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Pragmatic Skills in School-Age Children With Primary Language Impairment and Language-Learning Disabilities

A Scoping Review of Research From 1990 to 2022

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We conducted a scoping review following the Preferred Reporting Items for Systematic Reviews and Meta-analyses to map the available research describing verbal pragmatic skills development and problems in school-age children with primary language impairments and children with language-learning disabilities. A total of 112 reports met inclusion criteria for our review. Many studies were published in journals focused on communication disorders between the years 2000 and 2019 and targeted K-12 children in the United States or the United Kingdom with developmental language disorder who were most often compared with age-matched typically developing peers using a group comparison research design. Over 60% of the studies had fewer than 25 participants in the target group. Nearly two thirds of study participants were boys, and most were Caucasian from middle- to upper-income families. The majority of studies used multiple outcome measures in data analyses, most often norm-referenced and researcher-designed tests, language sample analysis, and rating scales. A third of studies omitted information about outcome measure reliability and nearly all studies omitted validity data. Several studies are described in detail as examples and a summary of the major findings from the reviewed studies is presented. **Key words:** *language disorder*, *learning disabilities*, *pragmatics*, *school-aged*, *scoping review*

IT IS WELL established that children with primary language impairment exhibit pronounced deficits in morphosyntax, especially in marking verb finiteness (agreement and tense) in obligatory contexts (e.g., Rice, 2020) and assigning roles to nouns and pronouns in sentences, which makes passive and embedded constructions difficult to comprehend and produce (e.g., van der Lely, 2005). Children with primary language impairment include those diagnosed with developmental language disorder (DLD), as well as the subset of children with DLD who have specific language impairment (SLI), that is, children whose nonverbal intellectual functioning falls within the average range and who do not display other co-occurring developmental disabilities (Bishop et al., 2017; National Institute on Deafness and Other Communication Disorders, 2017). Likewise, it is well established that children with language-learning disabilities (LLD) often have deficiencies in word reading

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and spelling accuracy and/or fluency (i.e., dyslexia) and, possibly, reading comprehension and written expression due to their underlying language problems (e.g., Berninger & May, 2011). Children with dyslexia exhibit major weaknesses in phonology (e.g., Alt et al., 2017; Catts & Kamhi, 1999; Stanovich & Siegel, 1994), whereas children with academic challenges in higher-order literacy skills characteristically struggle more so with nonphonological aspects of language including morphosyntax and semantics (Bishop et al., 2009; Carroll et al., 2014; Catts et al., 2005).

Of course, there is some overlap between groups diagnosed with LLD and those with DLD. Such overlap may be due to the impacts of early spoken language difficulties on later literacy (e.g., Snowling & Melby-Lervåg, 2016) or, conversely, the downstream effects of dyslexia, often diagnosed in the elementary grades, on later language learning (Bishop et al., 2016; Paul, 2020). Additionally, overlap between the conditions may exist because literacy skills rely on successful integration of all aspects of linguistic functioning in addition to accurate and fluent word reading and spelling (Adlof & Hogan, 2018).

In most studies that have attempted to differentiate primary language impairments from language-based learning disabilities in reading and writing, there has been limited focus on the discourse level of language and, specifically, pragmatic abilities (see Adlof & Hogan, 2018). Pragmatics reflects language use in varied contexts to exploit the implicit and explicit meanings of language to achieve socially motivated communication goals (Green et al., 2014; O'Neill, 2014). It refers to an integrative group of skills, including (a) the ability to use discourse structures and rules to initiate, maintain, shift, terminate, and repair communication with others; (b) the appropriate understanding and use of a variety of communicative intentions and pragmatic functions (e.g., requesting information to fulfill a heuristic function); (c) presupposing shared understandings between oneself and one's communicative partner(s) given each person's unique perspective, a set of interactional rules, and circumstances in which these rules may or may not be adhered; and (d) the understanding and use of nonliteral and figurative language that helps transmit cultural values and norms in a society (Demchick & Day, 2016; Farnsworth, 2018; Lightbown & Spada, 2013; Mackie & Law, 2014; O'Neill, 2014; Troia, 2011, 2021; Wiener & Schneider, 2002).

Nevertheless, research suggests that children with primary language impairments frequently exhibit serious weaknesses in their pragmatic language skills (e.g., Brinton, Fujiki, & Powell, 1997; Brinton, Fujiki, Spencer, et al., 1997; Brinton, Fujiki, & Higbee, 1998; Brinton, Fujiki, & McKee, 1998; Craig & Washington, 1993; Guralnick et al., 1996; Hadley & Rice, 1991; Horowitz et al., 2006; Lee & Kamhi, 1990; Liiva & Cleave, 2005; Nippold, 2007; Rice, 2003; Timler, 2008). Students with LLD in reading and/or writing, likewise, appear to experience significant challenges with pragmatics (e.g., Bryan et al., 1981; Cardillo et al., 2018; Donahue & Bryan, 1984; Kasirer & Mashal, 2017; Lam & Ho, 2014; Lapadat, 1991; Norbury & Bishop, 2003; Riddick et al., 1997; Spekman, 1984; Wiejak, 2014). Moreover, there is a strong relationship between pragmatic skills and literacy skills, and between pragmatic skills and spoken language abilities. For example, Troia and Emam (in press) found that, while controlling for student demographic variables and cognitive plus behavioral abilities, teacher-rated pragmatic competence was the best predictor of teacher-rated literacy proficiency and vice versa. For spoken language abilities, they found teacher-rated pragmatic competence was the second-best predictor (following reasoning skills), even more so than teacher-rated literacy skills.

Aside from two older meta-analyses described later, a comprehensive review of the literature on pragmatics in these populations has not been undertaken and, given the importance of pragmatic competence for socialization and academic achievement (e.g., Troia, 2011, 2021), having a clear understanding of the pragmatic strengths and weaknesses of children with language

and literacy concerns is warranted. A published meta-analysis completed by Lapadat (1991) of 33 studies investigating the pragmatic language skills of 3- to 12-year-old children with primary language impairments and learning disabilities found these children demonstrated pragmatic deficits when compared with their typical peers with a mean effect size of −0.52 across settings, conversational partners, age groups, and types of pragmatic skills measured. An unpublished meta-analysis completed by Finegan (1991) of 27 studies that examined the relationship between pragmatic language difficulties and the presence of learning disabilities in school-age children reported a weighted correlation effect size of 0.22, which was not significantly impacted by type of school, criteria used for diagnosing a learning disability, or kind of pragmatic language measure.

RESEARCH AIMS OF CURRENT STUDY

A scoping review was conducted to map the available research describing verbal pragmatic skills development and problems in school-age children with primary language impairments and children with LLD. The research aims were to: (1) document the extent (and types) of primary research evidence available for this area of research; (2) describe the characteristics of available studies regarding their samples and design; and (3) identify gaps in the available literature to advise scholars about directions for future research. This review also served as a preliminary step for conducting a future meta-analysis of (a) the magnitude of the relationships between pragmatic competence and skills related to spoken language form and content as well as literacy-related skills and (b) the magnitude of the differences in pragmatic competence between populations with DLD and LLD and their unaffected peers to update those done by Finegan (1991) and Lapadat (1991). For our scoping review, we define school-age children as between 6 and 18 years of age or in kindergarten through Grade 12.

METHOD

Search strategy

We conducted the scoping review following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) extension for Scoping Reviews guidelines (Tricco et al., 2018). The literature search was conducted by the first and second authors. Three relevant electronic databases (ERIC, PsycINFO, and PsycArticles) were searched for published peer-reviewed articles and unpublished dissertations and theses that included outcome data (i.e., reports of research). Additional articles were located by hand-searching the references of manuscripts that met criteria, reviews related to pragmatic intervention and assessment (Alduais et al., 2022; Gerber et al., 2012; Jensen de López et al., 2022), and from the authors' knowledge of relevant publications. The search was restricted to manuscripts written in English between 1990 and 2022. We excluded articles that focused on pragmatics exclusively in students diagnosed with autism spectrum disorder (who would be expected to exhibit some level of impaired pragmatic competence due to their social skills deficits) or attention deficit hyperactivity disorder (because of the comorbidity of this condition with LLD and DLD), as well as in students with unique or rare conditions such as Williams syndrome, Fragile X syndrome, and fetal alcohol spectrum disorders. Because pragmatic competence is, in part, related to social norms and values, we also excluded studies in which children who were bilingual or nonnative second language learners were the key population of interest, as these students' pragmatic skills could be unduly influenced by their native language's characteristics, onset time and duration of their second language learning, the context for second language learning, and so forth.

The search terms, organized into two distinct categories, included (pragmatic OR social communication OR discourse OR nonliteral OR figurative) for the category of

pragmatics and, for the category of population, included (language OR learning OR reading OR writing OR written expression) AND (disability OR disorder OR impairment OR developmental language disorder OR specific language impairment OR dyslexia OR dysgraphia) plus NOT (autism OR ASD OR attention deficit OR ADHD OR bilingual OR second language OR ELL). Manuscripts were reviewed in three stages based on the inclusion and exclusion criteria noted previously—title screen, abstract screen, and full-text screen. The first and second authors reached consensus on manuscripts to include based on screening.

Articles were reviewed to extract information related to (1) publication data, (2) general characteristics of the study sample, and (3) study design characteristics. The specific information extracted in each of these main categories is detailed in Table 1. We note that we applied strict criteria for reliability and validity data reporting, in that if an author simply stated a measure had established reliability and/or validity or that such information was reported elsewhere, we coded this as information not specified. The second and third authors independently reviewed and coded all included manuscripts and the final codes assigned were determined via discussion to attain consensus. Prior to discussion, their agreement ranged from 61.5% for outcome type to 99.3% for sampling frame with mean agreement across coding categories of 89%. The two lowest interobserver agreement values, for outcome type (61.5%) and sample type (79.1%), were primarily due to vague descriptions of these characteristics in corpus papers; all other values were at least 83%. Following discussion, the agreement for all coding was 100%.

RESULTS

Study selection and general sample characteristics

The initial search with the noted search terms and parameters generated 6,336 unique results. After the title and abstract screenings, 114 articles were selected for full-text screening; two of these could not be retrieved. Articles were eliminated following rounds of screening mainly for the following three reasons: (1) outcome data were not reported (e.g., manuscript was a literature review or practitioner-oriented article with recommendations for practice), (2) ineligible population (e.g., focus on preschool-age children or children with traumatic brain injury), and (3) lack of clear focus on verbal pragmatic language competence (e.g., study examined broad social skills and problem behaviors of children with SLI, solely examined discourse structure, such as narrative, as an outcome or as an intervention, or narrowed investigation to paralinguistic or extralinguistic/nonverbal aspects of social communication such as prosody, gestures, or facial expressions). A total of 112 reports representing 112 studies met inclusion criteria for this review, including 73 reports from screening and another 39 from citation searching. The flow diagram of identification and screening for study selection is presented in Figure 1.

Approximately 23.2% ($k = 26$) of the manuscripts were produced during the 1990s, 37.5% ($k = 42$) in the 2000s, 32.1% ($k = 36$) in the 2010s, and 7.1% ($k = 8$) between 2020 and the end of 2022. Nearly 54.5% ($k = 61$) of published articles were found in communication sciences and disorders journals such as *Child Language Teaching and Therapy*, *International Journal of Language & Communication Disorders*, *Journal of Speech, Language, and Hearing Research*, and *Language, Speech, and Hearing Services in Schools*. Eight studies (7.1%) were dissertations. Sixty-three studies (56.3%) were funded, with 21.4% ($k = 24$) funded through federal (e.g., U.S. Department of Education, the National Institutes of Health) or national grants or contracts, 12.5% ($k = 14$) funded through private organization or foundation grants or contracts, and 10.7% ($k = 12$) funded through intramural university or college grants or contracts. About 11.6% ($k = 13$) of studies were funded through

Table 1. Extracted data from studies

Major Category	Subcategory	Data
Publication data		Author name(s)
		Journal name
		Publication year
		Funding source
General sample characteristics		Country
		Key population of interest
		Comparison group(s)
		Ages/grades included
		Total and subgroup sample sizes
		Proportions of sample grouped by sex, race/ethnicity, and SES
	Sampling frame	Intact group (IG)
		Random sample (R)
		Stratified random sample (SR)
		Not specified (NS)
	Sample type	School (SCH)
		Clinic (CL)
		Community (COMM)
		Not specified (NS)
Study design characteristics	Primary study design	Group comparison (COMP)
		Within-subject change without treatment (WSC)
		Case study (CASE)
		Intervention (INT)
		Single-case experiment (SCED)
		Longitudinal beyond 1 year (LONG)
		Survey
	Matching approach	Chronological age (CA)
		Language age (LA)
		IQ
		Sociodemographic trait
		None
	Outcome measure type	Norm-referenced test (NRT)
		Criterion-referenced test (CRT)
		Researcher-designed test (RDT)
		Rating scale
		Checklist
		Language sample analysis (LSA)
		Observation (OBS)
		Interview
		Survey
		Other
	Outcome measure reliability type	Cronbach α
		Split-half
		Test-retest
		Alternate form
		Interobserver agreement (IOA)
		Other
		Not specified (NS)

(*continues*)

Table 1. Extracted data from studies (*Continued*)

Major Category	Subcategory	Data
	Outcome measure validity type	Criterion-related Content Construct Factor analysis Other Not specified (NS)

Note. IQ = intelligence quotient; SES = socioeconomic status.

multiple sources. These data are presented in Table 2.

The general sample characteristics of participants in the included studies also are reported in Table 2. Most of the studies (67.0%, $k = 75$) were conducted either in the United Kingdom or the United States (another 8.0% of studies were conducted in other majority English-speaking countries—Canada and Australia—and another 17.9% were conducted in European countries) and focused on school-age children with DLD, including those diagnosed with SLI (71.4%, $k = 81$). A small proportion of studies focused on students with dyslexia (5.4%, $k = 6$) or LLD (12.5%, $k = 14$), and about one in 10 studies (10.7%, $k = 12$) focused on children identified with pragmatic language impairment (PLI). Children with PLI, including those with semantic-pragmatic communication disorder, exhibit prominent difficulties with pragmatics and often semantics, but lack the behavioral characteristics associated with autism spectrum disorder. Most often, when at least one comparison group was included in a study, it comprised children who were typically developing (75.9%, $k = 85$) or who had notable pragmatic language difficulties, including those with PLI or autism spectrum disorder (24.1%, $k = 23$). About 27.7% ($k = 31$) of studies either did not make comparisons or made comparisons using other

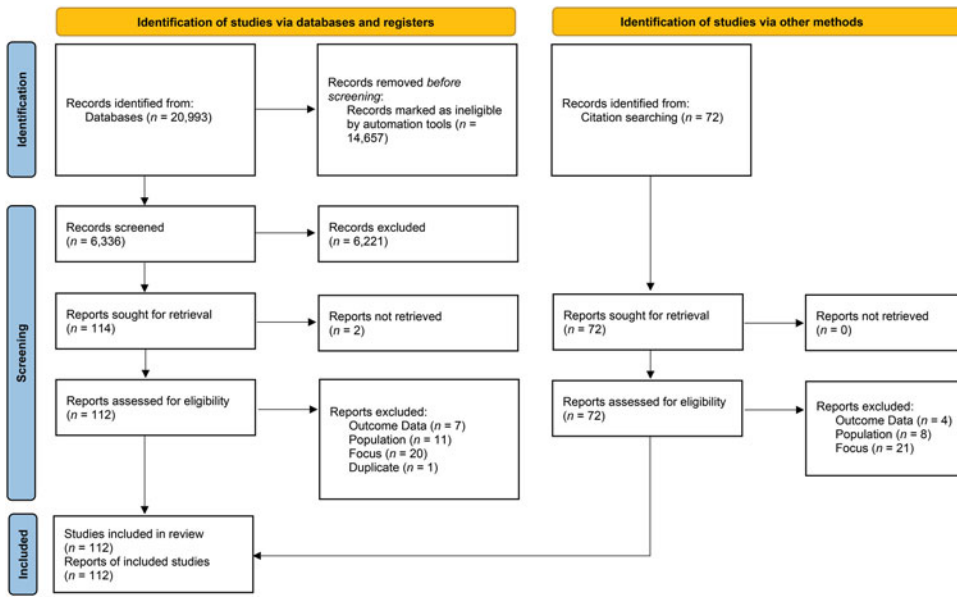

Figure 1. Flow diagram of study selection steps. This figure is available in color online (www.topicsinlanguagedisorders.com).

Table 2. Summary of publication data and sample characteristics

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Abdul Aziz et al. (2016)	Australia	None	NS	NS	64% male	4–7 years	90 DLD treatment	SCH	81 TD Control	SCH
Abrahamsen and Smith (2000)	USA	Intramural	NS	NS	NS	NS	8 DLD	SCH		
Adams (2001)	UK	None	NS	NS	100% male	7;3 and 10;3 years	2 PLI	CL and SCH		
Adams and Lloyd (2005)	UK	Other federal	NS	NS	67% male	7;1–11;6 years	15 PLI	SCH	15 TD	SCH
Adams et al. (2005)	UK	Other federal	NS	NS	100% male	8;1 and 9;9 years	2 PLI	NS		
Adams et al. (2006)	UK	Other federal	NS	NS	NS	5;11–9;9 years	6 PLI	SCH		
Adams et al. (2009)	UK	Foundation/private	NS	NS	NS	6–11 Years	38 DLD	SCH	26 PLI 128 TD (half matched by language age)	SCH
Adams et al. (2015)	UK	Foundation/private	NS	NS	100% male	8;4 years	1 PLI	SCH		
Adams et al. (2018)	UK	Other federal	NS	NS	66% male	6;1–10;10 years	14 DLD	CL	34 PLI 34 TD	CL and SCH

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Adibi (2010)	USA	None	NS	NS	73% male	Grades 6–8	15 LD	SCH	15 TD	SCH
Allen and Marshall (2011)	UK	Foundation/private	NS	NS	69% male	8;0–9;6 years	8 DLD treatment	SCH	8 DLD Control	SCH
Andrés-Roqueta and Katsos (2020)	Spain	Other federal and intramural	NS	NS	73% male	3;2–10;7 years	20 DLD	SCH	20 ASD 40 TD (half matched by language age)	SCH
Andrés-Roqueta et al. (2013)	Spain	Other federal and foundation/private	Full range	NS	61% male	3;5–7;5 years	19 DLD	SCH	12 PLI 62 TD (half matched by language age)	SCH
Andrés-Roqueta et al. (2016)	Spain	Other federal	NS	NS	69% male	3;10–8;0 Years	35 DLD	SCH	35 TD	SCH
Andrés-Roqueta et al. (2021)	Spain	Other federal and intramural	NS	NS	72% male	3;7–9;0 years	30 DLD	SCH	39 TD	SCH
Arosio et al. (2016)	Italy	None	NS	NS	75% male	7;5–12;3 years	24 DYS	COM	48 TD (half matched by language age)	COM

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Arosio et al. (2017)	Italy	None	NS	NS	75% male	6;1–9;10 years	16 DLD	CL	32 TD (half matched by language age)	SCH
Bakopoulou and Dockrell (2016)	UK	None	NS	NS	88% male	5;0–11;4 years	42 DLD	SCH	84 TD (half matched by language age)	SCH
Bauminger-Zviely et al. (2019)	Israel	None	Middle/ upper	NS	100% male	9;0–12;0 years	38 LD	SCH	25 ASD 33 TD	SCH
Benjamin et al. (2020)	UK	None	NS	NS	61% male	9;8–15;10 years	25 DLD (classroom treatment followed by individual treatment)	SCH	24 DLD (individual treatment followed by classroom treatment)	SCH
Bishop (1998)	UK	Foundation/private	NS	NS	NS	7;6–9;10 years	37 DLD	SCH	14 PLI 8 ASD	SCH

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Bishop and McDonald (2009)	UK	None	NS	100% White	49% male	9–10 years	52 DLD	COM	193 TD	COM
Bishop et al. (2000)	UK	Other federal	NS	NS	83% male	4;0–8;11 years	9 DLD	SCH	9 PLI 18 TD (half matched by language age)	SCH
Bliss and McCabe (2008)	USA	None	NS	75% White	53% male	7;0–11;10 years	36 DLD	SCH		
Botting (2002)	UK	Foundation/private	NS	NS	80% male	7;7–8;8 years	5 DLD	NS	5 PLI	NS
Botting and Adams (2005)	UK	Other federal	NS	NS	58% male	7–11 years	25 DLD	SCH	16 PLI 6 ASD 113 TD (77 were 1–3 years younger)	SCH
Botting and Conti-Ramsden (2008)	UK	Other federal and foundation/private	Full range	NS	66% male	15;2–16;7 years	134 DLD	SCH	124 TD	SCH

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Brinton and Fujiki (1999)	USA	None	NS	NS	50% male	8;10–12;5 years	6 DLD	SCH		
Brinton, Fujiki, Spencer, et al. (1997)	USA	Intramural	NS	NS	50% male	5–12 years	6 DLD[1]	SCH	12 TD (half matched by language age)	SCH
Brinton et al. (2019)	USA	Intramural	Middle/ upper	NS	60% male	5;7–10;11 years	5 DLD	SCH		
Brinton, Fujiki, and Higbee (1998)	USA	Intramural	NS	NS	50% male	5–12 years	6 DLD[1]	SCH	12 TD (half matched by language age)	SCH
Brinton, Fujiki, and McKee (1998)	USA	Intramural	NS	NS	50% male	8;10–12;5 years[b]	6 DLD[1]	SCH	12 TD (half matched by language age)	SCH
Brinton, Fujiki, and Powell (1997)	USA	Intramural	NS	100% White	57% male	4;3–7;4 years	10 DLD	SCH	20 TD (half matched by language age)	SCH
Brinton et al. (2007)	USA	Intramural	Middle/ upper	84% White	42% male	7;9–10;10 years	19 DLD[2]	SCH	19 TD	SCH
Cardillo et al. (2018)	Italy/ Brazil	Foundation/private	NS	NS	52% male	8–10 years	21 DYS	SCH	21 NVLD 21 TD	SCH

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Collins et al. (2014)	UK	Other federal	NS	NS	63% male	6;1–11;8 years	14 DLD	CL	34 PLI 40 TD	CL and SCH
Conti-Ramsden and Botting (2004)	UK	Foundation/private	Full range	NS	75% male	10–11 years	200 DLD	SCH		
Craig and Evans (1993)	USA	None	Middle/ upper	100% White	100% male	3;0–10;1 years	5 DLD-expressive 5 DLD-receptive+ Expressive	SCH	10 TD (half matched on language age)	COM and SCH
Craig and Washington (1993)	USA	None	Middle/ upper	100% White	60% male	3–8 years	5 DLD	CL and SCH	8 TD (half matched on language age)	SCH
Davies et al. (2016)	Spain	Other federal and foundation/ private	NS	NS	61% male	5;0–10;11 years	18 DLD	SCH	18 TD	SCH
DeKroon et al. (2002)	Canada	Other federal	NS	NS	100% male	4;3–6;2 years	3 DLD	CL	4 TD	SCH
Ekstein (1996)	USA	None	NS	NS	100% male	8–14 years	38 LD	CL and SCH	38 TD	CL and SCH
Ellis Weismer et al. (2021)	USA	NIH	NS	90% White	56% male	13–14 years	125 DLD	COM	268 TD	COM
Evans (1996)	USA	NIH	NS	NS	NS	7;1–10;1 years	5 DLD ex-pressive	NS	5 DLD-Receptive+ Expressive (matched on expressive language)	NS

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Farmer (2000)	UK	None	NS	NS	78% male	10–11 years[b]	16 DLD	SCH	16 TD (half matched by language age)	SCH
Ferrara et al. (2020)	Italy	None	NS	NS	62% male	8–10 years	21 DYS 23 DYS+ DLD	CL	19 ASD 26 TD	SCH
Ford and Milosky (2003)	USA	NIH	Full range	NS	50% male	5;4–6;4 years	12 DLD	SCH	12 TD	SCH
Forrest et al. (2022)	UK	None	Full range	NS	64% male	11–18 years	26 DLD	COM	27 TD	COM
Freed et al. (2015)	UK	Foundation/private	Full range	NS	82% male	6;0–10;8 years	49 PLI	CL	49 TD	SCH
Fujiki et al. (2001)	USA	Intramural	NS	NS	13% male	6;1–10;7 years	8 DLD	SCH	8 TD	SCH
Fujiki et al. (2008)	USA	Intramural	NS	84% White	42% male	7;9–10;10 years	19 DLD[2]	SCH	19 TD	SCH
Fujiki et al. (2013)	USA	Intramural	NS	NS	25% male	6;4–9;4 years	4 DLD	SCH	8 TD (paired with target children to form triads)	SCH
Gillam et al. (2012)	USA	DOE	NS	NS	58% male	6;0–9;0 years	8 DLD treatment 1 8 DLD treatment 2	SCH	8 DLD Control	SCH

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Gillott et al. (2004)	UK	Other federal	NS	NS	87% male	8–12 years	15 DLD	SCH	15 ASD 15 TD	SCH
Hage et al. (2021)	Brazil	None	NS	NS	NS	3;6–6;11 years	20 DLD	CL	14 ASD 35 TD	SCH
Halldorson (1993)	Canada	None	Middle/ upper	NS	50% male	6;4–9;10 years	10 DLD	SCH	20 TD (half matched by language age)	SCH
Hartas and Donahue (1997)	USA	None	Middle/ upper	100% White	58% male	10–14 years	44 LD	SCH	72 TD	SCH
Hernandez-Perez (1992)	USA	None	Full range	63% White	100% male	10–12 years	16 LD	SCH	16 TD	SCH
Kasirer and Mashal (2017)	Israel	None	NS	NS	61% male	9–25 years	52 DYS	SCH	54 TD	SCH
Katsos et al. (2011)	Spain	Other federal	NS	NS	77% male	3;2–9;3 years	29 DLD	SCH	58 TD (half matched by language age)	SCH
Kaye (2018)	USA	None	NS	100% White	100% male	11;9, 12;8, and 13;8 years	3 DLD	CL		
Kerbel and Grunwell (1998)	UK	None	NS	NS	70% male	6;6–11;6 years	26 PLI	SCH	15 DLD 30 TD	SCH

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Ketelaars et al. (2009)	Netherlands	None	NS	NS	75% male	4–5 years[b]	74 DLD 36 DLD+ PLI	SCH	115 PLI 1262 TD	SCH
Ketelaars et al. (2011)	Netherlands	None	NS	NS	71% male	4;11–6;1 years	84 PLI	SCH	80 TD	SCH
Krzemien et al. (2020)	Belgium/ France	Other federal	Full range	NS	63% male	6;10–13;5 years	19 DLD	SCH	19 TD	SCH
Lam and Ho (2014)	China	None	Full range	100% Asian	NS	10–11 years	22 DYS	SCH	22 ASD 24 TD	SCH
Lauer (1992)	USA	None	NS	64% White	100% male	9;0–13;3 years	36 LD	SCH		
Laws et al. (2012)	UK	Other federal and intramural	Middle/ upper	NS	50% male	4–11 years	13 DLD	SCH	5 ASD 231 TD	SCH
Lee and Kamhi (1990)	USA	None	Middle/ upper	100% White	58% male	9;1–11;0 years	24 LD	NS	12 TD	NS
Leinonen and Letts (1997)	UK	None	NS	NS	47% male	6–8 years	1 PLI	NS	16 TD (half matched by language age)	NS
Letts and Leinonen (2001)	UK	None	NS	NS	55% male	6;0–17;11 years	7 DLD 7 PLI	SCH	44 TD (16 were younger by a year and 12 were older by 6–7 years)	SCH

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Liiva and Cleave (2005)	Canada	Foundation/private	NS	99% White	61% male	6;8–8;6 years	10 DLD	SCH	13 TD	SCH
Lindsay et al. (2008)	UK	Foundation/private	NS	NS	76% male	10;6–12;9 years	67 DLD	SCH	32 SEN 42 TD	SCH
Liu and Xin (2017)	USA	Intramural	NS	67% White	67% male	9;1, 10;6, and 10;11 years	3 LD	SCH		
Lorusso et al. (2015)	Italy	Other federal	NS	NS	84% male	6–15 years	12 DLD	CL	13 NVLD 15 TD	SCH
Loukusa et al. (2014)	Finland	Foundation/private and intramural	NS	NS	81% male	4;11–8;8 years	18 DLD	SCH	14 ASD 25 TD	SCH
Lucas et al. (1993)	USA	None	NS	NS	50% male	8;2–12;9 years	3 DLD	CL	3 DAS 6 TD	COM
Mackie and Law (2014)	UK	None	Full range	NS	100% male	7;9–12;9 years	8 DLD 23 DLD+ EBD	SCH	12 EBD 42 TD	SCH
Mashal and Kasirer (2011)	Israel	None	NS	NS	88% male	12–15 years	20 LD 20 ASD treatment	SCH	20 TD Control	SCH
Mashal and Kasirer (2012)	Israel	None	NS	NS	85% male	12–14 years	20 LD	SCH	20 TD	SCH
Marshall et al. (2009)	UK	Other federal	NS	NS	NS	5–15 years	10 DLD 28 DLD+ DYS	NS	18 DYS 61 TD (half matched by language age)	NS

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Mathinos (1991)	USA	None	Full range	100% White	47% male	9;0–13;1 years	30 LD	SCH	30 TD	SCH
Matute et al. (2000)	Mexico	None	NS	NS	65% male	7–15 years	60 DYS	SCH	60 TD	SCH
Merkenschlager et al. (2012)	Germany	None	NS	NS	NS	7–11 years	24 DLD	CL and SCH	40 TD	CL
Merrison and Merrison (2005)	UK	Other federal	NS	NS	NS	7–11 years	3 PLI treatment	SCH	3 DLD Contact control 3 TD Control	SCH
Miller (2004)	USA	None	Middle/ upper	98% White	56% male	3;0–6;0 years	15 DLD	CL and SCH	30 TD (half matched by language age)	SCH
Mok et al. (2014)	UK	Other federal and foundation/ private	NS	NS	75% male	7 years	171 DLD	SCH		
Norbury (2005)	UK	Foundation/private	NS	NS	NS	8–15 years	28 DLD 31 DLD+ ASD	SCH	29 ASD 6 PLI 34 TD	SCH
Norbury and Bishop (2002)	UK	Foundation/private	NS	NS	NS	6–11 years	16 DLD	SCH	24 PLI 10 ASD 18 TD	SCH
Norbury and Bishop (2003)	UK	Foundation/private	NS	NS	NS	6–8 years	17 DLD	SCH	21 PLI 12 ASD 18 TD	SCH

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Peets (2009a)	Canada	Other federal and intramural	NS	NS	55% male	7;10–9;5 years	11 DLD[3]	SCH		
Peets (2009b)	Canada	Other federal and intramural	NS	NS	55% male	7;10–9;5 years	11 DLD[3]	SCH		
Price-Larson (1997)	USA	None	Full range	NS	55% male	11;0–12;9 years	20 LD	SCH		
Puglisi et al. (2016)	Brazil	None	Full range	NS	83% male	6–11 years	24 DLD	CL		
Reed et al. (2007)	Australia	None	Middle/ upper	NS	57% male	12;0–16;11 years	30 DLD	NS	30 TD	NS
Richardson and Klecan-Aker (2000)	USA	None	NS	NS	55% male	6;5–9;8 years	9 DLD	SCH	11 DLD (younger group by a year)	SCH
Rinaldi (2000)	UK	Foundation/private and intramural	NS	NS	NS	11;11–14;10 years[b]	64 DLD	SCH	128 TD (half matched by language age)	SCH
Rollins et al. (1994)	UK	NIH	NS	100% White	NS	1;11–6;9 years	5 DLD	COM	5 TD (younger siblings by 2–3 years)	COM
Ryder and Leinonen (2014)	UK	Foundation/private	NS	NS	67% male	5;2–11;3 years	18 DLD	SCH	12 PLI 67 TD (32 were younger by at least a year)	SCH
Ryder et al. (2008)	UK	Foundation/private	NS	NS	45% male	5;2–11;3 years	18 DLD	SCH	9 PLI 72 TD (32 were 1–2 years younger)	SCH

(*continues*)

Table 2. Summary of publication data and sample characteristics (*Continued*)

Author(s)/ Year	Country	Funding	SES	Race/ Ethnicity	Sex	Ages/ Grades[a]	Focal Population		Comparison Group(s)	
							n Description	Sample Type	*n* Description	Sample Type
Saferstein (1990)	USA	None	Middle/ upper	50% White	100% male	7;11–9;9 years	6 LD (Black)	SCH	6 LD (White)	SCH
Samuelsson et al. (2005)	Sweden	Other federal	NS	NS	50% male	6;1 and 6;6 years	2 DLD	NS		
Secord and Wiig (1993)	USA	None	NS	95% White	54% male	10;9–14;9 years	28 DLD	SCH	28 TD	SCH
Spackman et al. (2006)	USA	Intramural	Middle/ upper	85% White	53% male	5–12 years	43 DLD	NS	43 TD	NS
Spanoudis et al. (2007)	Cyprus	None	NS	NS	NS	8;0–11;11 years	28 DLD	SCH	18 PLI 40 TD	SCH
St Clair et al. (2011)	UK	None	Full range	NS	76% male	6;5–7;9 years	234 DLD	SCH		
Vallance and Wintre (1997)	Canada	Other federal	Middle/ upper	87% White	56% male	7;8–12;11 years	50 DLD[4]	SCH	50 TD	SCH
Vallance et al. (1998)	Canada	Other federal	Middle/ upper	87% White	56% male	7;8–12;11 years	50 DLD[4]	SCH	50 TD	SCH
van den Bedem et al. (2018)	Netherlands	Other federal and foundation/private	Full range	NS	45% male	8;4–16;0 years	112 DLD	CL and SCH	214 TD	SCH
Vance and Wells (1994)	UK	None	NS	NS	NS	6;4–13;1 years	18 DLD	SCH	18 TD (all matched by language age)	SCH
Vigil et al. (2005)	USA	None	NS	NS	100% male	7;4 years	1 PLI	CL		
Wagner et al. (2001)	Sweden	Other federal	NS	NS	50% male	6;3–7;10 years[b]	12 DLD	CL	12 TD	CL

Note. ASD = autism spectrum disorder; CL = clinical; COM = community; DAS = developmental apraxia of speech; DLD = developmental language disorder; DOE = department of education; DYS = dyslexia; EBD = emotional/behavioral disorder; LD = learning disability; NIH = National Institutes of Health; NVLD = nonverbal learning disability; NS = not specified; PLI = pragmatic language impairment; SCH = school; SEN = special education needs; SES = socioeconomic status; TD = typically developing. Shaded cells indicate a comparison group was not employed. Studies with the same superscript ([1,2,3,4]) relied on the same sample of children.

[a]Ages and grades are inclusive of all participants at the beginning of the study; language age-matched children often extended reported age ranges downward into early childhood.

[b]Age ranges were not provided for comparison groups such as language age-matched children.

groupings (e.g., race/ethnicity, treatment vs. control, and other diagnostic categories). Nearly all studies (98.2%, $k = 110$) relied on a nonprobability sampling frame to recruit intact groups of participants (convenience sampling). Samples were drawn mostly from schools (68.8%, $k = 77$), with the remainder drawn from clinical providers or entities (3.6%, $k = 4$), whole communities (4.5%, $k = 5$), or a combination (e.g., schools for typically developing participants and clinics for participants with DLD; 15.2%, $k = 17$). Nine studies (8.0%) did not clearly specify from where individuals were recruited. Across all studies included in the review, there was a total sample of 3,294 ($M = 30.8$) participants in the target groups of interest and 5,603 ($M = 52.4$) in the comparison groups. When considering subgroup size (e.g., participants with DLD in a study in which they were compared to a group with typical development), the total sample when considering the target group of a study was 2,564 for children with DLD, 310 for those with learning disability, 223 for those with dyslexia, and 197 for children with PLI. In the comparison groups, the total sample size was 4,870 for children with typical development, 355 for children with PLI, 199 for children with autism, 74 for children with DLD, and 105 for children with other conditions. About 35.7% ($k = 40$) of studies had fewer than $n = 25$ and another 25.9% ($k = 29$) had fewer than $n = 10$ in the target groups of interest. Investigators in nine studies total (indicated with superscripts 1 through 4 in Table 2) used the same student samples for their research; we counted children in a sample used across multiple studies only once to avoid inflating the corpus total and mean reported previously.

As shown in Table 2, approximately a third of the reviewed studies ($k = 37$) only included children younger than 10 years, whereas 15.2% ($k = 17$) focused on older student populations—13 (11.6%) solely included preadolescents (ages 10–14), one (0.9%) only included adolescents (ages ≥15), and another three (2.7%) included both these older student groups. The study by Kasirer and Mashal (2017) included young adults as a reference group. One study (Abrahamsen & Smith, 2000) did not report participants' ages or grade levels. In studies that employed matching based on language age, the language-matched participants in about 50% were approximately 2 years younger than their counterparts, and in about a third of the studies they were approximately 3 years younger. In the remainder of studies, language-matched students were about 1 year younger than their counterparts. Although the majority (84.8%, $k = 95$) reported their participants' sex, relatively few studies reported participants' race and/or ethnicity (21.4%, $k = 24$) or family socioeconomic status (SES; 26.8%, $k = 30$). On average, studies that reported the relevant information included about 65.6% male and 80.9% White participants. Thirteen studies (11.6%) included only male participants and nine (8.0%) included only White participants. Another 11 studies (9.8%) included equivalent numbers of male and female participants. Of the studies that reported SES, half ($k = 15$) included only middle- or upper-income participants and the other half included the full range of SES.

Study design characteristics

As seen in Table 3, nearly three-quarters ($k = 80$) of the studies in our review employed a group comparison design, usually comparing children with DLD to their typically developing peers. Far fewer studies used a longitudinal (5.4%, $k = 6$), case study (3.6%, $k = 4$), or within-subject change (5.4%, $k = 6$) design. Only 14.3% ($k = 16$) of the studies evaluated an intervention using either group comparison ($k = 6$), single-case experimental design ($k = 6$), or case analysis ($k = 4$) to evaluate the effects of the treatment. When matching was employed (66.1%, $k = 74$), most studies matched participants on chronological age or grade (59.8%, $k = 67$), and a smaller proportion did so on language age (19.6%, $k = 22$). Surprisingly, only 19 studies (17.0%) used both approaches to match students for group comparative purposes,

Table 3. Study design characteristics

Author(s)/Year	Sampling Frame	Matching Approach	Primary Study Design	Outcome Measure Type	Outcome Measure Reliability and Type	Outcome Measure Validity and Type
Abdul Aziz et al. (2016)	IG	None	INT/COMP	RDT, LSA	IOA	NS
Abrahamsen and Smith (2000)	IG	None	INT/CASE	NRT, RDT	NS	NS
Adams (2001)	IG	None	INT/CASE	LSA	IOA	NS
Adams and Lloyd (2005)	IG	CA, sex	COMP	Checklist, LSA	NS	NS
Adams et al. (2005)	IG	None	INT/CASE	LSA	NS	NS
Adams et al. (2006)	IG	None	INT/SCED	NRT, LSA	IOA[a]	NS
Adams et al. (2009)	IG	CA, LA, sex	COMP	NRT, RDT	IOA[a]	Construct
Adams et al. (2015)	IG	None	INT/SCED	NRT, rating	IOA[a]	NS
Adams et al. (2018)	IG	CA	COMP	NRT, rating, RDT	Cronbach α, IOA[a]	NS
Adibi (2010)	IG	Grade, sex	COMP	NRT, rating	Cronbach α, IOA[a]	NS
Allen and Marshall (2011)	IG	None	INT/COMP	LSA	NS	NS
Andrés-Roqueta and Katsos (2020)	IG	CA, LA	COMP	NRT, RDT	Cronbach α, IOA[a]	Construct
Andrés-Roqueta et al. (2013)	IG	CA, LA, sex	COMP	NRT, RDT	NS	NS
Andrés-Roqueta et al. (2016)	IG	CA, sex	COMP	NRT, RDT	Cronbach α, IOA[a]	Construct
Andrés-Roqueta et al. (2021)	IG	CA, sex	COMP	NRT, rating, RDT	Cronbach α, test-retest, IOA	Criterion (Construct), construct
Arosio et al. (2016)	IG	CA, LA, sex	COMP	NRT, RDT, LSA	NS	NS
Arosio et al. (2017)	IG	CA, LA, sex	COMP	RDT	NS	NS
Bakopoulou and Dockrell (2016)	IG	CA, LA, NVIQ, sex	COMP	rating, RDT	IOA[a]	NS
Bauminger-Zviely et al. (2019)	IG	CA	COMP	NRT, RDT	Cronbach α, IOA	NS
Benjamin et al. (2020)	IG	None	INT/COMP	NRT, RDT	Test-retest, IOA	NS
Bishop (1998)	IG	None	COMP	NRT, rating	Cronbach α, IOA[a]	NS
Bishop and McDonald (2009)	IG	None	COMP	NRT, rating	NS	Factor (construct)
Bishop et al. (2000)	IG	CA, LA	COMP	LSA	IOA	NS

(*continues*)

Table 3. Study design characteristics (*Continued*)

Author(s)/Year	Sampling Frame	Matching Approach	Primary Study Design	Outcome Measure Type	Outcome Measure Reliability and Type	Outcome Measure Validity and Type
Bliss and McCabe (2008)	IG	None	WSC	LSA	IOA	NS
Botting (2002)	IG	CA, sex	COMP	NRT, LSA	NS	NS
Botting and Adams (2005)	IG	CA, LA	COMP	RDT	NS	NS
Botting and Conti-Ramsden (2008)	IG	CA	LONG	NRT, rating, RDT	Cronbach α[a]	Criterion (construct)
Brinton and Fujiki (1999)	IG	CA, sex	CASE	NRT, rating, checklist, LSA	NS	NS
Brinton, Fujiki, Spencer, et al. (1997)	IG	CA, LA, sex	COMP	OBS, LSA	IOA	NS
Brinton et al. (2019)	IG	None	CASE	LSA	IOA	NS
Brinton, Fujiki, and Higbee (1998)	IG	CA, LA, sex	COMP	OBS, LSA	IOA	NS
Brinton, Fujiki, and McKee (1998)	IG	CA, LA, sex	COMP	LSA	IOA	NS
Brinton, Fujiki, and Powell (1997)	IG	CA, LA, Sex (for CA-matched group only)	COMP	OBS, LSA	IOA	NS
Brinton et al. (2007)	IG	CA, sex	COMP	Rating, RDT	IOA	NS
Cardillo et al. (2018)	IG	CA	COMP	NRT	NS	NS
Collins et al. (2014)	IG	None	COMP	RDT	IOA	NS
Conti-Ramsden and Botting (2004)	IG	None	WSC	NRT, rating, checklist	Test-retest, IOA	Construct
Craig and Evans (1993)	IG	CA, LA	COMP	OBS, LSA	IOA	NS
Craig and Washington (1993)	IG	CA, LA, sex	COMP	OBS, LSA	IOA	NS
Davies et al. (2016)	IG	CA, NVIQ, sex	COMP	RDT	IOA[a]	NS
DeKroon et al. (2002)	IG	CA	CASE	OBS, LSA	IOA	NS
Ekstein (1996)	IG	None	COMP	Rating, RDT, LSA	Cronbach α, test-retest, IOA[a]	Factor (construct), criterion (construct), construct

(*continues*)

Table 3. Study design characteristics (*Continued*)

Author(s)/Year	Sampling Frame	Matching Approach	Primary Study Design	Outcome Measure Type	Outcome Measure Reliability and Type	Outcome Measure Validity and Type
Ellis Weismer et al. (2021)	SR	None	COMP	Rating	NS	Factor (construct)
Evans (1996)	IG	LA-expressive	COMP	LSA	IOA	NS
Farmer (2000)	IG	CA, LA	COMP	Rating, RDT	NS	NS
Ferrara et al. (2020)	IG	CA	COMP	Rating	NS	NS
Ford and Milosky (2003)	IG	CA	COMP	RDT	IOA	NS
Forrest et al. (2022)	IG	CA, sex	COMP	NRT, rating, RDT, LSA	Cronbach α, test-retest, IOA[a]	NS
Freed et al. (2015)	IG	CA, sex	COMP	NRT, RDT	IOA[a]	NS
Fujiki et al. (2001)	IG	CA, sex	COMP	OBS	IOA	NS
Fujiki et al. (2008)	IG	CA, sex	COMP	NRT, RDT	IOA[a]	NS
Fujiki et al. (2013)	IG	CA, sex	INT/SCED	NRT, OBS, rating	IOA[a]	NS
Gillam et al. (2012)	IG	None	INT/COMP	NRT, rating	IOA[a]	Criterion (construct)
Gillott et al. (2004)	IG	CA, sex	COMP	RDT	IOA	NS
Hage et al. (2021)	IG	CA, sex	COMP	Rating	NS	NS
Halldorson (1993)	IG	CA, LA	COMP	LSA	IOA	NS
Hartas and Donahue (1997)	IG	CA, IQ, sex	COMP	LSA	IOA	NS
Hernandez-Perez (1992)	IG	None	COMP	LSA	IOA	NS
Kasirer and Mashal (2017)	IG	CA	COMP	RDT	IOA[a]	NS
Katsos et al. (2011)	IG	CA, LA, sex, SES	COMP	NRT, RDT	NS	NS
Kaye (2018)	IG	None	INT/SCED	RDT	IOA	NS
Kerbel and Grunwell (1998)	IG	None	COMP	LSA	IOA	Construct
Ketelaars et al. (2009)	IG	CA, sex	COMP	Rating	Cronbach α	Factor (construct), criterion (construct)

(*continues*)

Table 3. Study design characteristics (*Continued*)

Author(s)/Year	Sampling Frame	Matching Approach	Primary Study Design	Outcome Measure Type	Outcome Measure Reliability and Type	Outcome Measure Validity and Type
Ketelaars et al. (2011)	IG	None	COMP	Rating, LSA	IOA	NS
Krzemien et al. (2020)	IG	CA, NVIQ	COMP	RDT	NS	NS
Lam and Ho (2014)	IG	CA, IQ, SES	COMP	NRT, rating	NS	NS
Lauer (1992)	IG	None	WSC	NRT	Cronbach α	Content, construct
Laws et al. (2012)	IG	LA	LONG	NRT, rating	Cronbach α[a]	NS
Lee and Kamhi (1990)	IG	IQ	COMP	Rating	IOA	NS
Leinonen and Letts (1997)	IG	None	CASE	RDT	IOA	NS
Letts and Leinonen (2001)	IG	CA	COMP	RDT	IOA	NS
Liiva and Cleave (2005)	IG	CA, sex	COMP	OBS, LSA	IOA	NS
Lindsay et al. (2008)	IG	Sex, special education service needs	COMP	NRT, rating	NS	NS
Liu and Xin (2017)	IG	None	INT/SCED	Rating, RDT	Cronbach α, ALT, IOA	Content
Lorusso et al. (2015)	IG	CA, IQ, sex	COMP	OBS, RDT	NS	NS
Loukusa et al. (2014)	IG	CA	COMP	NRT	NS	NS
Lucas et al. (1993)	IG	CA, sex	COMP	Rating, LSA	IOA	NS
Mackie and Law (2014)	IG	CA, SES	COMP	NRT, checklist, rating	NS	NS
Mashal and Kasirer (2011)	IG	None	INT/COMP	NRT, RDT	NS	NS
Mashal and Kasirer (2012)	IG	None	COMP	NRT, rating, RDT	NS	NS
Marshall et al. (2009)	IG	CA, LA	COMP	NRT, RDT	IOA[a]	NS
Mathinos (1991)	IG	CA, IQ, sex	COMP	Rating, LSA	Cronbach α, IOA	Factor (construct)
Matute et al. (2000)	R	CA, sex	COMP	Rating, LSA	IOA	NS
Merkenschlager et al. (2012)	IG	CA	COMP	RDT	NS	NS
Merrison and Merrison (2005)	IG	CA	INT/COMP	LSA	NS	NS
Miller (2004)	IG	CA, LA	COMP	RDT	NS	NS
Mok et al. (2014)	IG	None	LONG	NRT, rating	NS	NS
Norbury (2005)	IG	CA, NVIQ	COMP	NRT, RDT	NS	NS

(*continues*)

Table 3. Study design characteristics (*Continued*)

Author(s)/Year	Sampling Frame	Matching Approach	Primary Study Design	Outcome Measure Type	Outcome Measure Reliability and Type	Outcome Measure Validity and Type
Norbury and Bishop (2002)	IG	CA	COMP	NRT, checklist, RDT, LSA	IOA[a]	NS
Norbury and Bishop (2003)	IG	CA	COMP	RDT, LSA	NS	NS
Peets (2009a)	IG	None	WSC	LSA	IOA	NS
Peets (2009b)	IG	None	WSC	LSA	IOA	NS
Price-Larson (1997)	IG	None	WSC	Rating, LSA	IOA	NS
Puglisi et al. (2016)	IG	None	COMP	Rating	NS	NS
Reed et al. (2007)	IG	CA, NVIQ, sex, SES	COMP	LSA	IOA	NS
Richardson and Klecan-Aker (2000)	IG	None	INT/SCED	CRT, LSA	NS	NS
Rinaldi (2000)	IG	CA, LA	COMP	NRT, RDT	NS	NS
Rollins et al. (1994)	IG	LA, SES	COMP	OBS, LSA	IOA	NS
Ryder and Leinonen (2014)	IG	CA, SES	COMP	LSA	IOA	NS
Ryder et al. (2008)	IG	CA	COMP	RDT	IOA	NS
Saferstein (1990)	IG	CA, SES	COMP	Checklist	IOA	NS
Samuelsson et al. (2005)	IG	None	LONG	Rating, LSA	Cronbach α[a]	NS
Secord and Wiig (1993)	IG	CA, Sex	COMP	NRT	IOA	NS
Spackman et al. (2006)	IG	CA, Sex	COMP	Rating, interview	IOA	NS
Spanoudis et al. (2007)	IG	CA, IQ, SES	COMP	RDT, rating	Cronbach α, IOA[a]	NS
St Clair et al. (2011)	IG	None	LONG	NRT, rating	NS	NS
Vallance and Wintre (1997)	IG	None	COMP	NRT	Cronbach α, test-retest, IOA	NS
Vallance et al. (1998)	IG	None	COMP	NRT	Cronbach α, test-retest, IOA	Criterion (construct)
van den Bedem et al. (2018)	IG	CA	LONG	Rating	Cronbach α[a]	Construct
Vance and Wells (1994)	IG	LA	COMP	Checklist, RDT	NS	NS
Vigil et al. (2005)	IG	None	INT/CASE	Checklist, LSA	IOA	NS
Wagner et al. (2001)	IG	None	COMP	RDT	NS	NS

Note. ALT = alternate form; CA = chronological age; CASE = case study; COMP = group comparison; CRT = criterion-referenced test; IG = intact group; INT = intervention; IQ = intelligence quotient; IOA = interobserver agreement; LA = language age; LONG = longitudinal; LSA = language sample analysis; NRT = norm-referenced test; NS = not specified; NVIQ = nonverbal IQ; OBS = observation; R = random; RDT = researcher-designed test; SCED = single-case experiment; SES = socioeconomic status; SR = stratified random; WSC = within-subject change (absent an intervention).

[a]Reliability data were not reported for all outcome measures.

which is the typical strategy for distinguishing a language delay (i.e., when an affected sample performs worse on a task compared with their chronological age-matched peers) from a specific linguistic deficit (i.e., when an affected sample performs worse on a task compared with their language-age matched peers, who would otherwise be equivalently delayed in overall language skills). Some studies used other matching variables such as intelligence quotient (IQ; most often nonverbal; 9.8%, $k = 11$) or other sociodemographic characteristics (38.4%, $k = 43$), usually sex or SES.

With regard to outcome measure types used by researchers to evaluate pragmatic competence, facility with spoken language form and content, literacy skills, and social and behavioral proficiencies when making comparisons, assessing intervention impacts, and so forth, most studies (58.9%, $k = 66$) used more than one measure type (see Table 3). Of the 46 studies that used a single outcome measure, two thirds ($k = 31$) employed either researcher-designed tests or language sample analysis. The most frequently used kinds of measures across all studies in the corpus were researcher-designed tests (41.1%, $k = 46$), norm-referenced tests (38.4%, $k = 43$), language sample analysis (38.4%, $k = 43$), and rating scales (34.8%, $k = 39$). Less than 9% of studies relied on checklists, criterion-referenced tests, or interviews. It is incumbent upon researchers to use reliable and valid instruments to evaluate outcomes and to report this information in reports of research, but in the corpus of studies we reviewed (see Table 3), a third (33.0%, $k = 37$) failed to report any kind of reliability information associated with their outcome measures and a substantial number of remaining studies gave incomplete data (i.e., some measures had accompanying reliability data but others did not; 21.4%, $k = 24$). In those studies where such information was present, interobserver agreement for language sample coding or observation coding (61.6%, $k = 69$) and/or the Cronbach α for internal consistency reliability of items on a test (17.9%, $k = 20$) were most often used. Other types of reliability data (e.g., alternate form or test-retest) were rarely included (7.1%, $k = 8$). As can be seen in Table 3, nearly all studies (84.8%, $k = 95$) omitted information about outcome measure validity, and of those where this information was presented, construct validity was most often reported (including the use of factor analysis and convergent/divergent criterion-related correlations to establish construct validity; 94.1%, $k = 16$).

Four illustrative studies

We draw on information from Tables 2 and 3 and corresponding original research reports to describe here four illustrative examples of work that has examined pragmatic abilities in children with DLD or LLD. These particular studies were selected because they were fairly typical of the work being conducted in this area, displayed some of the key strengths and limitations we observed in the corpus, but yet revealed some of the diversity present in the corpus with regard to methodology and aspects of pragmatics.

Group comparison of inferential comprehension skills in children with DLD, PLI, and autism

In the study conducted by Botting and Adams (2005) in the United Kingdom, the authors employed a cross-sectional group comparison design. Twenty-five children between 10 and 11 years of age with DLD and 22 children of the same age with pragmatic language difficulties were recruited from special education classrooms (called language units) and mainstream classrooms. The children with DLD had performance IQ scores of 70 or greater, persistent language problems and performance lower than one standard deviation below the age-related mean on a spoken language test, and neither concurrent pragmatic difficulties as measured by their scores on the Children's Communication Checklist (despite its name, this instrument uses a rating scale) nor a history of pragmatic weaknesses. The children with pragmatic language difficulties had

significantly lower scores and scores below the cut score of 132 on the Children's Communication Checklist. The children with pragmatic language difficulties were separated into two subgroups—those with PLI, of which there were 16, who all had performance IQs greater than 70, and those with autism spectrum disorder, of which there were six, who mostly had average performance IQ scores and clinically elevated scores on the Childhood Autism Rating Scale. A group of 112 typically developing children without a history of speech–language therapy or special education services were recruited from urban and suburban schools in three age groups of 7-, 9-, and 11-year-olds comprising 37, 40, and 35 children, respectively. These groups were selected to attain a chronological-age-matched comparison group and younger groups presumably matched for language age, though the typically developing children were not screened for language skills. The majority of participants diagnosed with language impairment or autism were boys (the typically developing students were more balanced with regard to sex), but information about SES or race/ethnicity of the sample was not given.

The investigators administered two researcher-designed experimental tests: (1) a semantic choice task (i.e., synonym identification) in which the examiner read aloud printed stimulus words representing nouns, verbs, and adjectives rated as high or low in concreteness and early or late in age of acquisition and asked children to select from semantically related targets or foils also printed and read by the examiner those words with similar meaning and (2) an inferential comprehension task in which an illustrated story without accompanying text is told by the examiner and followed by a series of yes/no and true/false questions that represent logical, bridging, and elaborative inferences about the story to which children responded. These inferences relied in part on the pragmatic skills of presupposition and interpretation of the saliency of information. They also administered norm-referenced tests, the Wechsler Intelligence Scale for Children, the British Picture Vocabulary Scale, and the Test for Reception of Grammar, as well as a rating scale, the Children's Communication Checklist, to the clinical groups. Information regarding instrument reliability and validity was omitted.

Both clinical groups (DLD and pragmatic difficulties) performed significantly more poorly on both experimental tasks than their age-match peers but generally performed similarly to the youngest age group of comparison children on both tasks. The exception was that those with pragmatic difficulties scored lower on the semantic choice task than typically developing 7-year-olds. This finding held even when the subgroup with autism was removed from analyses. The two clinical groups performed similarly to each another on both experimental tasks with and without the inclusion of children with autism. These findings for the clinical groups were replicated when including only students with performance IQs of 85 or greater and then with IQ held constant. Performance on the experimental tasks by the clinical groups with DLD or pragmatic difficulty was generally modestly correlated with performance IQ, vocabulary recognition, and sentence comprehension. However, it was unrelated to performance on the Children's Communication Checklist, a measure that includes multiple subscales that evaluate pragmatic language performance. The authors do note that the typically developing comparison groups performed at near ceiling levels on the experimental tasks. Overall, the clinical groups were definitively weaker on these semantic choice and inferencing tasks than their age-matched unaffected peers and, for the most part, appear to exhibit a delay rather than aberrant development. Moreover, they appear quite similar to each other in their performance on these tasks even though they scored differently on the Children's Communication Checklist, and experimental task performance was unrelated to scores on this rating scale. Though not stated by the authors, one might hypothesize

from these findings that (a) the experimental tasks were not closely aligned with pragmatic abilities, (b) performance differences between the clinical groups on the Children's Communication Checklist were not majorly due to differences on the subscales measuring pragmatics but rather differences on other subscales, or (c) inferential comprehension taps aspects of pragmatics that are not well represented on the checklist, but with which children with DLD and pragmatic difficulties struggle rather equally.

Group comparison of conversational discourse skills in children with and without DLD matched for age and language abilities

Brinton, Fujiki, Spencer, et al. (1997) compared the topic initiation and maintenance skills of 10 children with SLI, with 10 children matched for chronological age (between ages 6;4 and 7;4) and 10 children with similar language abilities (between ages 4;3 and 5;4). The presence of SLI was confirmed with nonverbal IQ scores greater than 85 and performance on at least two norm-referenced tests of receptive as well as expressive language at least one standard deviation below the population mean. Reliability and validity data for the screening measures were not reported. All the participants were White and the sex ratio was either 2:3 (the affected children and their age-matched peers) or 1:1 (the younger group with similar language abilities). The SES of the participants was not reported.

The examiners presented six conversational topics, half using objects plus verbal commentary and half using just verbal commentary to each child and paused to permit the child to respond. If there was no response, the examiner waited for 15–25 s and then moved on if there was still no response, being sure to close the current topic before doing so. The interaction was video-recorded and the first 2 min (most interactions were completed within this time) were transcribed for analysis. Child utterances were coded as topic maintenance with or without new information, new topic initiation with or without shading (i.e., linking new topic to elements of preceding topic), or inappropriate (i.e., uninterpretable, unclear referent, or confabulation). In addition, topic maintenance and introduction utterances were coded for their appropriateness (i.e., intelligible and relevant with shared referent). The research team examined 20% of the transcripts and utterances for transcription reliability and coding reliability, which reached at least 90% agreement.

Results of the study indicated that, although the subjects with SLI, like their matched peers, almost always maintained a topic appropriately for those introduced with objects, they struggled to do so with topics introduced using just verbal means, performing significantly less well than their age-matched or language-equivalent peers. Also, all the participants initiated new topics more often following one introduced with a verbal comment than one introduced with an object plus verbal comment. Finally, most of the inappropriate topic maintenance utterances produced by children with SLI contained unclear referents or uninterpretable information and the SLI group had trouble even maintaining with appropriate utterances those new topics they themselves introduced. The authors concluded that children with SLI may have struggled with the decontextualized nature of the topics introduced without an object and that their problems stem from issues beyond just structural language skills because they performed worse than the younger students with equivalent language skills.

Deficit-matched interventions and changes to referential communication and presuppositional skills in children with DLD and PLI

A pretest–posttest intervention study conducted by Merrison and Merrison (2005) in the United Kingdom recruited nine children between 7 and 11 years of age. Three of the children were diagnosed by school professionals with SLI, three with PLI, and three who exhibited typical language and

communication skills. The children with language difficulties, who did not exhibit autistic symptoms associated with stereotypic behaviors and interests, attended special education classes (called language units) and received individualized speech and language therapy. Screening data to confirm diagnoses were not collected, and no other sociodemographic information (i.e., gender, race/ethnicity, SES) was provided. All participants were administered a referential communication task using two maps separated by a screen; the interventionist sat on one side of the screen and the child on the other. The interventionist described a route on her map using a scripted sequence of directions and the child was expected to draw the route on his version of the map. However, some of the landmarks did not correspond on the maps and some of the directions given by the adult were inadequately informative. The child was told that the maps might be different and that he should ask questions if unsure of what to do. The goal of the assessment task was to provide opportunities for the child to initiate conversational repairs (i.e., request clarification), a component of pragmatic language competence. A second map task equivalent in difficulty to the first was administered following intervention. Information regarding the reliability (e.g., interobserver agreement) and validity of the map task or of the qualitative coding used to score child responses (described below) were not provided, though the authors did note that the task was used in numerous other studies and that a version of the categorical coding scheme they employed was previously developed for use with the map task.

At pretest, the children with SLI initiated repairs 78% of the time and the unaffected children did so 67% of the time, but children with pragmatic difficulties did so only 11% of the time. Their repair attempts were then qualitatively classified as explicit (e.g., denying a signpost is present on their map), implicit (e.g., indicating a problem with the information provided but not the absence of the landmark), or none. Using this classification scheme, at pretest the repair attempts made by children with SLI comprised 67% explicit and 11% implicit, those made by typically developing children comprised 33% explicit and 33% implicit, and repair attempts made by children with PLI comprised 0% explicit and 11% implicit. For intervention, children with SLI received six weekly sessions of therapy focused on structural language skills (i.e., phonology, morphology, and syntax) whereas the students with PLI received the same number of sessions focused on the importance of asking questions when there is misunderstanding, sharing important information with others, and checking for personal understanding using referential communications tasks (but not map-like tasks). No further information was provided about the interventions, except that the therapists were familiar to the students. The typically developing children did not receive any intervention. The researchers analyzed occurrences of repairs when participants were given directions containing a landmark that did not appear on their versions of the maps.

Following 6 weeks of therapy, the unaffected children initiated repairs 100% (an increase of 22%) of the time and the children with SLI did so 67% of the time (a decrease of 11%). Notably, the children with pragmatic difficulties initiated repairs 78% of the time (an increase of 67%). Moreover, the typically developing children increased their use of explicit repair requests to 78% from 33% and their use of implicit repair requests dropped to 22% from 33% whereas the children with SLI maintained 67% explicit repair attempts and decreased their use of implicit repairs to 0% from 11%. Those participants with PLI increased their use of explicit repairs to 56% from 0% and implicit repairs to 22% from 11%. Merrison and Merrison (2005) concluded that brief intervention focused on pragmatic skills development can indeed yield substantial improvements on assessed pragmatic performance in children who struggle with this aspect of language development.

Metaphor comprehension and production in Hebrew-speaking children with and without dyslexia

Kasirer and Mashal (2017) examined the comprehension and production of conventional and novel metaphors in 72 Hebrew-speaking children recruited from elementary and junior high schools in Israel. Thirty-seven were between 9 and 11 years of age and 35 were between 13 and 16 years of age; a group of adults between 18 and 25 also was included. The sample of children was approximately equally divided between those with dyslexia ($n = 35$) and those exhibiting typical development ($n = 37$). Most child participants were male ($n = 50$), but there were no significant differences in sex distribution across the groups with and without dyslexia. None of the participants exhibited symptoms of attention deficit hyperactivity disorder or other neurodevelopmental conditions. The children with dyslexia received prior diagnosis by an educational psychologist that was confirmed by the authors using a test in which children read as many real and pseudowords as possible in 45 s from lists with and without vowel markings (in recognition of Hebrew as an abjad script). As anticipated, the children with dyslexia read significantly fewer stimuli than their typically developing counterparts. As part of a screening process, the child participants were administered the vocabulary subtest of the Hebrew version of the Wechsler Intelligence Scale for Children and the students with dyslexia scored significantly lower than their peers in vocabulary knowledge. They also were given the Test of Nonverbal Intelligence, on which the adolescent group with dyslexia scored lower than their typically developing counterparts, but differences between affected and unaffected younger children were not observed. Finally, the children were assessed for word retrieval using the Hebrew Picture Naming Test and no significant differences between groups were observed at any age. The authors then excluded children who scored below average on any of these screening measures. Information regarding participant race/ethnicity and SES was not reported, and reliability and validity data for the screening measures were omitted.

Kasirer and Mashal (2017) assessed metaphor comprehension using a list of 10 conventional (e.g., a sharp tongue) and 10 novel (e.g., a pure hand) metaphors, each accompanied by four alternatives from which each child selected their answer—the correct interpretation, a literal interpretation, an unrelated interpretation, and meaningless. Children could read the metaphoric expressions and choices themselves or have the investigator read them. They assessed metaphor generation using 10 common emotions (e.g., feeling sad) presented as a metaphor completion (e.g., love is _____) or simile completion (e.g., feeling worthless is like _____) to which students responded in writing with a creative expression that could be understood by a friend. Students' responses were coded as novel (3 points), conventional (2 points), or literal (1 point), with nonsensical or unrelated responses scored as zero. Five trained graduate students, blinded to hypotheses and participants, rated each response for every student; interrater reliability was reported for this measure, which was on average $r = 0.98$. The researchers also evaluated executive functions (according to them) using the Trail Making Test, Ambiguous Word Meaning Generation Test (providing all definitions for multiple-meaning words), and semantic fluency measures (recalling as many words as possible within 1 min that begin with a particular sound or that fit within a particular category). None of these additional measures (translated to Hebrew) had accompanying reliability or validity data.

The researchers found that the youngest children with dyslexia had significantly lower scores than their typically developing peers, but this was true only for comprehending conventional metaphors and was not attributable to differences in nonverbal IQ or vocabulary, which were controlled. As for metaphor generation, there were no significant differences between the groups of 9- to 11-year-olds for either novel or conventional

coded types. In the adolescent (13- to 16-year-olds) groups, a different pattern emerged: there were no significant differences in comprehension or production between groups for either type of metaphor. The investigators also found that performance on the comprehension task improved with age as did the generation of conventional metaphors. Finally, vocabulary and executive functioning (i.e., mental flexibility) were shown to be significant predictors of conventional metaphor comprehension whereas nonverbal IQ (i.e., problem-solving) and executive functioning were significant predictors of novel metaphor generation.

DISCUSSION

Brief summary of corpus characteristics

The majority of studies in the corpus of 112 articles we reviewed were published in journals focused on communication disorders between the years 2000 and 2019 and targeted K-12 children with DLD who were most often compared with age-matched typically developing peers using a group comparison research design. Most of the studies were funded and took place either in the United Kingdom or the United States using convenience samples from schools, with an average sample size of about 31 children in the target group (over 60% of studies had fewer than 25 participants in the target group) and 52 in the comparison group. Nearly two thirds of study participants were male and, though only about a quarter of the studies reported the relevant information, most were White from middle- to upper-income families. The majority of studies used multiple outcome measures in data analyses, most often norm-referenced and researcher-designed tests, language sample analysis, and rating scales. A third of studies omitted any information about outcome measure reliability (another one-fifth supplied reliability data for only some outcome measures), and nearly all the studies omitted validity data.

Some major findings from the corpus studies

In comparison to their typically developing peers matched by chronological age or language abilities, children with DLD and LLD exhibit the following characteristics. First, they make fewer conversational contributions (e.g., Brinton, Fujiki, Spencer, et al., 1997; Craig & Evans, 1993; DeKroon et al., 2002). Second, they exhibit more reticence and social withdrawal, which is observed throughout childhood (e.g., Bishop et al., 2000; Brinton, Fujiki, & Higbee, 1998; Conti-Ramsden & Botting, 2004; Fujiki et al., 2001; Liiva & Cleave, 2005). Third, they possess weaker negotiation skills and engage in less self-advocacy (e.g., Brinton, Fujiki, & McKee, 1998). Fourth, they display less discourse cohesion, though not necessarily out of line with their general language abilities (e.g., Halldorson, 1993; Reed et al., 2007). Finally, they give more inappropriate or uninformative responses during conversational exchanges or in response to questions or requests, and these are often linked to the children's global language abilities (e.g., Brinton , Fujiki, & Powell, 1997; Price-Larson, 1997; Rollins et al., 1994). Their problems in these areas appear to be less severe than in children with autism and PLI (e.g., Hage et al., 2021; Lam & Ho, 2014; Ryder & Leinonen, 2014; Ryder et al., 2008; Spanoudis et al., 2007). Their social interaction difficulties often lead to negative reactions by others, and repeated social failures may ultimately create emotional distress that manifests as secondary clinical internalizing and externalizing symptomatology (Botting & Conti-Ramsden, 2008; Mok et al., 2014; St Clair et al., 2011; Vallance et al., 1998; van den Bedem et al., 2018). Treatments aimed at improving conversational skills appear to substantially ameliorate these deficits in social communication and pragmatics (Adams et al., 2006, 2015; Merrison & Merrison, 2005).

One contributor to pragmatic difficulties in children with DLD examined by studies we reviewed is a disturbance in social cognition,

often measured through emotional attribution tasks and first- and second-order theory of mind false belief tasks. Emotional attribution tasks involve recognition, labeling, and inferring reasons for emotional states such as fear, anger, sadness, and happiness. First-order false belief tasks involve attribution by the respondent of another's false belief about events known by the respondent; second-order false belief tasks require the respondent to attribute the false belief of one individual based on the beliefs of a different individual. Specifically, school-age children with DLD perform more poorly on such tasks than their same-age peers without DLD (Andrés-Roqueta et al., 2013, 2016; Bakopoulou & Dockrell, 2016; Brinton et al., 2019; Farmer, 2000; Ford & Milosky, 2003; Forrest et al., 2022; Letts & Leinonen, 2001; Loukusa et al., 2014; Spackman et al., 2006), though they perform similarly to language-age-matched peers, at least on theory of mind tasks (cf. Andrés-Roqueta & Katsos, 2020; Bakopoulou & Dockrell, 2016). When controlling for structural language abilities in children diagnosed with DLD and PLI, those with PLI demonstrate a weaker ability to attribute psychological states to communicative participants than their counterparts with DLD, suggesting children with DLD are better equipped with the underlying cognitive skills needed for social communication than children with specific deficits in pragmatics (Adams et al., 2009, 2018), including children with autism spectrum disorder (see Andrés-Roqueta & Katsos, 2020; Bauminger-Zviely et al., 2019; Gillott et al., 2004).

Children with DLD and LLD (including children with dyslexia) exhibit significant difficulties with understanding and using figurative language such as idioms and metaphors (Cardillo et al., 2018; Ferrara et al., 2020; Kerbel & Grunwell, 1998; Lee & Kamhi, 1990; Secord & Wiig, 1993), and these difficulties may have negative effects on their social competence (Vallance & Wintre, 1997). Tasks using conventional stimuli appear more challenging than novel stimuli for these students, suggesting their linguistic (i.e., semantic) coding of nonliteral expressions may be impaired (Kasirer & Mashal, 2017; Mashal & Kasirer, 2012; also see Freed et al., 2015; Norbury, 2005). Consequently, degraded performance with figurative language tasks in children with dyslexia in particular seems to be associated with limited vocabulary knowledge (arising from, in part, restricted exposure to vocabulary through reading). A small number of intervention studies demonstrate that figurative language can be successfully taught to children with language learning difficulties (Abrahamsen & Smith, 2000; Benjamin et al., 2020; Kaye, 2018). In comparison to children with autism spectrum disorder, children with language learning difficulties appear to exhibit somewhat better learning transfer to untaught figurative expressions (Mashal & Kasirer, 2011).

Limitations of this scoping review

Our scoping review has several limitations. First, as with any review, it is possible the particular search terms and inclusion and exclusion criteria we employed resulted in some appropriate studies being missed. For instance, we did not use highly specific terms such as "turn-taking," "cohesion," and "metaphor," and thus studies examining these aspects of pragmatics may have been omitted. Second, because we limited our review to studies with K-12 participants, the findings may not be representative of those that would be obtained for the full range of ages for which evidence is available. Of course, our choice to exclude studies that focused on children who were diagnosed with autism spectrum disorder or attention deficit hyperactivity disorder or who were nonnative language learners or bilingual speakers also means our findings cannot be generalized to these populations.

Future research directions

We offer several recommendations for scholars as they endeavor to discover more about the pragmatic abilities of children with DLD and/or LLD based on findings from this scoping review. First, the breadth and depth of research that focuses on student populations with well-defined and properly

identified forms of LLD (e.g., dyslexia, dysgraphia, combined) needs to greatly increase. Although perhaps not surprising that the bulk of research on pragmatics deals with children identified with DLD, the importance of pragmatics for reading and writing development and performance (e.g., Troia, 2011, 2021) warrants exploration of the challenges students with LLD may or may not face in this area and how difficulties with pragmatics impact their literacy skills. Second, the development and evaluation of interventions to address one or multiple components of pragmatics has received little attention in the research—profiling the pragmatic difficulties experienced by children with disabilities is valuable, but practitioners also need validated, evidence-based interventions to tackle pragmatic deficits in their students. Third, closer inspection through carefully designed studies of the underlying nature of pragmatic difficulties in children with DLD could help explicate the degree to which their problems are fundamentally associated with weak structural and sematic language abilities, which was indicated in at least some of the research we reviewed (e.g., Andrés-Roqueta & Katsos, 2020; Davies et al., 2016). Fourth, we exhort researchers to report the reliability and validity of instruments and ensure those instruments adhere to acceptable measurement standards to yield the most useful information. Finally, investigators should endeavor to include more diverse samples of children with respect to geographic location, race/ethnicity, and SES, and to be more comprehensive in reporting sample characteristics to permit an assessment of the generalizability of study findings.

Clinical implications

Although our main goal in this scoping review was to describe the breadth of the research on pragmatic language skills in school-age children with DLD and LLD, we can glean a few recommendations for educators and clinicians. First, both populations appear to manifest notable difficulties with aspects of pragmatics related to conversational discourse skills and figurative language comprehension and production. Thus, it seems prudent for those who work with students at risk for DLD or LLD to evaluate their pragmatic skills using language sample analysis, observation, and available tests and rating scales. Because students with autism and PLI typically display more severe problems with pragmatics than children with DLD and LLD, comparison of the pragmatic skills among these individuals may serve as a method for differential diagnosis. Second, though the research is quite limited, there is evidence that treatments designed to address specific pragmatic deficits in children with high-incidence disabilities like DLD and LLD can have beneficial impact. Thus, we recommend speech–language pathologists and other educators examine the available intervention studies we reviewed to determine ways in which they might create individualized therapeutic plans to address the specific pragmatic needs of their students. Third, because children with pragmatic challenges often experience social withdrawal and isolation, early identification and treatment is paramount to avert the behavioral sequela that may develop, including working with affected students' peers to facilitate positive social interactions.

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