their suburban and urban counterparts (Simmons et al., 2021). Researchers have revealed contrasting perspectives in assessing state funding and the impact of state funding on the provision of special education services in rural schools. In an analysis of data, Texas was found to use state formulas to allocate state financial aid to school districts that include several factors designed to support rural school districts when compared to other states with similar populations in rural areas (Imazeki & Reschovsky, 2003). Overall, researchers found that the cost structure of rural school districts, including those located in the State of Texas, were comparable to that of non-rural school districts (Imazeki & Reschovsky, 2003). Comparatively, rural school districts have similar cost structures as non-rural school districts with greater student populations.

Review of previous literature also indicated that Texas uses a "bounty system," in comparison to a "census system," to determine special education funding within the state (Stock & Carriere, 2021). Bounty funding systems base funding on per-pupil, per-staff, and cost reimbursements models, which incentivize increased special education enrollment, particularly among students with disabilities that have more subjective diagnosis criteria. Conversely, census or lump sum funding models distribute funding based on the total student population in the district rather than on special education-related metrics (Stock & Carriere, 2021). TEC §42.006(a-1) requires school districts and charter schools within the state to report through the Texas Student Data System and Public Education Information Management System the number of enrolled students who have been identified as having dyslexia (TEA, 2023b). This data aids in state funding allocation for instructional service delivery for students with dyslexia within the state. In addition to state funding formulas that consider high rates of rural areas and seek to increase special education enrollment, state commissioner, Mike Morath, established a Texas Rural Schools Task Force in 2016 charged with the focus of identifying current challenges and best practices for rural school districts statewide (TEA, 2019).

Rationale for the Present Study

Factors have led to a challenging landscape in dyslexia identification within the state of Texas including: 1) the presence of varied definitions nation and statewide of dyslexia, 2) the highest prevalence of rural school districts within the nation, 3) landmark legislative changes in a short period of time (i.e. seven years), and 4) funding systems aimed at supporting rural schools and special education service delivery. Researchers have sought to examine the impact of legislative changes on prevalence rates of students identified with dyslexia (Cassidy, 2019; Morgan et al., 2023; National Center on Improving Literacy, 2021; Odegard et al., 2020; Petscher et al., 2019; Rice & Gilson, 2023; Wagner et al., 2020) and evaluate the impact of rural education in Texas and similar states (Simmons et al., 2021; Imazeki & Reschovsky, 2003; Stock & Carriere, 2021). However, research does not exist to examine the impact of state level legislative changes on dyslexia identification prevalence rates by school district locale settings. Against this background, researchers of the present study conducted quantitative data analyses of state dyslexia legislative updates by comparing dyslexia prevalence rates across school district locale within Texas.

The present study sought to provide new insights by investigating statewide enrollment trends of students identified as having dyslexia and by comparing the prevalence rates statewide of students identified as having dyslexia according to school district locale throughout Texas from 2016-2017 to 2022-2023 school year. Specifically, the following research questions guided the present study:

1. What are legislative trends in the prevalence rate of students with dyslexia in Texas from 2016-2017 to 2022-2023 school years?
2. How is the prevalence rate change of students with dyslexia over the last seven school years (i.e., 2016-2017 to 2022-2023) moderated by school district locale (i.e., city, suburban, town, or rural) in Texas?
3. What is the comparison between the prevalence rate of students with dyslexia in urban (i.e. city and suburban) and rural (i.e. town and rural) school district locales between 2016-2017 and 2022-2023 school years?

By conducting a Texas-focused analysis, researchers aimed to focus on statewide practices for identifying students as having dyslexia, guided by state-level laws, policies, and practices (i.e. TAC, TEC, TOC and the TEA's state dyslexia handbook). In response to the OSEP Corrective of Action to the TEA (OSEP, 2018), the TEA state dyslexia handbook revisions (TEA, 2021), recent legislative amendments to TEC, TAC and recent committee approved Texas State House and Senate bills, researchers used most currently publicly accessible data for selecting the seven years between 2016 to 2023 for investigation. Accordingly, findings from the present study inform current practices in dyslexia identification within the state of Texas and guide future legislative amendments that directly impact dyslexia identification statewide.

Method

Data Collection Procedure

To retrieve data for the present study, researchers followed a systematic data collection procedure. First, the lead researcher (i.e., the first author) created a master Excel spreadsheet that listed all public and charter school districts in Texas and their locale classification by consulting publicly available information on the TEA's (2023a) website. The TEA uses NCES's classification system (U.S. Dept. of Education, 2022) that categorizes school districts as one of twelve possible categories, composed of four basic school district locale types (i.e., city, suburban, town, rural). The lead researcher then filtered the master spreadsheet to sort school districts by basic school district locale category type (i.e., city, rural, suburb, town; see Table 2 for a listing of the four subcategories and corresponding definitions).

Table 2

NCES School District Locale Subcategories and Definitions

Locale	Definition
City: Large	Territory inside an urbanized area and inside a principal city with population of 250,000 or more.
City: Midsize	Territory inside an urbanized area and inside a principal city with population less than 250,000 and greater than or equal to 100,000.
City: Small	Territory inside an urbanized area and inside a principal city with population less than 100,000.
Suburban: Large	Territory outside a Principal City and inside an Urbanized Area with population of 250,000 or more.
Suburban: Midsize	Territory outside a Principal City and inside an Urbanized Area with population less than 250,000 and greater than or equal to 100,000.
Suburban: Small	Territory outside a Principal City and inside an Urbanized Area with population less than 100,000.
Town: Fringe	Territory inside an Urban Cluster that is less than or equal to 10 miles from an Urbanized Area.
Town: Distant	Territory inside an Urban Cluster that is more than 10 miles and less than or equal to 35 miles from an Urbanized Area.
Town: Remote	Territory inside an Urban Cluster that is more than 35 miles from an Urbanized Area.
Rural: Fringe	Census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster.
Rural: Distant	Census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster.
Rural: Remote	Census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

Note. TEA's school district type data search yielded data sets for school years ranging from 2016-17 up to 2021-22. The most recent district type categorization data set available was from the school year 2021-22. Thus, all school districts categorized as city, suburban (i.e., large, midsize, small) and town, rural (i.e., fringe, distant, remote) listed on the district type dataset for the 2021-22 school year were included for analysis.

Next, the lead researcher consulted publicly accessible information on the TEA's (2023b) PEIMS website to retrieve data from the Student Program and Special Populations Reports for the school years under study (i.e., 2016-2017 to 2022-2023). Data summarized total student enrollment by school district name and the total number of students identified as having dyslexia in each school district. Although the total number of students receiving special education services were provided for each school district, the TEA available spreadsheets did not differentiate students identified as having dyslexia within the special education identification categories. Thus, students receiving special

education services were not considered in isolation in this investigation. The study focused on students with dyslexia only. After the lead researcher retrieved these reports, data were consolidated into a single report and matched by the school district name to the master spreadsheet where each school district name was already sorted by basic school district locale category type. As a result, the master spreadsheet housed data for 1,229 school districts in Texas that included total student enrollment by school district name identified as having dyslexia for the school years under study. To ensure accuracy and completeness with the master spreadsheet, the secondary researchers (i.e., the second and third authors) each performed systematic reviews of the data collection procedure.

Data Coding

The purpose of the analysis was to analyze the statistical and comparative trends among students who were identified and received dyslexia services during the school years under study and compare identified trends between school district locale, and rural and urban school districts. The researchers identified the following variables for the present analyses:

- the school years under study (i.e., 2016-2017 to 2022-23 school years);
- the basic school district locale type (i.e., city, suburban, town, rural); and
- the percentage of total student enrollment by school district of students identified with dyslexia (i.e. prevalence rate of students with dyslexia).

Charter Schools

A charter school is a type of public school. The Texas Legislature authorized the establishment of charter schools in 1995; some of the first charter schools in Texas have been in operation since Fall 1996. Charter Schools are subject to fewer state laws than other public schools. The reduced legislation encourages more innovation and allows more flexibility, though state law does require fiscal and academic accountability from charter schools. The state monitors and accredits charter schools just as the state accredits school districts (TEA, 2023c). Within the NCES system, charter school districts are assigned one of the twelve possible categories, composed of four basic school district locale types (i.e., city, suburban, town, rural); there is not a separate category for charter school districts (TEA, 2023a). Thus, charter schools were included in data coding according to the NCES system of basic school district locale type.

Data Analysis

Descriptive Analysis

Once data was consolidated by combining dyslexia totals for each school district by NCES district type descriptions for each year (i.e. 2016-2017 to 2022-23), the total percentages of students identified as having dyslexia were calculated by total student enrollment populations for each school district. Outputs and R (R Core Team, 2024) codes used for the two-level multilevel modeling are available at https://mshin77.github.io/dyslexia_prevalence. Data analysis scripts have been posted through an online data repository (Simmons et al., 2024). Initially, we had 8,426 data points across seven academic years nested within 1,229 districts. We included district data that met the following two criteria. First, we included the district's reported number of students with dyslexia, which was at least 5. For this criterion, the lead author reviewed combined data, noting school districts that did not report total students identified as having dyslexia for every school year included in the study. As

such, some values in the data set were masked to comply with requirements in the Family Educational Rights and Privacy Act (FERPA), where the TEA had replaced values greater than 0 but less than 5 with "-999" or "-9999999." This procedure resulted in 5,883 data points across seven school years within 842 districts. Next, districts that reported data for the specified seven school years were included in the data analysis. Any school districts with the absence of reported dyslexia totals for a given academic year were not included in the study. School districts that did not report dyslexia totals for all seven school years under review were excluded from study analysis, resulting in 5,873 data points within 839 districts.

Multilevel Modeling

We employed two-level multilevel models to account for the school year based on each school year (level 1) nested within school districts (level 2) and identify the changes in the prevalence rate of students with dyslexia and its relation to school years and school district locales. Researchers applied a piecewise growth model approach (Harring et al., 2021) in examining these trends over time across seven school years. We hypothesized there could be legislative trends in the prevalence rate of students with dyslexia in Texas from 2016-2017 to 2022-2023 school years. Given that a nonlinear change on the identification rate of students with dyslexia is expected across academic years, we considered this potential discontinuity in our model (Shin et al., 2024). A residual analysis was employed to check for normality distributed error. Residuals were not mostly normally distributed, not meeting the statistical assumption of normality. Based on this result, we hypothesized that intercepts vary between school districts and estimated a null model (Model 0). As shown in the online supplemental materials, 90.96% of the total variance in the prevalence rate of students with dyslexia can be attributed to school clusters. The Level 1 equation with no moderator (Model 1) is as follows:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(t - T_{1i}) + \pi_{2i}(t - T_{2i}) \times (t > T_{2i}) + \pi_{3i}(t - T_{3i}) \times (t > T_{3i}) + \pi_{4i}(t - T_{4i}) \times (t > T_{4i}) + \pi_{5i}(t - T_{5i}) \times (t > T_{5i}) + \pi_{6i}(t - T_{6i}) \times (t > T_{6i}) + \pi_{7i}(t - T_{7i}) \times (t > T_{7i}) + e_{ti} \text{ with } e_{ti} \sim N(0, \Sigma e)$$

where Y_{ti} represents the prevalence rate of students with dyslexia at school year t (t = 2017, 2018, ··· T) in the ith district (i = 1, 2, ··· I). T_{1i}, T_{2i}, ··· T_{7i} denote seven segmented time points for the ith district data. The time variable, we replied on the end of each school year (i.e., 2017, 2018, ··· 2023) considering that each district data is based on the entire school year's information. ($t > T_{2i}$), ····· ($t > T_{7i}$) are logical statements and are considered 0 if false or 1 if true. π_{0i} indexes the intercept on the 2017 school year, and π_{1i} through π_{7i} index changes in trend compared to the previous school year. We modeled the first-order autoregressive model, AR(1), to the residual covariance structure, considering correlations among repeated measurement occasions, and further modeled heterogeneous residual variances across districts. Model 2 further tested the moderation effects of district locale, hypothesizing the prevalence rate of students with dyslexia over seven academic school years may be moderated by district locale types. For the initial analysis, two-level multilevel analyses were conducted using a *lme*( ) function from the *nlme* R package (Pinheiro et al., 2023).

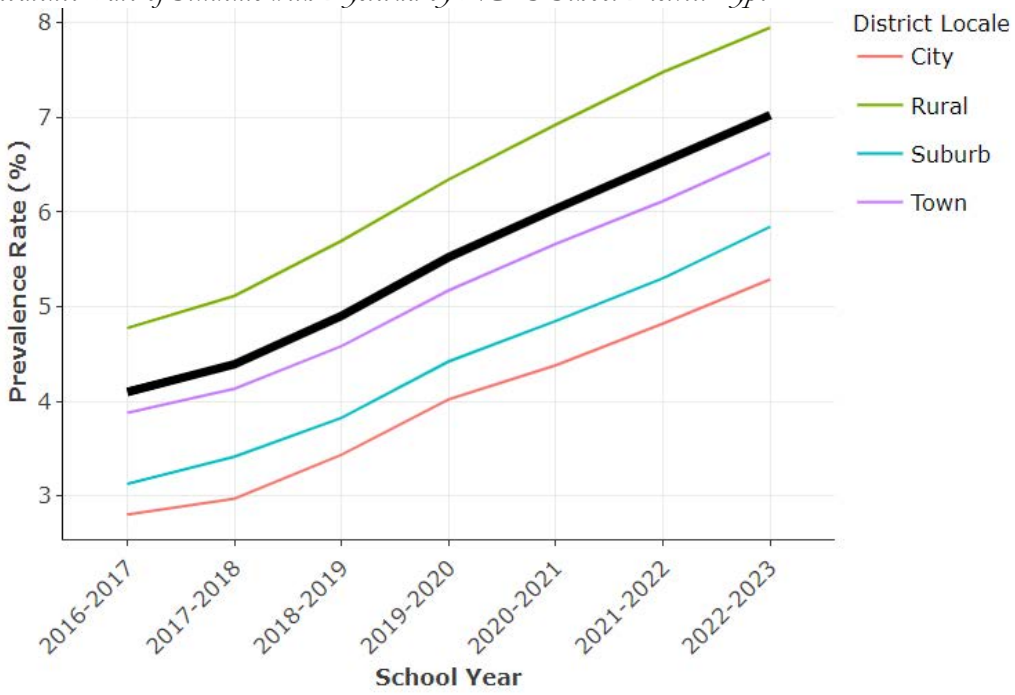
Results

Trends in Prevalence Rates

Based on 5,873 district data that met the study's inclusion criteria, researchers of the present study examined the trends in prevalence rate of students with dyslexia in Texas between 2016-2017 to 2022-2023 school year. Overall, the total number of students identified as having dyslexia in all school districts (city, suburban, town and rural) increased over time with a constant upward trend from the first school year (i.e., 2016-2017) to the last school year (i.e., 2022-2023; see Figure 1). To illustrate, the prevalence rate of students with dyslexia during the 2016-2017 school year was 4.10% of the total student population. The total prevalence rate of students across the state of Texas identified as having dyslexia by the 2022-2023 school year was 7.03% of the total student population.

Figure 1

Prevalence Rate of Students with Dyslexia by NCES School District Type



As shown in Table 3, the multilevel modeling results indicated that in the 2016-2017 school year, the average prevalence rate of students with dyslexia in Texas across 839 districts was 4.10% (t = 49.58, p < .001), which was statistically significantly different from 0. In the 2017-2018 school year, there was also a statistically significant increase in prevalence rate by 0.29% (t = 10.03, p < .001). In the following years of 2018-2019 and 2019-2020, the increase in the slope of prevalence rates was statistically significant by 0.22% (t = 4.60, p < .001) and 0.11% (t = 2.21, p = .03) respectively. In the 2020-2021 year, the slope change in prevalence rate significantly declined by 0.11% (t = −2.14, p = .03) compared to that in 2019-2020. Then, in the years 2021-2022 and 2022-2023, the slope changes were minimal (ps > .05).

Table 3

Parameters for the Two-Level Multilevel Model

Parameter	Model 1	Model 2
Fixed Effects		
Average in 2016-2017	**4.10*** (0.08)**	**2.80*** (0.17)**
Slope in 2017-2018	**0.29*** (0.03)**	**0.17** (0.06)**
Slope change in 2018-2019	**0.22*** (0.05)**	**0.30* (0.13)**
Slope change in 2019-2020	**0.11* (0.05)**	0.12 (0.12)
Slope change in 2020-2021	**−0.11* (0.05)**	−0.23 (0.12)
Slope change in 2021-2022	−0.01 (0.05)	0.08 (0.10)
Slope change in 2022-2023	−0.01 (0.05)	0.03 (0.12)
Suburban		
Average in 2016-2017		0.33 (0.25)
Slope in 2017-2018		0.12 (0.08)
Slope change in 2018-2019		−0.18 (0.16)
Slope change in 2019-2020		0.06 (0.14)
Slope change in 2020-2021		0.06 (0.15)
Slope change in 2021-2022		−0.06 (0.17)
Slope change in 2022-2023		0.07 (0.16)
Town		
Average in 2016-2017		**1.08*** (0.24)**
Slope in 2017-2018		0.09 (0.08)
Slope change in 2018-2019		−0.10 (0.15)
Slope change in 2019-2020		0.02 (0.14)
Slope change in 2020-2021		0.13 (0.14)
Slope change in 2021-2022		−0.13 (0.12)
Slope change in 2022-2023		0.03 (0.14)
Rural		
Average in 2016-2017		**1.97*** (0.21)**
Slope in 2017-2018		**0.17* (0.08)**
Slope change in 2018-2019		−0.06 (0.15)
Slope change in 2019-2020		−0.06 (0.15)
Slope change in 2020-2021		0.16 (0.15)
Slope change in 2021-2022		−0.11 (0.13)
Slope change in 2022-2023		−0.11 (0.15)
Random Effects		
Between-district variance (intercept)	0.11 (1.78)	0.11 (1.39)

Note. Standard errors are in parentheses. The reference group was given to the city in the 2016-2017 school year. * $p < .05$, ** $p < .01$, *** $p < .001$.

Dyslexia Prevalence Rates Changes Over Seven School Years Moderated by School District Locale

Researchers evaluated how the prevalence rate changes of students with are moderated by school year (i.e., 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-22 and 2022-23) and school district locale (city, suburb, town and rural) in Texas (see Table 2).

As shown in Table 3, each school district locale type (U.S. Dept. of Education, 2022) was examined individually. The percentage of total students enrolled in city school district locales that were identified as having dyslexia was 2.80% in the 2016-2017 school year and 5.29% in the 2022-2023 school year, a 2.49% increase in the prevalence rate on average. This average prevalence rate of students identified as having characteristics of dyslexia was statistically significantly different from 0 ($t = 16.10$, $p < .001$). In the 2017-2018 school year, a statistically significant increase in the prevalence rate of 0.17% ($t = 2.84$, $p = .006$) was noticed in city districts. In the following 2018-2019 year, a statistically significant slope change of 0.30% ($t = 2.39$, $p = .02$) was also observed. Although the slope was increasing, and the increases in the slope changes were noticed every year except for 2020-2021, these prevalence rate changes were not statistically significant (ps > .05) in city district schools.

School district locales under the basic type, suburban, increased from 3.13% of the total student population identified in 2016-2017 as having dyslexia to a percentage of 5.84 during the 2022-2023 school year, a 2.71% increase in the prevalence rate on average. During the following school years, there were no statistically significant differences in most prevalence rate changes between city and suburban school district locales (ps > .05).

Town school district locales had a 3.88% average of the total student population identified as having dyslexia in 2016-2017 and a 6.62% dyslexia identification rate in the 2022-2023 school year, representing an increase in the percentage of student population identification of 2.74%. In 2016-2017, compared to the average prevalence rate in the city district areas, town district areas were statistically higher by 1.08% ($t = 4.56$, $p < .001$). During the following school years, there were also no statistically significant differences in most prevalence rate changes between city and town school district locales (ps > .05).

When isolating for time and each NCES basic category school district locale type, results indicate that suburban schools exhibited the greatest increase in the percentage of student population identified as having dyslexia over the past seven years (i.e., 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-22 and 2022-23). Specifically, school districts located in rural areas reported a 4.78% dyslexia identification rate in 2016-2017 and a 7.95% in 2022-2023, for an increasing percentage of identification of 3.17%. In 2016-2017, compared to the average prevalence rate in the city district areas, that in rural district areas was statistically higher by 1.97% ($t = 9.31$, $p < .001$). The slope of the prevalence rate in 2017-2018 was also significantly higher for rural district schools by 0.17% ($t = 2.27$, $p = .02$) compared to city district schools. Although statistically not significant, there were slight decreases in slope changes in prevalence rates during most of the following years for rural district schools compared to city schools (ps > .05).

Rural and Urban School District Locale Prevalence Rate Comparisons

Researchers examined the impact state dyslexia legislative updates had on dyslexia prevalence rates in four basic district locale types in Texas from 2017 to 2023. In doing so, researchers referenced again NCES's classification system (U.S. Dept. of Education, 2022) of TEA's four basic school district locale types: city, suburban, town and rural (see Table 2). Simmons and colleagues (2021) showed that the prevalence rate of students with disabilities can vary by district locale, in particular, urban versus rural. Thus, we hypothesized the prevalence rate of students with dyslexia in urban and rural school district locales between 2016-2017 and 2022-2023 school years could be deviated, in general. Data were aggregated into two larger basic binary categories (rural and urban). School

district locale types were simplified to allow for a direct quantitative comparison between urban and rural school districts in the state of Texas. School districts assigned NCES's locales city and suburban were classified as, "urban,"; whereas school districts assigned NCES's locales town and rural were classified as, "rural." Based on this classification analysis, a comparison between the prevalence rate of total student population identified as having dyslexia in urban and rural school districts was completed (see Figure 1). The percentage of total student population with dyslexia in urban school district locales (city and suburban combined) for the 2016-2017 school year was 3%. The percentage of total student with dyslexia in urban school district locales (city and suburban combined) for the 2022-2023 school year was 6%. This represents an average rate of change in prevalence rate of students with dyslexia within urban school district locales from 2016-17 to 2022-2023 of 3%. In comparison, the prevalence rate of students with dyslexia in rural school district locales (rural and town combined) for the 2016-2017 school year was 4%. The prevalence rate of students with dyslexia in rural school district locales (rural and town combined) for the 2022-2023 school year was 6%. The prevalence rate of students with dyslexia within rural school district locales from 2016-17 to 2022-2023 was 2%. Findings indicate the average rate of change in prevalence rate of students with dyslexia when compared between urban and rural district locales is greater in urban school district locales. The prevalence rate of students with dyslexia in urban school districts increased at a greater rate in urban schools when compared to rural schools.

Discussion

Most of all states within the United States have passed legislation concerning the education of K-12 students with dyslexia (Gearin et al., 2022). Texas has passed seven legislative state amendments to existing laws, four committee-approved Texas State House and Senate bills, and updated changes to the Texas Dyslexia handbook all within a short seven-year time frame. This study examined the impact of federal and state legislation on the prevalence rates of students with dyslexia across the state by school district locale type and time.

Finding 1: Overall Trends in the Prevalence Rate of Students with Dyslexia in Texas

The total number of students identified as having dyslexia in Texas school districts (city, suburban, town and rural) steadily increased 3% between the first school year (i.e., 2016-2017) to the last school year (i.e., 2022-2023) in the study. By the 2022-23 school year, Texas identified 6% of the total student population, across all school district locale types, as students with dyslexia. Comparatively, the most conservative estimate of the prevalence of dyslexia, nationally, is 5% (Odegard et al., 2020). This confirms OSEP's corrective action did have an impact on dyslexia identification rates in Texas. The increase in Texas during this period resulted in an additional 142,130 students across the state who qualified to receive dyslexia services. The increase in students needing evaluation and subsequent services was undoubtedly a challenge for districts to accommodate. To meet the mandate, districts largely accommodated the increased number of students needing diagnostic testing and intervention services using existing staff and resources (TEA, 2019).

Finding 2: Prevalence Rate Change of Students with Dyslexia Over Time

When examining the time included in the study (2016-2023) and school district locale type, findings indicate that suburban schools exhibited the greatest increase in prevalence rate of student population identified as having dyslexia (2.77%), followed by town schools (2.73%), city schools

(2.37%), and rural schools (1.5%). An explanation may be the recent population growth in Texas suburbs (Ratcliffe, 2022), which increases the number of students with and without disabilities enrolled in suburban school districts.

Finding 3: Comparison Between the Prevalence Rate of Students with Dyslexia in Urban and Rural School District Locales

Analysis from the impact of recent state legislative updates indicates that prevalence rates of dyslexia identification in Texas have disproportionately increased in urban districts. For this analysis, the four school district locale types (city, suburban, town, and rural) were aggregated into two larger categories (urban and rural). Findings show that the prevalence rate of students with dyslexia in urban school districts increased at a greater rate in urban schools (3% increase) as compared to rural schools (2%). This means that the greatest increase in dyslexia identification rates occurred in suburban and city school district locale types. There are several plausible explanations. One explanation is that there is an influx of students with dyslexia in suburban and city districts that isn't occurring in districts classified as town or rural school district locale type. Another explanation is that suburban and urban districts had relatively low levels of dyslexia identification as compared to town and rural districts. In this case, the OSEP corrective action legislation and recent state-based legislation enabled suburban and urban districts to "catch up" with their town and rural counterparts by identifying and diagnosing high numbers of students with dyslexia. A final explanation is that efforts to increase financial support for rural schools in Texas, such as the "bounty" system for district funding and the Texas Rural Schools Task Force, have had a positive impact on district types that historically have less access to qualified service providers, resources, and professional development (Simmons et al., 2021).

Recommendations

Need for Universal Definition of Dyslexia

The definition used for identifying dyslexia varies from state to state with previous research indicating 33 of the 50 states recognize the IDA definition of dyslexia, five recognize an alternative definition, and 12 don't recognize any definition (Gearin et al., 2022). Texas, specifically, follows the guidance of the TEA dyslexia handbook which contains both the IDA definition (TEA, 2021, p. 1) and TEC definition (TEC §38.003(d)(1)-(2), 1995). Varying definitions for identifying dyslexia are further complicated within the state of Texas due to multiple legislative updates, amendments, and revisions over the past seven years (see Table 1). The complexity of guidance in evaluation criteria and identification leads to discrepant identification rates, particularly in scenarios where identification relies heavily on practitioner interpretation and judgments (Rice & Gilson, 2023), as is the case in the state-level analysis for this study. Furthermore, the lack of a universal definition for dyslexia suggests that the rates of students reported as having dyslexia by school districts within the state of Texas may not accurately represent the presence of characteristics of dyslexia, which may further complicate efforts to identify and serve these students.

Need for Continued Support for Rural School Districts

Although rural school district locales in the state of Texas are supported by models to increase funding for rural education and a state commissioner-established task force (Imazeki & Reschovsky, 2003; Stock & Carriere, 2021; TEA, 2019), findings from this state-level analysis of publicly

accessible dyslexia identification data illuminate the need for continued and additional resources specific to dyslexia identification and delivery of instructional services for students with dyslexia (Author, 2021) for rural school districts across the state. Even though the increase in the prevalence rate of students identified as having dyslexia was greater in urban school district locales in comparison to rural school district locales, there was a measurable increase in the number of students identified as having dyslexia in rural school districts. This finding is of great concern as Texas serves more rural school districts than any other state in the nation (TEA, 2019), impacting state access to service providers, funding, resources, and professional development (Simmons et al., 2021).

Conclusion

State legislation continues to serve as a guide and critical influence on the evaluation and identification of students with dyslexia across the United States. Recent efforts to identify and serve students with dyslexia in Texas have been improved due to recent federal and state-based legislation, such as the TAC, TEC, TOC, and the TEA's handbook for identifying and providing instructional services for students with dyslexia (National Center on Improving Literacy [NCIL], 2021). Although the plethora of legislation may create confusion about how to best serve this population, findings from this study highlight the need for advocacy in state law making and the importance of school district funding and resource allocation to support the increased number of students with dyslexia in Texas.

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