February, 2023

Speech/Language Impairment or Specific Learning Disability? Examining the Usage of Educational Categories

Lisa Archibald
Wendy C. Georgan
Tiffany Hogan

ASHA American Speech-Language-Hearing Association

JSLHR

Research Note

Speech/Language Impairment or Specific Learning Disability? Examining the Usage of Educational Categories

Wendy C. Georgan,[a,b,c] Lisa M. D. Archibald,[d] and Tiffany P. Hogan[a]

[a] MGH Institute of Health Professions, Boston, MA [b] Program in Speech and Hearing Bioscience and Technology, Division of Medical Sciences, Harvard University, Cambridge, MA [c] Department of Communication Sciences and Disorders, Northeastern University, Boston, MA [d] School of Communication Sciences and Disorders, University of Western Ontario, London, Canada

ARTICLE INFO

Article History:
Received December 1, 2021
Revision received February 4, 2022
Accepted October 25, 2022

Editor-in-Chief: Stephen M. Camarata
Editor: Emily Lund

https://doi.org/10.1044/2022_JSLHR-21-00636

ABSTRACT

Purpose: Developmental language disorder (DLD) is a lifelong condition that when impacting educational performance is identified and serviced through U.S. schools as outlined in the Individuals with Disabilities Education Act. A few examples of educational categories that refer to DLD are (a) speech or language impairment (S/LI) and (b) specific learning disability (SLD). In this research note, we aim to examine trends in how these categories are assigned.
Method: We analyzed publicly available data released by the U.S. Department of Education from six school years between 2010 and 2020. We examined the use of S/LI and SLD categories across students of different ages at the U.S. national and state levels.
Results: We present a trend in which younger students tend to be identified with the S/LI category, whereas older students tend to be identified with the SLD category. This trend is evident in all 6 years of data analyzed at the national level, and in 49 of 50 states.
Conclusions: We discuss these findings in the context of research on language disorders to explain this trend. We highlight the potential damaging effects of using inconsistent terminology, including affecting the services for which students with DLD qualify and causing confusion for their parents and educators.

Developmental language disorder (DLD) is a lifelong neurodevelopmental condition that affects one's ability to understand and use language in the absence of brain damage, hearing impairment, or intellectual disability (McGregor et al., 2020). Its presentation is variable and can be characterized by difficulties in word learning, morphosyntactic skills, vocabulary, and discourse-level language (Lancaster & Camarata, 2019). DLD is one of the most common developmental disorders, with a prevalence of around 7.5% (e.g., Norbury et al., 2016), and its effects carry through the life span. Children with DLD are at greater risk for having reading difficulties (Catts et al., 2002), smaller social circles and greater isolation (Chen et al., 2018), and higher rates of anxiety and depression (Conti-Ramsden & Botting, 2008). Adults with DLD tend to leave education earlier and have less skilled employment (Conti-Ramsden et al., 2017). Early identification and provision of appropriate supports and services are crucial to optimize outcomes for children with DLD (e.g., Winstanley et al., 2018).

Unfortunately, children with DLD tend to be identified later and with less reliability than children with other neurodevelopmental disorders, including dyslexia (Adlof & Hogan, 2018) and autism (Gupta et al., 2007). In a parent survey conducted as part of a DLD study, only 9%–27% of parents of children with DLD reported concerns in areas of receptive and expressive language (Hendricks et al., 2019; see also Tomblin et al., 1997). Those children with DLD who are identified are often those with more visible comorbidities, including autism (Dockrell et al., 2019) and speech sound disorder (SSD; Skeat et al., 2010;

Correspondence to Wendy C. Georgan: wcgeorgan@g.harvard.edu.
Disclosure: *The authors have declared that no competing financial or nonfinancial interests existed at the time of publication.*

Zhang & Tomblin, 2000), or those with educational and financial resources (Wittke & Spaulding, 2018). This underidentification of DLD can be attributed to several factors, one of which is the inconsistent and variable terminology used to refer to DLD by researchers, clinicians, and educational policymakers. Because DLD has been studied from psychological, linguistic, neuroscientific, and genetic perspectives, there are over 100 different terms that researchers have used to describe children with DLD (Bishop, 2014). The term *DLD* was selected by the CATALISE Consortium, a group of 57 researchers representing six countries, of which six were speech-language pathologists from the United States (Bishop et al., 2017). DLD is defined as "a language problem that endures into middle childhood and beyond and that has a significant impact on social or educational function" (Bishop et al., 2017). Some debate remains among researchers about how the broader term *DLD* relates to the widely used, more narrowly defined *specific language impairment* (SLI; Volkers, 2018). SLI typically describes an impairment specific to language that cannot be attributed to hearing loss, neurological damage, or intellectual disability (Leonard, 2014, 2020). This final exclusion is typically defined as having a nonverbal IQ of at least 85, though there is marked variability across researchers regarding the nonverbal IQ "cutoff" score (Gallinat & Spaulding, 2014). Though DLD and SLI, among other research terms, continue to be used throughout the literature, these research-oriented terms, often, do not have a direct correlation with terms used by clinicians, insurance providers, and educational policymakers, all of whom operate under different labeling systems. In the United States, clinicians across settings often refer to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*, which defines the terms *language disorder* and *specific learning disorder*. Meanwhile, insurance providers use codes outlined in the World Health Organization's International Classification of Diseases, which includes F80.1 Expressive language disorder and F80.2 Expressive and receptive language disorder. Educational policymakers and speech-language pathologists working in school settings in the United States use the broader categories defined in the Individuals with Disabilities Education Act (IDEA). This inconsistency causes further confusion and makes it difficult not only for researchers to collaborate with each other, but also for people from different sectors to communicate with each other or generate awareness of DLD (Georgan & Hogan, 2019; Leonard, 2020; Schuele & Hadley, 1999). In this research note, we will focus on the usage of educational categories as defined in the IDEA that could potentially be assigned to children with DLD. It is imperative that category usage is understood to ensure that educators and parents recognize the way that these categories impact services for DLD, a lifelong condition.

Labeling DLD in the U.S. Public Education System

Within the U.S. school system, students whose disabilities affect their educational performance will be deemed eligible for special education services under one or more categories as outlined in the IDEA. These eligibility categories are broadly defined and are not meant to be diagnostic. Additionally, a student can be found eligible for special education through multiple IDEA categories, in which case they are listed as "primary," "secondary," and so forth. The categories defined in the IDEA are (a) autism, (b) deaf-blindness, (c) deafness, (d) emotional disturbance, (e) hearing impairment, (f) intellectual disability, (g) multiple disabilities, (h) orthopedic impairment, (i) other health impairment, (j) specific learning disability (SLD), (k) speech or language impairment (S/LI), (l) traumatic brain injury, and (m) visual impairment. The majority of students serviced through IDEA are identified with SLD (33%) and S/LI (19%) according to the National Center for Education Statistics (2022).

There are several categories that could potentially apply to a child who has DLD. A few likely options are (a) S/LI and (b) SLD (Sun & Wallach, 2014). The following definitions are taken verbatim from IDEA Part B, Subpart A, Section 300.8: Child with a disability.

> **Speech or language impairment** means a communication disorder, such as stuttering, impaired articulation, ***a language impairment,*** or a voice impairment, that adversely affects a child's educational performance.

> **Specific learning disability** means a disorder in one or more of the basic psychological processes involved in ***understanding or in using language***, spoken or written, that may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia.

Considering the language-based deficits of children with DLD, it is clear that either of these two categories could be used to refer to a child with DLD. The category S/LI clearly includes "language impairment" in its definition. However, this category does not distinguish whether the child in question has a S/LI (or both). In comparison, the category SLD is much broader, encompassing disorders in reading (i.e., dyslexia), writing (i.e., dysgraphia), and math (i.e., dyscalculia), among many others. At its core, however, SLD is described as "a disorder. . .in using language, spoken or written" (IDEA, 2004). DLD clearly falls under this description, and would likely impact a child's reading, writing, and even math (Cross et al.,

2019), all of which rely heavily on language ability. Notably, the descriptions of both S/LI and SLD stipulate that the child's language impairment negatively affects their academic performance in some domain.

The definitional difference between these categories is difficult to pinpoint. As Sun and Wallach (2014) point out, "Even a cursory consideration of these various definitions shows their similarity and, in many aspects, their complete overlap. By definition, a disorder of spoken or written language is a learning disability (p. 28)." Indeed, children with DLD are often identified under one or both of these categories, or "transition" from one category to another (Sun & Wallach, 2014).

Study Purpose

The considerable overlap between the terms *S/LI* and *SLD* in the United States raises the question of why a child with DLD would be identified with one of these categories or the other (or both). Clinical observations have highlighted more usage of the S/LI category in ages 3–5 years than in ages 6–21 years (e.g., American Speech-Language-Hearing Association [ASHA], 2016). The data-driven analysis of category trends in this study may lend support to these observations. Additionally, in a white paper released by the U.S. National Center for Learning Disabilities, Horowitz et al. (2017) showed graphically that the number of 6-year-old children with SLD in 2007 increased almost 6-fold compared to the number of 10-year-old children with SLD in 2011. In the same time frame, the proportion of 6-year-old children with an S/LI label was almost three times the proportion of 10-year-old children with S/LI.

Although Horowitz et al. (2017) reported the increased use of the SLD category with older children as an indication that these children were not identified in earlier grades, it is important to note that many children who had originally been designated as S/LI may have been reclassified as SLD as they were re-evaluated through the years. Thus, the discrepancies over time in S/LI and SLD usage observed in Horowitz et al. (2017) are likely not due to true shifts in the prevalence of S/LI or underlying language impairment. We know that DLD affect individuals across the life span (Clegg et al., 2005), and there has been no evidence to suggest that the prevalence of such disorders changes across ages. If there is no epidemiological shift across ages, then this begs the question: Why would age affect the usage of these educational categories?

In this research note, we aim to investigate the trends in the usage of these educational categories using publicly available data released by the U.S. Department of Education as required by IDEA Section 618. Considering the fact that DLD is a life-long disorder that has impacts across the life span and manifests differently over time, we hypothesize that designations for oral language impairment (S/LI) should be identified early and remained consistent throughout the school years. Findings that this category grows in number and remains relatively stable would be consistent with this hypothesis. A pattern of decreased numbers being identified with S/LI, however, would be more consistent with a change in category use over time. Our work aims to replicate and extend the findings of Horowitz et al. (2017) and clinical observations such as those published in ASHA Leader (ASHA, 2016) by investigating potential age-related differences in category usage at the national level and within individual states. We also apply robust linear models to quantify the relationship between age and category usage.

Method

Data

We performed data analysis on anonymized publicly available data released by the U.S. Department of Education under IDEA Section 618. All states, territories, and freely associated states of the United States supplied data about children with disabilities, aged 3 through 21 years, who received special education and related services under IDEA. We included nationwide data from the 2010–2011, 2011–2012, 2016–2017, 2017–2018, 2018–2019, and 2019–2020 school years. Between 2012 and 2015, the Department of Education released IDEA data that did not include disability category by age, so the data were incomplete for our analysis. We also analyzed state-level data from 2011–2012, the most recent year for which state-level disability category data for every age between 3 and 21 years were available. We then examined the assignment of the S/LI and SLD categories across ages at the aggregate national level, as well as within individual states.

Participants

Data from children (aged 3–21 years) with disabilities who were serviced under IDEA were included for six school years. Though data were available for the number of children designated to each of the 13 disability categories of IDEA, we only examined the number of children with S/LI or SLD and the number of children with any disability across ages. As mentioned before, a student can be identified with multiple categories under IDEA; the data analyzed reported only the primary category assignment in these cases. The total number of children who were classified by age and disability category for each school year can be found in Table 1. Due to the nature of the data, we were unable to track an individual child over multiple years to see whether his or her category changes,

Table 1. Number of students with speech or language impairment (S/LI), specific learning disability (SLD), and total across all disabilities for each school year of data analyzed in the United States.

School year	Number of students		
	S/LI	SLD	All disabilities
2010–2011	1,435,599	2,429,873	6,573,564
2011–2012	1,413,956	2,366,641	6,535,838
2016–2017	1,338,507	2,344,965	6,808,683
2017–2018	1,346,508	2,348,541	6,904,232
2018–2019	1,374,495	2,386,650	7,130,238
2019–2020	1,362,510	2,381,322	7,208,707

which would be the ideal way to investigate the S/LI to SLD shift. However, by investigating disability category by age within individual states and nationwide, we are able to report whether such trends exist at the aggregate level and perform a more holistic analysis of general trends in the use of IDEA categories.

Data Analysis

We downloaded Comma Separated Value (.csv) files from the IDEA Section 618 Data Products website (available at https://data.ed.gov/dataset/idea-section-618-data-products as of February 1, 2022; previous web address: https://www2.ed.gov/programs/osepidea/618-data/index.html). We used the free, open-source software R (R Core Team, 2021) for data cleaning and analysis.

For both nationwide and state-level analysis, we investigated how the number of children who are classified as S/LI or SLD changes across ages. Nationwide analyses included data from the 50 states (including Washington D.C.), U.S. territories (American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands), and freely associated states (the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau [Palau]). State-level analysis included only data from the 50 states (excluding Washington D.C.). If there was a shift in whether more children were classified as S/LI or SLD as age increased, then the mean "age of shift" was calculated. By "age of shift," we mean the age at which there was a change in the primary category identifying children. The data do not indicate whether or not the same children are included across consecutive years, and so cannot indicate whether individual children's categories shifted. We calculated age of shift by determining the x-value (age) of the intersection. Since data are only available for whole number ages, the age of shift was calculated by determining the two ages between which the number of S/LI children became less than the number of SLD children or vice versa. We then took the total difference in number of children between these two ages and approximated the age at which the counts would cross using the following formula:

$$a_1 + \frac{[S/LI - SLD]_{a_1}}{[S/LI - SLD]_{a_1} + [SLD - S/LI]_{a_2}} \quad (1)$$

a_1 = age before shift

a_2 = age after shift

For example, for the data in Table 2 (presented graphically in Figure 1), the calculated age of shift would be the x-value of the intersection, calculated as:

$$8 + \frac{6,033}{(6,033 + 2,878)} = 8.677. \quad (2)$$

Mean age of shift was calculated at the nationwide level for each of the 6 years of data. Additionally, the age of shift for each individual state was calculated for the 2011–12 school year, the most recent year for which state-level disability category data for every age between 3 and 21 years were available. Descriptive statistics of the distribution of the ages of shift are presented in the results.

When plotting the state-level trends in S/LI and SLD, we calculated the percentage of all children with disabilities who were categorized as S/LI or SLD, respectively, rather than using the raw counts. This is because of the wide variation in state populations, which makes the raw numbers of children with S/LI or SLD difficult to compare across states. Proportions of S/LI and SLD were calculated as follows for each age:

$$\%\ S/LI = \frac{\#\ of\ children\ with\ S/LI}{total\ \#\ of\ children\ with\ disabilities} \quad (3)$$

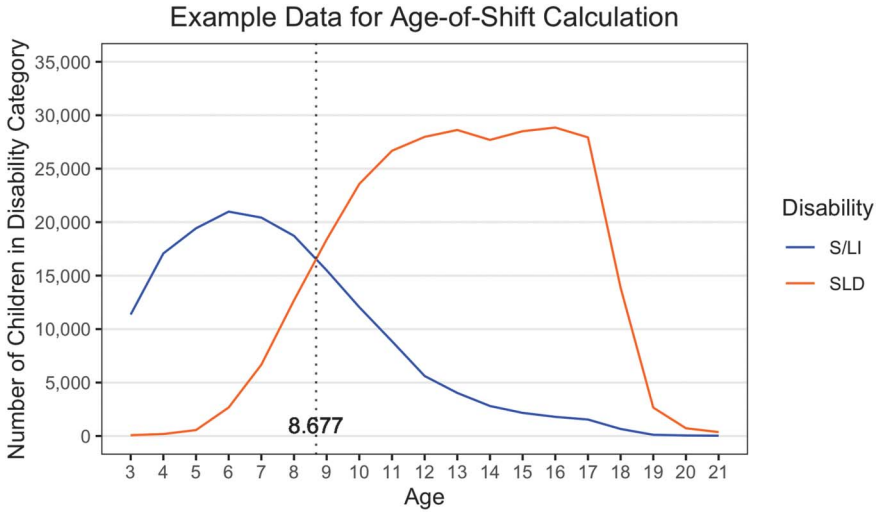
$$\%\ SLD = \frac{\#\ of\ children\ with\ SLD}{total\ \#\ of\ children\ with\ disabilities} \quad (4)$$

Finally, we used a generalized additive model (GAM) to quantify the effect of age on proportions of S/LI and SLD across states. GAM, a type of generalized linear model, has the flexibility to model nonlinear data by assigning smooth functions to the predictors (Hastie & Tibshirani, 1986; Wood, 2017). Interpretation of GAMs is relatively similar to interpretation of other linear models, with the exception that the smoothed predictors are not

Table 2. Example data to demonstrate age of shift calculation. S/LI = speech or language impairment; SLD = specific learning disability.

Variable	Age 8 years	Age 9 years
S/LI	18,721	15,497
SLD	12,688	18,375
|S/LI − SLD|	6,033	2,878

Figure 1. Line plot of example data (Table 2) to demonstrate calculation of age-of-shift using *x*-value of the intersection. Blue = speech or language impairment (S/LI); orange = specific learning disability (SLD).



assigned a single coefficient. Instead, we report the estimated degrees of freedom (EDF), which indicates the complexity of the smooth function (i.e., an EDF = 1.0 is a linear function, EDF = 2.0 is a quadratic function, etc.). We also report the *p* value of the smoothed age predictor and the adjusted R^2.

Results

At the nationwide level, we found that across all six years, a virtually identical pattern emerged: up until around age 9 years, more children are identified with the S/LI category than the SLD category. However, around age 9 years, the prevalence shifts, with more children identified as SLD than S/LI (see Figure 2). This trend is robust and consistent across years, indicating an irrefutable shift in educational categories from S/LI to SLD as children get older.

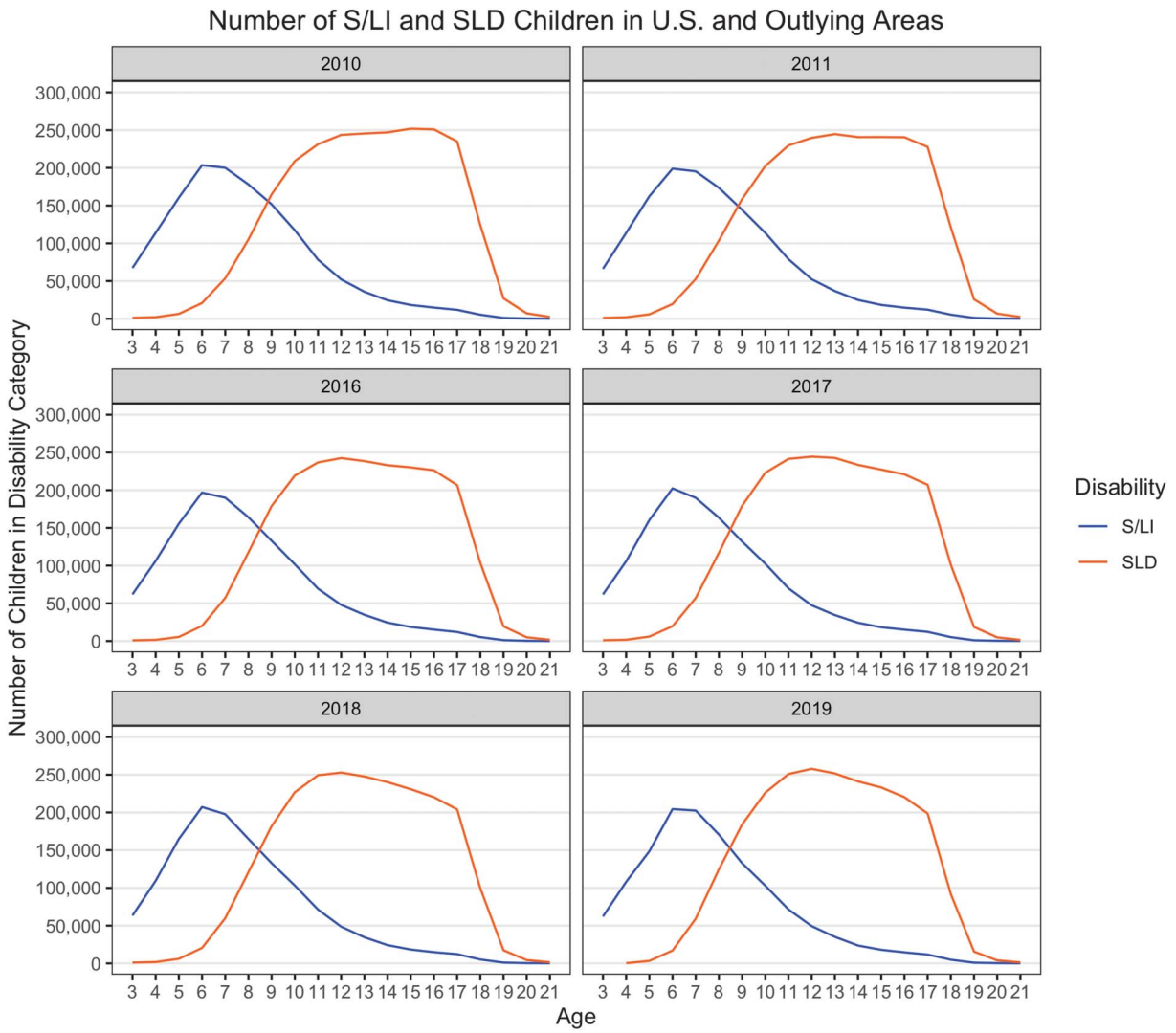
Using the age of shift calculation formula, the mean ages of shift from higher prevalence of S/LI to higher prevalence of SLD were calculated for each school year (see Table 3). In more recent years, the mean age of shift is lower than in 2010 and 2011, indicating a trend for an earlier shift to categorizing children as SLD rather than S/LI. This may be due in part to the push to identify children with specific learning disability earlier (National Joint Committee on Learning Disabilities, 2006).

At the state level, the proportion of all children with disabilities who were categorized as S/LI or SLD is presented for the 2011–12 school year (see Figure 3). Visually, for almost all states, there is a clear trend in that the use of the S/LI category decreases as the use of SLD increases, with a clear crossing point around age 9 years. To quantify the effect of age on category usage, we fit a GAM to estimate the effect of a smoothed age predictor on the proportion of S/LI and SLD identifications across all states (see Figure 4). The model generated two smoothed age terms, one for each category, denoted as *s*(Age)|S/LI and *s*(Age)|SLD. The EDF for *s*(Age)|S/LI was 8.647, and the EDF for *s*(Age)|SLD was 7.204. The smoothed age predictor was significant for predicting the proportion of S/LI usage ($p < .001$) and SLD usage ($p < .001$), with an overall adjusted R^2 of .705. This means that the age variable explained 70.5% of the variance in S/LI and SLD category usage.

The glaring exception to the state-level trend is the state of Iowa, in which the prevalence of S/LI hovers around 8.6% of all disabilities and that of SLD around 60.4% of all disabilities across all ages. There is no clear reason why this would be the case epidemiologically, so this discrepancy is likely due to Iowa school systems assigning the S/LI and SLD categories using different evaluation criteria than the majority of U.S. states.

We also calculated the age of shift from higher S/LI prevalence to higher SLD prevalence for each state using the 2011–2012 data set (excluding Iowa, for which there is no shift in educational categories). The mean age of shift across these 49 states was 8.81, with a median age of 8.68. Values of the age of shift ranged from 6.45 to 10.58. The age of shift in each state is presented in Table 4. The large amount of variation across states is likely due to the fact that individual states have different policies regarding evaluation and classification of children with disabilities, including different eligibility criteria,

Figure 2. Number of children in the United States (states, territories, and freely associated states) serviced under the Individuals with Disabilities Education Act with speech or language impairment (S/LI; blue) and specific learning disability (SLD; orange) by age for the 2010–2011, 2011–2012, 2016–2017, 2017–2018, 2018–2019, and 2019–2020 school years.



response to intervention requirements and procedures, and even arbitrary caps on the percentage of students that can be classified as having a disability (De Jesús, 2016; Frame & Mirfendereski, 2018). The distribution of the values of the age of S/LI to SLD shift is presented as a box plot and histogram in Figure 5.

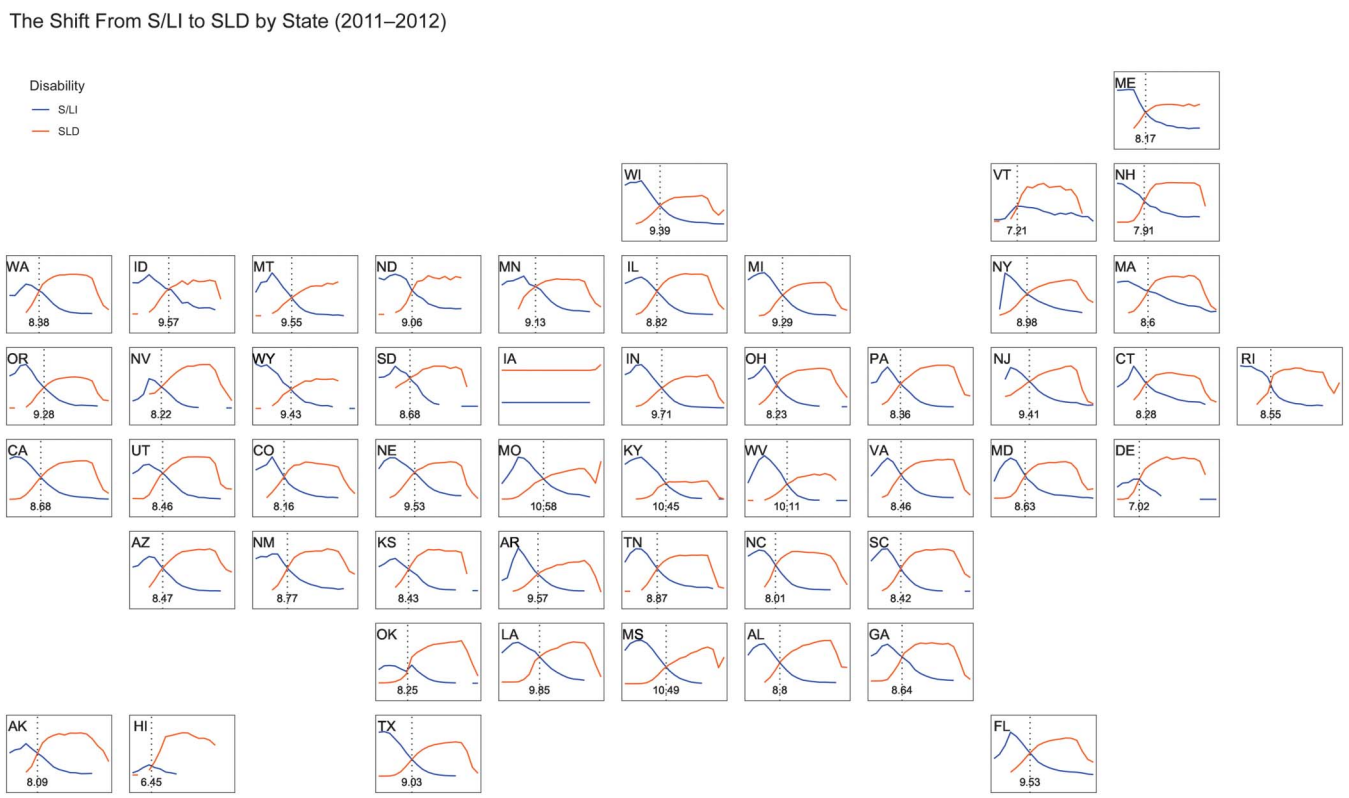
Table 3. Mean age of shift in the United States for each school year.

School year	Mean age of shift
2010–2011	8.847
2011–2012	8.831
2016–2017	8.503
2017–2018	8.497
2018–2019	8.474
2019–2020	8.473

Discussion

The purpose of this study was to investigate the usage of the S/LI and SLD educational categories across ages at statewide and nationwide levels in the United States. We found a clear nationwide trend in which a higher proportion of younger children are identified with the S/LI category than the SLD category and that these proportions shift toward higher SLD categorization in children older than the age of 9 years. This pattern was evident in all 6 years of data included in this study. Additionally, the

Figure 3. A U.S. map showing the proportion of children in the 50 states serviced under the Individuals with Disabilities Education Act with speech or language impairment (S/LI; blue) and specific learning disability (SLD; orange) by age for the 2011–2012 school year. Dotted lines indicate the intersection of the blue and orange lines (if one exists). The age (*x*-value) of this shift is denoted. Figure generated with helper code from nandeshwar.info.



state-level data from the 2011–2012 school year showed that in 49 out of 50 states, this same terminological shift from S/LI to SLD occurs. These findings reveal a robust and pervasive trend in the use of educational categories involving a shift from the use of S/LI in younger children to SLD in older children. Understanding what factors may contribute to this shift is essential for accurately identifying and providing services for children with language impairments.

Figure 4. Smoothed predictive curves generated by a generalized additive model, using smoothed age as a predictor of speech or language impairment (S/LI) identification (blue, left) and specific learning disability (SLD) identification (orange, right). Data points depict the raw data, which is the proportion of children with a given label in a single state.

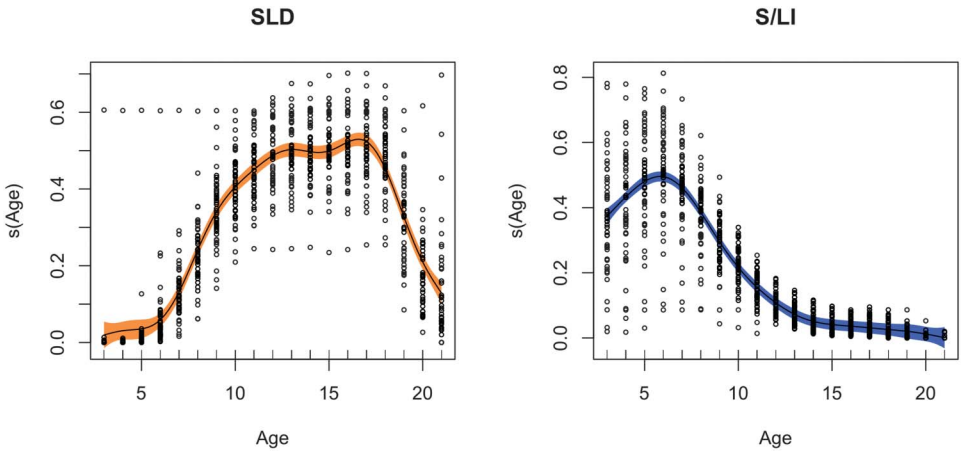


Table 4. The age of shift in each U.S. state as calculated from the 2011–2012 data set.

2011–2012 state-level age of shift			
State	**Age of shift**	**State**	**Age of shift**
Alabama	8.804	Montana	9.555
Alaska	8.090	Nebraska	9.534
Arizona	8.469	Nevada	8.220
Arkansas	9.573	New Hampshire	7.913
California	8.677	New Jersey	9.411
Colorado	8.164	New Mexico	8.770
Connecticut	8.278	New York	8.976
Delaware	7.022	North Carolina	8.012
Florida	9.529	North Dakota	9.061
Georgia	8.638	Ohio	8.226
Hawaii	6.453	Oklahoma	8.251
Idaho	9.571	Oregon	9.279
Illinois	8.823	Pennsylvania	8.359
Indiana	9.707	Rhode Island	8.548
Iowa	N/A	South Carolina	8.420
Kansas	8.434	South Dakota	8.675
Kentucky	10.452	Tennessee	8.870
Louisiana	9.853	Texas	9.028
Maine	8.170	Utah	8.456
Maryland	8.633	Vermont	7.211
Massachusetts	8.604	Virginia	8.456
Michigan	9.290	Washington	8.384
Minnesota	9.131	West Virginia	10.108
Mississippi	10.489	Wisconsin	9.385
Missouri	10.581	Wyoming	9.429

Note. N/A indicates that the state did not exhibit a trend such that an age of shift could be calculated.

Decrease of the S/LI Category: Possible Explanations

A clear trend that was observed across all years of data was the decrease in the usage of the S/LI category from younger to older students. There are several possible explanations for this shift that are not necessarily exclusive of each other. The first explanation relates to a shift in academic demands. Both word decoding and oral language skills predict reading comprehension (Hoover & Gough, 1990; Kendeou et al., 2009). However, the relative contributions of each of these components to reading comprehension begins to shift around third to fourth grade (~age 9 years), as children transition from learning to decode lower level text to reading complex texts with advanced language. This shift from "learning to read" to "reading to learn" has been well-documented (Language and Reading Research Consortium, 2015; Wolf & Stoodley, 2007) and explains why children with weak oral language skills may seem to suddenly struggle with reading in later grades. As reading is fundamental not only for English Language Arts classes but also for science and history classes, children with language impairments such as DLD may not be identified until around age 9 years, when they begin to struggle academically (Nation et al., 2004). Chall (1983) describes this seemingly sudden decline in reading ability as the "fourth-grade slump" (see also Leach et al., 2003). The timeline of the shift from S/LI to SLD that we determined in this research note aligns well with what would be predicted from the change in reading level that occurs around age 9 years.

Figure 5. Distribution of the age at which proportion of speech or language impairment (S/LI) becomes less than proportion of specific learning disability (SLD). (A) Box plot indicates median (dark line), with each dot representing an individual state's age of shift. (B) Density histogram of the distribution of ages of shift, mean indicated by dotted line.

Additionally, this terminological shift could be related to the higher demands on oral language than word-level skills in more competent readers. As reported in Catts et al. (2005), there is a shift in the predictive value of the two components of reading comprehension across age. In a longitudinal study, examining the contributions of word-level decoding and oral language skills to reading comprehension in second, fourth, and eighth

grade, Catts et al. (2005) found that the amount of unique variance predicted by oral language skills increased from 9% to 21% to 36% across the three grades. The amount of unique variance predicted by word-level decoding skills decreased from 27% to 13% to 2% within the same time frame. It is within this critical period of dynamic change in the contribution of the components of reading comprehension that we see a shift in the terminology used to describe children whose language impairment begins to affect their reading ability. Older children with DLD struggle most visibly with reading (Botting, 2020), an area of potential deficit specifically listed in the IDEA definition of SLD, but not in that of S/LI. This is a potential explanation for why children with DLD tend to be categorized as SLD rather than S/LI at older ages.

Another explanation for the decrease in the S/LI category is that the category represents a variety of disorders, some of which are more prevalent in younger children, such as SSDs (Sharp & Hillenbrand, 2008). It would stand to reason that these children would no longer be identified as S/LI or be eligible under IDEA once these speech patterns have resolved. The fact that SSD and DLD fall under the same broad educational disability category makes it difficult to tease them apart by analyzing IDEA categories. This points to the larger issue of how IDEA categories are defined and the purpose of educational disability categories as opposed to clinical diagnostic labels. Although this falls outside the scope of this research note, future work is needed to determine the potential positive effects of creating more narrowly defined IDEA categories, such as in the case of autism spectrum disorder (e.g., Pennington et al., 2014). Overall, changing academic demands and resolved SSD, along with other possible explanations, should be explored in future studies in a longitudinal sample of children who are initially qualifying for services as S/LI as they matriculate through elementary school.

DLD Is a Lifelong Condition

One additional explanation for the current findings could be that children transition in their disability categories. Although longitudinal data would be necessary to determine if a given child is assigned different categories at different years of age, the present results would be consistent with that possibility. Transitioning in categories could be problematic for a number of reasons, including putting stress on the family and contributing to a lack of understanding of the child's underlying areas of need. Further research is needed to investigate whether children's categories change over time.

The patterns we observed are consistent with the possibility that children with DLD experience a shift in eligibility categories as they get older. It is crucial to point out the fact that this terminological shift is not necessarily indicative of a shift in underlying deficit or true diagnosis. Children with DLD who are identified early on as having S/LI have language difficulties that manifest in different ways depending on the learning demands. At older ages, the impairment may affect key areas of learning, resulting in something that looks like SLD, but the child's underlying impairment is still in oral language skills. In fact, Sun and Wallach (2014) propose that "the majority of learning disabilities are language disorders that have changed over time. SLD is not a 'new' and distinct condition that arrives when children enter school (p. 34)." It is troubling when one considers the fact that children who are identified as S/LI early on may undergo treatment and seem to improve in language skills, only to later on be identified as SLD when the language demands of the classroom increase. This "illusory recovery" (Scarborough & Dobrich, 1990) in which children are discharged under S/LI, only to be re-identified with SLD, can mean that children who require continued language services may go through periods of receiving little to no support.

The redundancy of the definitions of S/LI and SLD raises the question of how important these educational categories are for the treatment of children who are categorized as one or the other. Children with language impairment who are categorized as S/LI versus SLD often have the same types of language deficits (Bishop, 2009; Casby, 1989; Sun & Wallach, 2014), and the use of varied terminology only serves to be confusing for parents and educators. The use of different categories is further complicated by the way services are provided in schools. Oral language deficits, like those underlying DLD, are primarily serviced by speech-language pathologists, whereas academic difficulties in reading, writing, and math are addressed by reading specialists or special education teachers. For children with DLD, regardless of the label used to qualify for services and regardless of who provides those services, appropriate supports should be in place with no breaks or gaps. Speech-language pathologists are in the unique—albeit challenging—position of being able to ensure continued language support and facilitate smooth transitions to academic services for these children.

Limitations and Conclusions

The aim of this study was to explore how IDEA categories are assigned and to identify factors (such as age) that affect category usage. Due to the exploratory nature of this study, our findings are not meant to advocate for changes in the IDEA categories. Future work is needed to study the effects of broad categories and

definitions on the treatment and services students receive through IDEA.

One limitation of this study is that the available data were cross-sectional in nature. Though we identify a clear shift in category usage over age, this trend can only be described at the aggregate level. An important future direction will be to follow children longitudinally to examine how categories are assigned and change over time in individuals. Additionally, the available data included only the primary disability category that a student was identified with; if a student was found eligible under multiple categories, these secondary categories were not accounted for in the data. Therefore, it is possible that some students could have been identified under both the S/LI and SLD categories, with one being the primary category. Because of the lack of data on secondary categories, the trends observed for shifts in primary category usage of S/LI and SLD do not consider potential interactions with other IDEA categories. Future work is needed to understand how primary and secondary IDEA categories affect services. Also, due to the nature of our data set, we were unable to investigate other factors that could potentially impact the choice to use S/LI or SLD, such as setting (schools vs. private clinics), state and local determinations of eligibility criteria, school culture, and financial considerations, such as funding for special education departments and insurance company policies (Murza & Ehren, 2020). This study also did not investigate how workplace policies or practices limit diagnostic decisions (Girolamo et al., 2022; Selin et al., 2019, 2022). Future work on the complexities involved in assigning IDEA categories is needed. Finally, it should be noted that findings related to trends in IDEA category usage are specific to the United States and do not include international variations of educational disability categories.[1]

Ultimately, the findings of this study reveal a terminological shift from S/LI to SLD that occurs around the age of 9 years. This shift occurs in almost every individual state but varies state-to-state due to differences in state-level special education policies. Understanding why this shift occurs and the significance of changing categories is crucial for improving the early diagnosis and treatment of children with language impairment.

[1]However, there is potential that similar trends are occurring in other countries besides the United States. For example, in a document published by the Department for Education in England in 2019, it was noted that the use of the category "Speech, Language and Communications Needs" decreased with older students, while the use of "Specific Learning Difficulty" increased with age (Data Insight and Statistics Division, Data Group, Department of Education, 2019). An intersection is observed between ages 9 and 10 years. This trend seems to be consistent with the findings described in this study for U.S. educational categories.

Data Availability Statement

The data used in this study are all publicly available for download through the U.S. Department of Education's Open Data Platform (https://data.ed.gov). IDEA data included in this study can be found under IDEA Section 618 Data Products (https://data.ed.gov/dataset/idea-section-618-data-products).

Acknowledgments

The National Institute on Deafness and Other Communication Disorders Institutional Training Grant 5T32DC000038-28 was awarded to Harvard University and supported Wendy C. Georgan during their work on this research note. The Research Supplements to Promote Diversity in Health-Related Research, R01 DC016895, was awarded to Wendy C. Georgan with Tiffany P. Hogan as the recipient of the parent R01.

References

Adlof, S. M., & Hogan, T. P. (2018). Understanding dyslexia in the context of developmental language disorders. *Language, Speech, and Hearing Services in Schools, 49*(4), 762–773. https://doi.org/10.1044/2018_LSHSS-DYSLC-18-0049

American Speech-Language-Hearing Association. (2016). Speech-language impairments rank first, second highest by age. *The ASHA Leader, 21*(4), 13. https://doi.org/10.1044/leader.NIB4.21042016.13

Bishop, D. V. M. (2009). Specific language impairment as a language learning disability. *Child Language Teaching and Therapy, 25*(2), 163–165. https://doi.org/10.1177/0265659009105889

Bishop, D. V. M. (2014). Ten questions about terminology for children with unexplained language problems. *International Journal of Language & Communication Disorders, 49*(4), 381–415. https://doi.org/10.1111/1460-6984.12101

Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T., & the CATALISE-2 Consortium. (2017). Phase 2 of CATALISE: A multinational and multidisciplinary Delphi consensus study of problems with language development: Terminology. *Journal of Child Psychology and Psychiatry, 58*(10), 1068–1080. https://doi.org/10.1111/jcpp.12721

Botting, N. (2020). Language, literacy and cognitive skills of young adults with developmental language disorder (DLD). *International Journal of Language & Communication Disorders, 55*(2), 255–265. https://doi.org/10.1111/1460-6984.12518

Casby, M. W. (1989). National data concerning communication disorders and special education. *Language, Speech, and Hearing Services in Schools, 20*(1), 22–30. https://doi.org/10.1044/0161-1461.2001.22

Catts, H. W., Fey, M. E., Tomblin, J. B., & Zhang, X. (2002). A longitudinal investigation of reading outcomes in children with language impairments. *Journal of Speech, Language, and Hearing Research, 45*(6), 1142–1157. https://doi.org/10.1044/1092-4388(2002/093)

Catts, H. W., Hogan, T. P., & Adlof, S. M. (2005). Developmental changes in reading and reading disabilities. In H. W. Catts

& A. G. Kamhi (Eds.), *The connections between language and reading disabilities* (pp. 25–40). Erlbaum. https://doi.org/10.4324/9781410612052

Chall, J. S. (1983). *Stages of reading development*. McGraw-Hill.

Chen, J., Justice, L. M., Rhoad-Drogalis, A., Lin, T. J., & Sawyer, B. (2018). Social networks of children with developmental language disorder in inclusive preschool programs. *Child Development, 91*(2), 471–487. https://doi.org/10.1111/cdev.13183

Clegg, J., Hollis, C., Mawhood, L., & Rutter, M. (2005). Developmental language disorders—A follow-up in later adult life. Cognitive, language, and psychosocial outcomes. *Journal of Child Psychology and Psychiatry, 46*(2), 128–149. https://doi.org/10.1111/j.1469-7610.2004.00342.x

Conti-Ramsden, G., & Botting, N. (2008). Emotional health in adolescents with and without a history of specific language impairment (SLI). *Journal of Child Psychology and Psychiatry, 49*(5), 516–525. https://doi.org/10.1111/j.1469-7610.2007.01858.x

Conti-Ramsden, G., Durkin, K., Toseeb, U., Botting, N., & Pickles, A. (2017). Education and employment outcomes of young adults with a history of developmental language disorder. *International Journal of Language & Communication Disorders, 53*(2), 237–255. https://doi.org/10.1111/1460-6984.12338

Cross, A. M., Joanisse, M. F., & Archibald, L. M. D. (2019). Mathematical abilities in children with developmental language disorder. *Language, Speech, and Hearing Services in Schools, 50*(1), 150–163. https://doi.org/10.1044/2018_LSHSS-18-0041

Data Insight and Statistics Division, Data Group, Department of Education. (2019). *Special educational needs in England: January 2019*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/814244/SEN_2019_Text.docx.pdf

De Jesús, M. D. (2016). *How Texas keeps tens of thousands of children out of special education*. Houston Chronicle, Local Investigations. https://www.houstonchronicle.com/denied/1/

Dockrell, J. E., Ricketts, J., Palikara, O., Charman, T., & Lindsay, G. A. (2019). What drives educational support for children with developmental language disorder or autism spectrum disorder: Needs, or diagnostic category. *Frontiers in Education, 4*(29), 1–14. https://doi.org/10.3389/feduc.2019.00029

Frame, S., & Mirfendereski, T. (2018, May 9). Cap on funding leaves kids with learning disabilities in limbo. *King 5 News, Investigations*. https://www.king5.com/article/news/local/cap-on-funding-leaves-kids-with-learning-disabilities-in-limbo/281-550510661

Gallinat, E., & Spaulding, T. J. (2014). Differences in the performance of children with specific language impairment and their typically developing peers on nonverbal cognitive tests: A meta-analysis. *Journal of Speech, Language, and Hearing Research, 57*(4), 1363–1382. https://doi.org/10.1044/2014_JSLHR-L-12-0363

Georgan, W. C., & Hogan, T. P. (2019). The many terms used for DLD. *DLD and Me*. https://dldandme.org/terminology/

Girolamo, T. M., Rice, M. L., Selin, C. M., & Wang, C. J. (2022). Teacher educational decision making for children with specific language impairment. *American Journal of Speech-Language Pathology, 31*(3), 1221–1243. https://doi.org/10.1044/2021_AJSLP-20-00366

Gupta, V. B., Hyman, S. L., Johnson, C. P., Bryant, J., Byers, B., Kallen, R., Levy, S. E., Myers, S. M., Rosenblatt, A. I., & Yeargin-Allsopp, M. (2007). Identifying children with autism early? *Pediatrics, 119*(1), 152–153. https://doi.org/10.1542/peds.2006-2026

Hastie, T., & Tibshirani, R. (1986). Generalized additive models. *Statistical Science, 1*(3), 297–310. https://doi.org/10.1214/ss/1177013604

Hendricks, A. E., Adlof, S. M., Alonzo, C. N., Fox, A. B., & Hogan, T. P. (2019). Identifying children at risk for developmental language disorder using a brief, whole-classroom screen. *Journal of Speech, Language, and Hearing Research, 62*(4), 896–908. https://doi.org/10.1044/2018_JSLHR-L-18-0093

Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and Writing, 2*(2), 127–160. https://doi.org/10.1007/BF00401799

Horowitz, S. H., Rawe, J., & Whittaker, M. C. (2017). *The state of learning disabilities: Understanding the 1 in 5* [White paper]. National Center for Learning Disabilities. https://www.ncld.org/the-state-of-learning-disabilities-understanding-the-1-in-5

Individuals with Disabilities Education Act. (2004). 20 U.S.C. §§ 1400 et. seq.

Kendeou, P., van den Broek, P., White, M. J., & Lynch, J. S. (2009). Predicting reading comprehension in early elementary school: The independent contributions of oral language and decoding skills. *Journal of Educational Psychology, 101*(4), 765–778. https://doi.org/10.1037/a0015956

Lancaster, H. S., & Camarata, S. (2019). Reconceptualizing developmental language disorder as a spectrum disorder: Issues and evidence. *International Journal of Language & Communication Disorders, 54*(1), 79–94. https://doi.org/10.1111/1460-6984.12433

Language and Reading Research Consortium. (2015). Learning to read: Should we keep things simple? *Reading Research Quarterly, 50*(2), 151–169. https://doi.org/10.1002/rrq.99

Leach, J. M., Scarborough, H. S., & Rescorla, L. (2003). Late-emerging reading disabilities. *Journal of Educational Psychology, 95*(2), 211–224. https://doi.org/10.1037/0022-0663.95.2.211

Leonard, L. B. (2014). *Children with specific language impairment* (2nd ed.). MIT Press. https://doi.org/10.7551/mitpress/9152.001.0001

Leonard, L. B. (2020). A 200-year history of the study of childhood language disorders of unknown origin: Changes in terminology. *Perspectives of the ASHA Special Interest Groups, 5*(1), 6–11. https://doi.org/10.1044/2019_PERS-SIG1-2019-0007

McGregor, K. K., Goffman, L., Owen Van Horne, A., Hogan, T. P., & Finestack, L. H. (2020). Developmental language disorder: Applications for advocacy, research, and clinical service. *Perspectives of the ASHA Special Interest Groups, 5*(1), 38–46. https://doi.org/10.1044/2019_PERSP-19-00083

Murza, K. A., & Ehren, B. J. (2020). Considering the language disorder label debate from a school speech-language pathology lens. *Perspectives of the ASHA Special Interest Groups, 5*(1), 47–54. https://doi.org/10.1044/2019_PERSP-19-00077

Nation, K., Clarke, P., Marshall, C. M., & Durand, M. (2004). Hidden language impairments in children: Parallels between poor reading comprehension and specific language impairment. *Journal of Speech, Language, and Hearing Research, 47*(1), 199–211. https://doi.org/10.1044/1092-4388(2004/017)

National Center for Education Statistics. (2022). *Students with disabilities*. U.S. Department of Education, Institute of Education Sciences. https://nces.ed.gov/programs/coe/indicator/cgg

National Joint Committee on Learning Disabilities. (2006). *Learning disabilities and young children: Identification and intervention* [White paper]. http://www.ldonline.org/article/11511/

Norbury, C. F., Gooch, D., Wray, C., Baird, G., Charman, T., Simonoff, E., Vamvakas, G., & Pickles, A. (2016). The impact of nonverbal ability on prevalence and clinical presentation of language disorder: Evidence from a population study. *The Journal of Child Psychology and Psychiatry, 57*(11), 1247–1257. https://doi.org/10.1111/jcpp.12573

Pennington, M. L., Cullinan, D., & Southern, L. B. (2014). Defining autism: Variability in state education agency definitions of and evaluations for autism spectrum disorders. *Autism Research and Treatment, 2014,* 1–8. https://doi.org/10.1155/2014/327271

R Core Team. (2021). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. https://www.R-project.org/

Scarborough, H. S., & Dobrich, W. (1990). Development of children with early language delay. *Journal of Speech and Hearing Research, 33*(1), 70–83. https://doi.org/10.1044/jshr.3301.70

Schuele, M. C., & Hadley, P. A. (1999). Potential advantages of introducing specific language impairment to families. *American Journal of Speech-Language Pathology, 8*(1), 11–22. https://doi.org/10.1044/1058-0360.0801.11

Selin, C. M., Rice, M. L., Girolamo, T., & Wang, C. J. (2019). Speech-language pathologists' clinical decision making for children with specific language impairment. *Language, Speech, and Hearing Services in Schools, 50*(2), 283–307. https://doi.org/10.1044/2018_LSHSS-18-0017

Selin, C. M., Rice, M. L., Girolamo, T. M., & Wang, C. J. (2022). Work setting effects on speech-language pathology practice: Implications for identification of children with specific language impairment. *American Journal of Speech-Language Pathology, 31*(2), 854–880. https://doi.org/10.1044/2021_AJSLP-21-00024

Sharp, H. M., & Hillenbrand, K. (2008). Speech and language development and disorders in children. *Pediatric Clinics of North America, 55*(5), 1159–1173. https://doi.org/10.1016/j.pcl.2008.07.007

Skeat, J., Eadie, P., Ukoumunne, O., & Reilly, S. (2010). Predictors of parents seeking help or advice about children's communication development in the early years. *Child: Care, Health and Development, 36*(6), 878–887. https://doi.org/10.1111/j.1365-2214.2010.01093.x

Sun, L., & Wallach, G. P. (2014). Language disorders *are* learning disabilities. *Topics in Language Disorders, 34*(1), 25–38. https://doi.org/10.1097/TLD.0000000000000005

Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research, 40*(6), 1245–1260. https://doi.org/10.1044/jslhr.4006.1245

Volkers, N. (2018). Diverging views on language disorders. *The ASHA Leader, 23*(12), 44–53. https://doi.org/10.1044/leader.FTR1.23122018.44

Winstanley, M., Webb, R. T., & Conti-Ramsden, G. (2018). More or less likely to offend? Young adults with a history of identified developmental language disorders. *International Journal of Language & Communication Disorders, 53*(2), 256–270. https://doi.org/10.1111/1460-6984.12339

Wittke, K., & Spaulding, T. J. (2018). Which preschool children with specific language impairment receive language intervention? *Language, Speech, and Hearing Services in Schools, 49*(1), 59–71. https://doi.org/10.1044/2017_lshss-17-0024

Wolf, M., & Stoodley, C. J. (2007). *Proust and the squid: The story and science of the reading brain*. HarperCollins.

Wood, S. N. (2017). *Generalized additive models: An introduction with R* (2nd ed.). Chapman and Hall/CRC. https://doi.org/10.1201/9781315370279

Zhang, X., & Tomblin, J. B. (2000). The association of intervention receipt with speech-language profiles and social-demographic variables. *American Journal of Speech-Language Pathology, 9*(4), 345–357. https://doi.org/10.1044/1058-0360.0904.345