





REVIEW ARTICLE

Conceptualizing, defining, and assessing pragmatic language impairment in clinical settings: A scoping review

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Abstract

There has been significant and extensive knowledge production in the last four decades regarding pragmatic language impairment (PLI) in children with neurodevelopmental disorders. The evidence contained in this literature, however, is contradictory. The present scoping review (ScR) seeks to disentangle competing explanations of conceptualizing, defining, and assessing PLI to develop more systematic knowledge suitable for improving early intervention and diagnosing PLI. Our research included retrieving articles, books, book chapters, encyclopaedia articles, and other published material on conceptualizing, defining, and assessing preschoolers' PLIs from online databases. A total of 133 studies have been identified, divided into two types: 63 studies conceptualizing and assessing PLI in preschoolers and 70 studies conceptualizing and defining PLI without regard to age. They were published between 1983 and 2022. The inclusion of studies in the first group was based upon factors such as the age of participants, clinical settings, and the use of PLI assessment instruments. The second group of studies was selected in accordance with Web of Science, Scopus, and Lens database indicators that indicated who were the most popular authors within the field. This review utilized the PRISMA-ScR (Preferred Reporting

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Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews) checklist and the Joanna Briggs Institute (JBI) guidelines. Results indicate that PLI is being conceptualized inconsistently. Three lists of concepts are reported here, with the earliest concept being “semantic-pragmatic syndrome” and the most prevalent being “PLI” without semantic features. Among the most common misconceptions of PLI is the use of impairment, disorder, deficit, dysfunction, disability, and many other concepts, both within the same publication and among different authors who have written numerous publications in this field. Researchers and clinicians are confused as to the nature of social (pragmatic) communication disorder compared to PLI, owing in part to its inclusion as a competing concept for PLI. As a final point, we argue that using different assessment methods for PLI is a promising approach to hope for consistency in conceptualizing, defining, and assessing PLI in children with neurodevelopmental disorders or others. The vast number of existing studies that seek to conceptualize, define, and assess PLI in preschool children with neurodevelopmental disorders and other conditions illustrates the broad interest in understanding more about the nature and occurrence of this impairment. Further, these studies also highlight some common patterns, discrepancies, and contradictions in relevant language that suggests researchers in all related fields should endeavour to be consistent in the way these concepts are defined and discussed to avoid miscommunication and confusion across and within the professions, as well as decrease the redundancy and overlap of related information. A consistent conception of language development disorders is necessary to obtain clarity in diagnosis, assessment, intervention, and rehabilitation.

KEYWORDS

assessment, biopsychosocial model, pragmatic language impairment, pragmatics, preschooler, scoping review

1 | INTRODUCTION

The term “pragmatic language impairment” (hereafter PLI) has been widely used to refer to a disorder in which someone manifests problems in the (social) use of language (Perkins, 2008, 2010). This impairment affects the ability to communicate and engage in social interactions, with negative consequences for the quality of interpersonal

relationships, academic performance, and career prospects of those who have it (Andrés-Roqueta et al., 2021; Brenne & Rimehaug, 2019; Cummings, 2016; Ferrara et al., 2020; Reindal et al., 2021; Turkstra et al., 2017). However, several factors led to extreme variability in conceptualizing, defining, and assessing PLI. Put differently, the heterogeneous nature of pragmatics resulted in competing accounts among researchers from different fields of how PLI should be conceptualized, defined, and assessed (Cummings, 2009; Perkins, 2008, 2010). This division among the research community is triggered, in part, by the tendency of those in the academic realm to develop new findings that look different from others. In other situations, it is encouraged by the research interests of the researchers who tend to approach this concept from their perspectives. Although this breadth of knowledge allows a deeper understanding of PLI, it complicates the provision of good health services for young children diagnosed with PLI through the various psychometric tools and services (Bishop & McDonald, 2009; Ketelaars & Embrechts, 2017). In sum, it leads to confusion within the research community, inaccuracy in diagnosis, and inconsistency in providing speech-language pathology services for persons who exhibit PLI. This inconsistency is manifest in the divergent definitions and characteristics of PLI and even the conceptualization of the disorder as “Social (Pragmatic) Communication Disorder” in Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013) and “Developmental language disorder with impairment of mainly pragmatic language” in the International Classification of Diseases (ICD-11) (World Health Organization, 2022).

Previous and recent literature on PLI advocate for the need to study this area further and adopt more comprehensive models and perspectives (Adams & Gaile, 2020; Andrés-Roqueta et al., 2021; Anglada et al., 2016; Çiray et al., 2021; Murphy et al., 2021; Reindal et al., 2021; Wong et al., 2021). For instance, Hyter claimed that pragmatic assessment in children “is missing [...] measures that are designed to examine more comprehensive aspects of pragmatics rather than focusing on one or two components”, so “future development of assessment measures that permit a more holistic picture of a child's pragmatic skills is essential” (Hyter, 2017, p. 517). Further, a recent review on PLI stated that “a broader understanding of pragmatic communication functions can help team members identify a patient's strengths and limitations, inform treatment planning and improve communication among healthcare professionals, thereby contributing to improved outcomes for patients and their families” (Turkstra et al., 2017, p. 1872).

As mentioned above, there are competing views on the conceptualization and definition of PLI. Consequently, existing literature on PLI incorporates extremely variable concepts and related definitions. For instance, the terms semantic-pragmatic disorder (Anglada et al., 2016), pragmatic language dysfunction (Ciebięra & Łoziński, 2020), pragmatic language difficulty (Miller et al., 2015), social (pragmatic) communication disorder (Amoretti et al., 2021), social communication impairment (Murphy et al., 2021), pragmatic language disorder (Montemurro et al., 2019), pragmatic aphasia and pragmatic dysphasia (Alduais, 2013), and pragmatic language deficit (Lam & Yeung, 2012) have all been used to describe PLI. Although several researchers limited the use of PLI to primary pragmatic deficits and refer to those who do not manifest PLI due to specific language impairment, this Scoping Review (ScR) argues that a broader view of PLI incorporating all the types and forms of pragmatic deficits that have been studied can lead to a more precise assessment of Pragmatic Language Development (PLD) and diagnosis of PLI.

Several researchers attempted to conceptualize PLI. Among these is the framework proposed by Perkins (2010). Factors that contribute to PLI include neurological deficits, cognitive deficits, linguistic deficits, sensorimotor deficits, and compensatory adaptation (Perkins, 2010). As such, these deficits contribute to the existence of PLI and its accompanying types, as pragmatic aspects characterize them. These elements are divided into semiotic, cognitive, motor, and sensory. Semiotic elements include linguistic and non-linguistic elements. Although the linguistic one includes phonology, prosody, morphology, semantics, and discourse, the non-linguistic elements include gesture, gaze, facial expression, and posture. The cognitive elements include inference, theory of mind (ToM), executive function, memory, emotion, and attitude. The motor elements include vocal track, hands, arms, face, eyes, and body. The sensory elements include hearing and vision (Perkins, 2007; Perkins, 2008).

A preliminary search of the Cochrane, Campbell, and PROSPERO databases of Systematic Reviews, JBI Evidence Synthesis, and BMC Systematic Review Journals was conducted and a few systematic reviews on the topic were

identified. However, neither scoping reviews nor any of these systematic reviews approached the same topic of this ScR. These reviews are discussed briefly below.

From a philosophical perspective, a systematic review approached the intersection of Social (Pragmatic) Communication Disorder (SPCD) with other disorders, mainly autism spectrum disorder (ASD) (Amoretti et al., 2021). However, the authors tried to clarify the confusion caused by factors such as symptomatology of SPCD and ASD and the recent inclusion of SPCD in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), this review, as other studies remain limited to the study of PLI and ASD (Gibson et al., 2013). Put differently, it did not approach the variable concepts and definitions of PLI and the possible causes leading to this variability. Another systematic review accounted for the characteristics of PLI and the intervention programs adopted in persons with attention-deficit/hyperactivity disorder (ADHD) (Carruthers et al., 2021). However, once again, the characteristics of PLI were only discussed concerning another disorder and compared between persons with and without ADHD. One more systematic review focused on play-based intervention's role in enhancing social communication skills for children with ASD. The review highlights the importance of this intervention (O'Keeffe et al., 2021).

Among all these reviews of interest to this ScR is the review which attempted to approach PLI by discussing theoretical frameworks and including all aspects of pragmatics (i.e., linguistic, cognitive, social, and neurological) and all ages from infancy to adulthood (Turkstra et al., 2017). However, this review was not conducted systematically and followed a literature review method, making it a general overview of pragmatics and its associated disorders, albeit it is a good base for any systematic, rapid, scoping, or mapping review.

1.1 | Rationale

This ScR aimed at locating and describing the existing published and grey literature conceptualizing, defining, and assessing PLI in preschoolers. It should be noted that while the first two aspects of this ScR (i.e., concepts and definitions) covered all those who presented with PLI, the assessment component was chosen to help focus on the preschool population. This provided a focus on factors that might contribute to establishing a basic yet comprehensive understanding of what motivates researchers to use extreme variable concepts, definitions, and assessment methods for identifying and diagnosing preschoolers with PLI. Hence, this ScR is different from previous reviews in that it focuses on highlighting the variable concepts, definitions, and assessment methods specific to preschoolers. Further, it attempts to map these according to several factors that affect pragmatic language skills' typical and/or atypical development.

1.2 | Objectives

Previous research identified six indications for scoping reviews “to identify the types of available evidence in a given field; to clarify key concepts/definitions in the literature; to examine how research is conducted on a certain topic or field; to identify key characteristics or factors related to a concept; as a precursor to a systematic review; to identify and analyse knowledge gaps” (Munn et al., 2018, p. 2). In this ScR, we targeted two objectives: “to clarify key concepts and definitions in the literature” and “to identify key characteristics related to a concept” (Munn et al., 2018, p. 2). Given this, a ScR was performed to investigate how the concept “PLI” has been conceptualized, defined, and assessed in the existing literature. The following two research questions were formulated: (1) How has PLI been defined among practitioners, researchers, and experts in the field?; and (2) How has PLI been conceptualized and assessed in clinical settings population?

2 | METHODS

2.1 | Protocol and registration

The ScR protocol was conducted following the JBI methodology for scoping reviews (Peters, Godfrey, et al., 2020a, 2020b; Peters, Marnie, Tricco, Pollock, Munn, et al., 2020). It was registered with the Open Science Framework on October 10, 2021 (<https://osf.io/9sxx6>) (Alduais et al., 2021). The protocol and review are reported based on the guidance provided in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) and the PRISMA extension for protocols (PRIS MA-P) (Moher et al., 2015; Tricco et al., 2018). (See supplementary files 1–3 reporting PRISMA-ScR checklist, PRISMA-S search information, and PRISMA abstract checklist).

2.2 | Eligibility criteria

2.2.1 | Participants

The review included participants who reported manifesting PLI as a primary or secondary disorder. It limited this inclusion to young children who have reportedly not yet entered the grade school system. Preschoolers without PLI are not included. In terms of Medical Subjects Headings (MeSH), the concept of preschool child, which was first used in 1966, is introduced and defined as “a child between the ages of 2 and 5” (National Center for Biotechnology Information, 2021, preschooler). We expanded this age range to 0–6 years for three reasons. First, there is a difference among countries in what constitutes a preschool education. For instance, in some countries (e.g., the Arab countries), most children start grade school at or after 7 years of age. Second, pragmatic language abilities during infancy have received little focus on assessment tools and are sometimes viewed as controversial, and third, there is scarce research or literature available on pragmatic language skills in infants and toddlers. Therefore, we found it logical and beneficial to contribute to the greater understanding of PLI in young children by examining the existing literature by including and defining this entire group of children, ages 0–6, who have not yet entered formal schooling as “preschool” children. Finally, since this ScR focused on conceptualizing, defining, and assessing PLI in clinical settings, excluding any populations with typical development.

2.2.2 | Concept

The main concept of this ScR was PLI and other (competing) concepts: pragmatic language disorder, pragmatic language disability, pragmatic language dysfunction, pragmatic language difficulty, pragmatic language deficit, pragmatic impairment, pragmatic disorder, pragmatic disability, pragmatic dysfunction, pragmatic difficulty, pragmatic deficit, semantic-pragmatic disorder, social communication disorder, pragmatic communication disorder, pragmatic aphasia, and pragmatic dysphasia. The other main concept is preschool and its related concepts: pre-schooler, infant, baby, toddler, kindergarten, nursery, nursery school, and playschool. We cited several studies using variable concepts for PLI. In MeSH terms, the concept of social communication disorder and pragmatic communication disorder is introduced as part of communication disorders and defined as “persistent difficulties in the social uses of verbal and non-verbal communications” included in the (DSM-5) in 2016 (National Center for Biotechnology Information, 2021). It is worth mentioning that the earliest use of the concept of semantic-pragmatic disorder was documented in 1983 in the US and 1987 in the UK before the term PLI was introduced to distinguish between pragmatic language difficulties in persons with and without autism and specific language impairment (Cummings, 2009; Perkins, 2010).

2.2.3 | Context

The context of this study was open to all geographical locations. It was limited to clinical settings. It did not consider preschoolers identified or assessed in preschools without reference to clinical settings or specialists in diagnosing and assessing PLI (i.e., psychologists, speech-language pathologists, expert researchers, or examiners). We also used the context in this ScR to refer to the different aspects and elements of PLI. We limited this to the emergentist model of pragmatic language disability introduced by Perkins (Perkins, 2008) and the biopsychosocial model (Engel, 1977a). According to these two models, our proposed extraction instrument shows these factors and elements. We argue through this ScR that PLI is to be better conceptualized and to be defined more comprehensively considering all these aspects and factors (i.e., semiotic, cognitive, motor, and sensory).

2.2.4 | Information sources

The search strategy aimed to locate both published and unpublished studies. A three-step search strategy was utilized. First, an initial limited search of the Web of Science and Scopus was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles and the index terms used to describe the articles were used to develop a full search strategy for the other mentioned databases (see Supplementary file 2). The search strategy, including all identified keywords and index terms, was adapted for each included database and/or information source. The reference list of all included sources of evidence was screened for additional studies. The references included original articles, reviews (of any type), books, book chapters, encyclopaedias, opinions, commentaries, editorials, theses, dissertations, graduation projects, and any other relevant sources that matched the inclusion criteria.

Studies published in any language were included if they had an English translation of a sufficiently informative abstract. There was no limitation on the publication date. These were unlimited because this ScR is to have a comprehensive overview of conceptualizing, defining, and assessing PLI in preschoolers.

The searched databases included Academic Search Premier, BioMed Central, Cochrane Library, ScienceDirect, Eric, ProQuest Dissertations & Theses, PsycINFO, Ovid MEDLINE, PubMed, Sage Journals Online, Scopus, Springer Link, Taylor & Francis Online, Web of Science, UNIVERSE (University of Verona Search), Lens, and Wiley Online Library. Sources of unpublished studies and grey literature to be searched include Open Grey, Grey Net, and Google Scholar.

2.2.5 | Search

When preparing the protocol, a search was first performed on Wednesday, October 13, 2021. This research was performed again for the final review on Tuesday, February 15, 2022. A detailed search strategy is provided in the PRISMA-S (see Supplementary file 2) (Rethlefsen et al., 2021). A sample of the used search string is given below.

(((((((((((((((((TI = [pragmatic language impairment]) OR TI = (pragmatic language disorder)) OR TI = (pragmatic language disability)) OR TI = (pragmatic language dysfunction)) OR TI = (pragmatic language difficulty)) OR TI = (pragmatic language deficit)) OR TI = (pragmatic impairment)) OR TI = (pragmatic disorder)) OR TI = (pragmatic disability)) OR TI = (pragmatic dysfunction)) OR TI = (pragmatic difficulty)) OR TI = (pragmatic deficit)) OR TI = (semantic-pragmatic disorder)) OR TI = (social communication disorder)) OR TI = (pragmatic communication disorder)) OR TI = (pragmatic aphasia)) OR TI = (pragmatic dysphasia)) AND TI = (preschool*)

2.2.6 | Selection of sources of evidence

This ScR considered all studies that approached conceptualizing, defining, and assessing PLI. In other words, it considered experimental and quasi-experimental study designs, including randomized controlled trials, non-randomized controlled trials, before and after studies, and interrupted time-series studies. In addition, analytical observational studies, including prospective and retrospective cohort studies, case-control studies, and analytical cross-sectional studies, were considered for inclusion. This review also considered descriptive observational study designs, including case series, individual case reports, and descriptive cross-sectional studies for inclusion.

Qualitative studies were considered that focus on qualitative data, including, but not limited to, designs such as phenomenology, grounded theory, ethnography, qualitative description, and action research. In addition, systematic reviews that met the inclusion criteria were considered, depending on the research question. Because this ScR attempted to clarify competing views on PLI, text and opinion papers were considered for inclusion.

Following the search, all identified citations were collated and uploaded into Mendeley 1.19.8 (Mendeley Ltd., Elsevier, Netherlands), and duplicates were removed. Following a pilot test, titles and abstracts were screened by two independent reviewers for assessment against the inclusion criteria for the review. Potentially relevant sources were retrieved in full, and their citation details were imported into the JBI System for the Unified Management, Assessment and Review of Information (JBI SUMARI) (JBI, Adelaide, Australia) (Munn et al., 2019). Two independent reviewers assessed the full text of the selected citations in detail against the inclusion criteria. The scoping review recorded and reported reasons for excluding the sources of evidence that do not meet the inclusion criteria. Any disagreements between the reviewers at each stage of the selection process were resolved through discussion. The search results and the study inclusion process were reported in full and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram (Tricco et al., 2018).

2.2.7 | Data charting process

Data were extracted from papers included in the scoping review by two independent reviewers using a data extraction tool developed by the reviewers. These extraction forms are based on the form provided by JBI and mentioned in other sources and guidelines for conducting an ScR (Khalil et al., 2021; Munn et al., 2018; Peters, Godfrey, et al., 2020a, 2020b; Peters, Marnie, Tricco, Pollock, Munn, et al., 2020). The data extracted included specific details about the participants, concepts, context(s), study methods, and key findings relevant to the review questions. These were divided into two forms: conceptualizing and defining PLI and another for conceptualizing and assessing PLI in preschoolers.

The Extraction forms were provided (see Appendices 1 and 2, Tables 1 and 2). The data extraction tool was modified and revised as necessary while extracting data from each included evidence source. Modifications included removing the factors influencing PLI reported in the results section without mentioning them in the table due to space limitations.

2.2.8 | Data items

We have prepared these extraction tables based on the factors mentioned by Perkins (2008, 2010). He proposed that PLI should be approached specifically or comprehensively using several factors. These include neurological deficits (e.g., neural substrates of cognitive dysfunction); cognitive deficits (e.g., inference, theory of mind, executive functions, memory, and emotion); linguistic deficits (e.g., syntax, morphology, semantics, discourse, and phonology); sensorimotor deficits (e.g., visual impairment, auditory impairment); compensatory adaptation (e.g., intrapersonal

TABLE 1 Data extraction chart for studies conceptualizing and assessing pragmatic language impairment in preschoolers

No.	Citation	Department	Population: SAG	Country	Diagnosis	Concept	Other concepts	Instrument	Type
1	(Aghaz et al., 2022)	Speech therapy, behavioural sciences,	47, 5-11y, NA	Iran	ASD	Pragmatic language impairment (PLI)	Pragmatic difficulties, pragmatic problems, pragmatic deficits	CCC-Persian	Informal
2	(Xu et al., 2022)	Psychology	22, 20-26 m, NA	China, USA	ASD	Pragmatic deficits (PDs)	Pragmatic and social deficits	ABC, PCDI	Informal
3	(Hage et al., 2022)	Speech therapy, Communication disorders, physiotherapy	20, 3-6y, NA	Brazil, USA	ASD, DLD	Social and pragmatic impairments	Social pragmatic difficulties	APLSC	Informal
4	(Wong et al., 2021)	Otorhinolaryngology, Human Communicative Research	89, 2-3y, 46:33	China	NDs	Pragmatic language deficits	Pragmatic deficits	PLS-S (HK-CLASS-P)	Formal
5	(Andrés-Roqueta et al., 2021)	Developmental, Educational, Social and Methodological Psychology	30, 3-10y, 22:08	Spain	DLD	PLI	Pragmatic breakdown and pragmatic difficulties	CCC-2-Spanish	Informal
6	(Su & Naigles, 2021)	Child language, psychology	56, 2-6y, 46:10	China, USA	ASD	PDs	Pragmatic/social deficits/difficulties	ABC (Chinese), PCDI (Chinese), IPL-EMIM	Mixed
7	(Ellis Weismer et al., 2021)	Communication disorders, family medicine, Disease control, population and paediatrics, epidemiology	1094, ≥ 4y, NA	USA	DLD	Social (Pragmatic) Communication Disorder (SPCD)	Social communication disorder	SCQ	Informal
8	(Fanning et al., 2021)	Autism, developmental neuromotor, psychology and language, cognitive sciences and technologies	28, 27-67 m, 19:9	Australia, UK, Italy, USA	ASD and WS	Impairments in pragmatic skills	Impairments in language and atypical social interactions	ADOS-2, Vineland-II, MSEL, FPP	Mixed
9	(Reindal et al., 2021)	Psychiatry, mental health, rare disorders and disabilities, neurodevelopmental disorders	148, 4-18y, 119:29	Norway	ASD	PLI	Pragmatic (language) deficits, Pragmatic difficulties	CCC-2-Norwegian	Informal
10	(Andrés-Roqueta & Katsos, 2020)	Developmental, Educational, Social and Methodological Psychology, theoretical and applied linguistics	40, 4-10y, 29:11	Spain, UK	ASD, DLD	Pragmatic difficulties	Pragmatic challenges and pragmatic deficits	Linguistic task, pragmatic task	Formal
11	(Yamashiro et al., 2020)	Psychology	107, 9 m, 57:50	USA, Canada	ASD	Social pragmatic difficulties	Social pragmatic attention	Speech preference task, complex non-speech, eye-tracking task, MSEL, MD-CDI	Mixed

TABLE 1 (Continued)

No.	Citation	Department	Population: SAG	Country	Diagnosis	Concept	Other concepts	Instrument	Type
12	(Adams & Galle, 2020)	Health sciences	20, 5–11y, NA	UK	High functioning ASD	SPCD	Social communication needs/difficulties/impairments	CELF-4, ACE 6–11, CCC-2, SLDT, TOPICC-2	Mixed
13	(Boyce et al., 2019)	Children's research, children's hospital, health institute	39, 5–12, NA	Australia	SMC	Pragmatic impairments	Pragmatic and social difficulties	CCC-2, CELF-4	Mixed
14	(John et al., 2019)	Children's research, children's hospital, clinical genetics	26, 1–17y, 26:00	Australia	KS	Social pragmatic deficits	Pragmatic impairment(s)/deficits	CELF-P-2, CELF-4	Mixed
15	(Jung et al., 2019)	Psychiatry, child mental development, internal medicine	40, 5–19, 40:00	USA, Japan	ASDs	Social communication deficits	Verbal and non-verbal communication deficits and repetitive behaviours	SCQ, SRS, ADOS, ADI-R	Mixed
16	(Jafari et al., 2019)	Counselling, exceptional children psychology	120, 60–108m, NA	Iran	NDs	SPCD	Pragmatic impairment and difficulties in social relationships	PAQ-Persian original	Informal
17	(Bai et al., 2019)	Applied psychology	140, 2–19y, NA	USA	ASD	social-communicative symptoms	Social-communicative impairments/deficits	ADI-R, ADOS	Mixed
18	(Flippin & Watson, 2018)	Communicative disorders	16, 36–69 m, 12:4	USA	ASD	Pragmatic language deficits	Pragmatic deficits/problems	ADOS, MSEL PLS-4, BAPQ, PCNPO	Mixed
19	(Arnett et al., 2018)	Psychiatry, genome science	116, 4–21y, 82:34	USA	ADNP syndrome and ASD	Social communication deficits	Social language impairments	ADOS-2, RBS-R, DAS-II,	Mixed
20	(Morgan et al., 2018)	Children's research, speech pathology and audiology, children's hospital, neuroscience, children's medical centre, clinical genetics, paediatrics, language and genetics, Brain, cognition and behaviour, human genetics	29, 1–27y, 12:17	Australia, The Netherlands, USA	KdVS	Pragmatic impairments	Pragmatic (language) deficits	PLS-5, CELF-P-5-Dutch, CCC-2	Mixed
21	(Myers et al., 2018)	Paediatrics, urology, biostatistics, medicine	563 crowdworkers and 24 experts, 18 m, NA	USA	ASD	Social communication impairments	Social communication behaviours	Videos, SCBRM	Mixed
22	(Lawson et al., 2018)	Autism	67, 24–48 m, 46:21	Australia	ASD	Social communication impairments	Social communication deficits	MSEL, ADOS-G, ADOS-2	Mixed

(Continues)

TABLE 1 (Continued)

No.	Citation	Department	Population: SAG	Country	Diagnosis	Concept	Other concepts	Instrument	Type
23	(Hyter, 2017)	Research and Education in Speech Therapy	31, 3–6y, 31:00	USA, Greece	ASD	Pragmatic communication disorder	Pragmatics and social communication impairments	Parent and teacher questionnaires (not mentioned clearly)	Informal
24	(Stromach & Wetherby, 2017)	Communication sciences and disorders	364, 18–36 m, NA	USA	ASD	Communication disorders	Social communication	CSBS-BS, ESAC, ADOS	Mixed
25	(Hopkins et al., 2017)	Psychology	14*, 3–13, NA	UK	ASD	PDs	Pragmatic impairment and pragmatic challenges/difficulties	SCQ, BPVS-3, picture-naming game, theory of mind task, conflict inhibition task	Mixed
26	(Helland et al., 2017)	Psychology	28, 5y, 17:11	Norway	LI and dyslexia	PLI	Preschool language impairment	CCC-2, RI-5, OLDI-Norwegian	Mixed
27	(Bauminger-Zviely et al., 2017)	Education	21, 3–6y, 20:1	Israel	High functioning ASD	PDs	Pragmatic and conversational deficit, pragmatic dysfunction	Experimental free play scenario, Dore's Speech-Acts Taxonomy,	Formal
28	(Parsons et al., 2017)	Occupational therapy, health science	925, 21 m–14y, NA	Australia	ASD	PLI	Pragmatic language difficulties	Review: several tools	Mixed
29	(Andrés-Roqueta et al., 2016)	Developmental, Educational, Social and Methodological Psychology	35, 3–8y, 24:11	Spain	SLI	Difficulties in social interaction	Language difficulties to social problems	CPM, CCC-2, (ELI); pragmatics profile, Social cognition tasks	Mixed
30	(Haebig et al., 2016)	Communication sciences and disorders	20, 5, 13:7	USA	FXS and SLI	Pragmatic (language) deficits	Pragmatic weaknesses	LIPS-R, PPVT-4	Mixed
31	(S. L. Bishop et al., 2016)	Psychiatry, hospital, public health	238, 3–13, 206:32	USA, Norway	ASD	Social communication impairment(s)	(Basic) social communication symptoms/deficits/abnormalities	ADOS, ADI-R	Mixed

TABLE 1 (Continued)

No.	Citation	Department	Population: SAG	Country	Diagnosis	Concept	Other concepts	Instrument	Type
32	(Davies et al., 2016)	Linguistics and phonetics, human sciences, psychology	18, 5–10, 11:7	UK, Spain	SLI	Pragmatic deficits	Pragmatic errors from deficits in social cognition, pragmatic infelicity, pragmatic impairments	Production task, comprehension and judgement tasks	Formal
33	(Jeste et al., 2016)	Neuroscience and human behaviour, children's hospital, developmental medicine, neurobiology, education	118, 19–37 m, NA	USA	TSC and nsASD	Social communication impairment(s)	Social communication delays/deficits/symptom	MSEL, ADOS	Mixed
34	(Mieke P. Keteleers et al., 2016)	Clinical child and adolescent studies, language communication, behavioural science	77, 5–7, 53:24	The Netherlands	PLI	PLI	Social communication disorder (SCD), Pragmatic language problems, pragmatically impaired, pragmatic deficit	CCC-Dutch, six narrative measures	Mixed
35	(Mccarthy et al., 2016)	Educational service	7, 2–5, 5:2	USA	ASD, pragmatic difficulties	Pragmatic difficulties	Social communication difficulties	ESCS, free play interactions	Mixed
36	(Grazdzinski et al., 2016)	Autism and developing brain, teachers college, hospital, psychiatry	56, 12–56 m, 44:12	USA, UK	ASD	SPCD	Social communication deficits	ADI-R, ADOS-2, MSEL, SACSS, RRBCSS	Mixed
37	(Stiller et al., 2015)	Linguistics, psychology	147, 2–4, NA	USA	DLD (self-reported)	PDs	NA	Pragmatic inference tasks	Formal
38	(Miller et al., 2015)	Psychiatry, psychology, Psychological Sciences and Speech Language and Hearing Sciences	Siblings 188 high, 119 low, 36 m, 160:147	USA	ASD	Pragmatic language difficulties	Pragmatic language impairments/problems, Social (Pragmatic) Communication Disorder (SCD)	ADOS, MSEL, LUI	Mixed
39	(Väisänen et al., 2014)	Health centre, child language research, university hospital	19, 5–8, 15:04	Finland	ADHD	Pragmatic difficulties	Pragmatic language impairment, pragmatic problems, pragmatic or social communication problems/difficulties, pragmatic and language deficiencies	CCC-2	Informal
40	(Andrade et al., 2014)	Neurosciences, medical school, physical medicine	3*, 5, 03:00	Brazil, USA	Expressive language disorder (only this matches preschool)	PLI	NA	transcranial direct current stimulation	Formal

(Continues)

TABLE 1 (Continued)

No.	Citation	Department	Population: SAG	Country	Diagnosis	Concept	Other concepts	Instrument	Type
41	(Bauminger-Zivielj et al., 2014)	Education	174, 3–6, NA	Israel	High functioning ASD	PDs	Pragmatic abnormalities Pragmatic language deficit	ADI-R, experimental free-play scenario, PRS-Y	Mixed
42	(Chuthapisith et al., 2014)	Developmental and behavioural paediatrics	50 (parents), 4–6, 39:11	Thailand	ASD	PLI	Pragmatic difficulties Pragmatic deficits Pragmatic impairments	CCC-Thai, VABS	Informal
43	(Murphy et al., 2014)	Health research, education and language studies, child and adolescent mental health	214, 5–6, 116:98	UK	Social communication disorders	Low-pragmatic language skilled children	Low pragmatic language skills Pragmatic language impairments	TPS (skills), BPVS-II, CCC-2 [impairment patterns]	Mixed
44	(Godbee & Porter, 2013)	Psychology	26, 5–43y, 12:14	Australia	WS	Pragmatic difficulties	NA	NLSS task, WJ-R COG	Formal
45	(Cordier et al., 2013)	Social Work, Education and Community Wellbeing	14, 5–11, 9:5	Australia	ADHD	Pragmatic language deficits	NA	PP, S-MAPs	Mixed
46	(Taylor et al., 2013)	Neurocognitive development, child health research, child development, pathology and medicine	82, 4–17, 67:15	Australia	ASD	Pragmatic language difficulties	Pragmatic and structural language difficulties Pragmatic impairments Pragmatic difficulties	CCC-2, ADOS-G, AQ	Mixed
47	(Andres-Roqueta et al., 2013)	Educational and developmental psychology, theoretical and applied linguistics	31, 3–7, 19:12	Spain, UK	SLI	Pragmatic impairment	Pragmatic language impairment	Cognitive measures, linguistic measures, ToM measures	Mixed
48	(Gibbs et al., 2012)	Dianoetic assessment, autism spectrum	132, 2–16, 107:25	Australia	ASD	Social communication disorder	Social communication impairments Impairments in pragmatics Social communication difficulties	ADOS, ADI-R	Mixed
49	(Ketelaars et al., 2012)	Special education	77, 5, 59:25	The Netherlands	PLI	PLI	Pragmatic deficits*** Pragmatic language problems Pragmatic language difficulties	CCC, linguistic measures, executive functions measures, ToM measures, working memory	Mixed

TABLE 1 (Continued)

No.	Citation	Department	Population: SAG	Country	Diagnosis	Concept	Other concepts	Instrument	Type
50	(Goodwin et al., 2012)	Psychology	15, 7–21 m, 15:00	USA	ASD	Social pragmatic difficulties	Pragmatic challenges	The IPL paradigm, ADOS, CDI	Mixed
51	(Lee et al., 2012)	Child psychiatry, brain and cognition	110, 4–22y, 78:32	USA	Supernumerary sex chromosome aneuploidies (X/Y-aneuploidies), the presence of extra X and/or Y chromosomes	PLI	Pragmatic deficits Pragmatic language deficits Pragmatic language difficulties	CCC-2	Informal
52	(Howard et al., 2012)	Huan communication sciences, linguistics and phonetics	1, 4y, 01:00	UK	DLDs	Pragmatic impairment	Social and pragmatic difficulties	CELF-P, other linguistics tasks	Mixed
53	(Pourcain et al., 2011)	Social and community medicine	5383, 4–17, NA	UK	autistic and hyperactive-inattentive symptomatology	Social communication deficits	Social communication disorder	SCDC	Informal
54	(Katsos et al., 2011)	English and applied linguistics, developmental ad educational psychology	29, 4–9y, 20:09	UK, Spain	SLI	Pragmatically impaired	NA	Tasks	Formal
55	(Mieke Pauline Ketelaars et al., 2011)	Behavioural science	84, 4–6, 58:26	The Netherlands	PLI	PLI	NA	CCC-Dutch (teachers), other linguistic tasks	Mixed
56	(Mieke P Ketelaars et al., 2009)	Special education	1396 (teachers), 4, NA	The Netherlands	SLI	PLI	Pragmatically impaired children Pragmatic language problems	CCC-Dutch	Informal
57	(Eigsti et al., 2007)	Clinical and social sciences in psychology, psychology	32, 3–6, 25:07	USA	ASD	PDs	NA	ADI-R, ADOS, CBCL	Mixed
58	(Defloor et al., 2005)	ENT, clinical genetics, growth and development research	6, 4–10, 03:03	Belgium, the Netherlands	Kabuki syndrome	Pragmatic difficulties	NA	Conversational tasks	Formal
59	(Piven et al., 1997)	Psychiatry	25 families, 4–28, 42:08	USA	ASD	Pragmatic language deficits	Pragmatic language abnormalities	ADI, ADOS, PRS [interview], FS	Mixed

(Continues)

TABLE 1 (Continued)

No.	Citation	Department	Population: SAG	Country	Diagnosis	Concept	Other concepts	Instrument	Type
60	(Snow, 1996)	Child language	1, 4, 01:00	USA	SLI	Semantic-pragmatic disorder	Semantic-pragmatic syndrome	Linguistic measures, conversational speech, pragmatics	Mixed
61	(Vedeler, 1996)	Special education	1, 5, 01:00	Norway	socio-emotional problem	Pragmatic difficulties	Pragmatic disorders Pragmatic disturbance	Play episodes: dialogue structure, utterance functions, coherence	Informal
62	(Lapadat, 1991)	Education	467*, 3–5, 467:00	Canada	Language-learning disabilities and	PDs	Pragmatic difficulties	Several tools: metanalysis review	Formal
63	(Bishop & Adams, 1989)	Psychology, Audiology, Education of the Deaf and Speech Pathology	57, 4–12, NA	UK	LI	Semantic-pragmatic disorder(s)	Pragmatic problems	Conversational tasks: inappropriacy	Formal

Note: (abbreviations by column). Population: F, female; M, male; m, month; NA: not available; SAG, Sample, Age, Gender; y, year; *only the sample for our criteria is included. Country: USA: United States of America; UK: United Kingdom. Diagnosis: ASD: Autism Spectrum Disorders; nsASD: nonsyndromic ASD; DLD: Developmental/delayed Language Disorders; NDs: neurodevelopmental disorders; WS: Williams Syndrome; SMCP: Submucous cleft palate; KS: Klinefelter syndrome; ADNP: activity-dependent neuroprotector homeobox syndrome; KdVS: Koolen de Vries syndrome; LI: language impairment; SLI: Specific Language Impairment; FXS: fragile X syndrome; TSC: tuberous sclerosis complex; PLI: Pragmatic Language Impairment; ADHD: Attention deficit hyperactivity disorder; SCD: social communication disorders. Instruments: CCC(2): Children's Communication Checklist; ABC: Autism Behaviour Checklist-Chinese; PCDI: Pictorial Communication Development Inventory; APLSC: Assessment of Pragmatic Language and Social Communication; PLS-5: Pragmatic Language Skills Subscale of the HK-CLASS-P; IPL-EMM: the eye-movement measures of Intermodal Preferential Looking; SCQ: Social Communication Questionnaire; ADOS-2: Autism Diagnostic Observation Schedule, Second Edition; VABS: Vineland Adaptive Behaviour Scales, Second Edition; MSEL: Mullen Scales of Early Learning; FPP: Free Play Paradigm; MD-CDI: MacArthur-Bates Communicative Development Inventories; CELF-4: Clinical Evaluation of Language Fundamentals –4; ACE –11: Assessment of Comprehension and Expression 6–11; SLDT: Social language development test; TOPICC-2: Targeted observation of pragmatics in children's conversation; CELF-P: CELF-Preschool; SRS: Social Responsiveness Scale; ADI-R: Autism Diagnostic Interview Revised; PAQ: The Pragmatic Abilities Questionnaire; PLS-4: The Preschool Language Scale-4; BAPO: The Broad Autism Phenotype Questionnaire; PCNPO: Parent-Child Naturalistic Play Observation; RBS-R: The Repetitive Behaviour Scale-Revised; DAS-II: Differential Ability Scales, 2nd Edition; PLS-5: The Preschool Language Fundamentals-5; SCBRM: Social Communication Behaviour Rating Measure; CSBS-BS-Behaviour Sample; ESAC: Early Screening for Autism and Communication Disorders; BPVS-3: British Picture Vocabulary Scale; RI-5: Risk-Index by 5; OLDI: Observation of Language in Daily Interaction; CPM: Coloured Progressive Matrices test; ELI: Evaluacão n del Lenguaje Infantil; LIPS-R: Leiter International Performance Scale– Revised; PPVT-4: Peabody Picture Vocabulary Test–Fourth Edition; ESCS: Early Social Communication Scale; SACS: Social Affect Calibrated Severity Score; Restricted, RRBSS: Repetitive Behaviour Calibrated Severity Score; LUI: Language Use Inventory; PRS-Y: Pragmatic Rating Scale-Young; TPS: Test of Pragmatic Skills; NLSS: non-literal speech stories; WJ-R COG: Woodcock–Johnson (Revised) Tests of Cognitive Ability; PP: The Pragmatic Protocol; S-MAPS: Structured Multidimensional Assessment Profiles; AQ: The Autism Spectrum Quotient; ToM: theory of mind; SCDC: Social Communication Disorder Checklist; CBCL: Child Behaviour Checklist; ADI: Autism Diagnostic Interview; PRS: Pragmatic Rating Scale; FS: Friendship Scale. References are provided in supplementary files 4–5.

TABLE 2 Data extraction chart for studies conceptualizing and defining pragmatic language impairment

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
1	(Rapin & Allen, 1983)	Psychiatry, paediatrics	Book chapter	Semantic-pragmatic syndrome without autism Syntactic-pragmatic syndrome	<p>One in which the children have very fluent expressive language" (p. 174)</p> <p>We have no reason to think that the syndrome necessarily denotes brain damage. It seems more likely that it denotes dysfunction in particular systems, whatever the aetiology of the dysfunction (p. 176)</p> <p>A semantic-pragmatic syndrome that lacks the severe affective deficits of autism but is also characterized by echolalia and deficient semantic processing as well as by inappropriate use of language in certain pragmatic contexts (p. 179)</p> <p>Children with syntactic-pragmatic syndrome show grossly impaired syntax and severely limited pragmatic use of language (p. 176)</p> <p>We have no idea about the neurologic basis for this syndrome, which we have encountered in very few children thus far. It is the only syndrome in which syntax was severely affected while phonology was normal or near normal (pp. 177–8)</p> <p>Some children with this syndrome resemble somewhat children of the semantic-pragmatic without autism type, presumably because of the dependency of semantic operations on elaborate syntax (p. 178)</p>
2	(Medical Subject Headings MeSH, n.d.-a)	Medical and health sciences	Vocabulary thesaurus PubMed	Semantic-pragmatic disorder	<p>Conditions characterized by language abilities (comprehension and expression of speech and writing) that are below the expected level for a given age, generally in the absence of an intellectual impairment. These conditions may be associated with deafness; brain diseases; mental disorders; or environmental factors (LDDs)</p> <p>It is introduced as a category of language development disorders</p>
3	(Prucha, 1983)	Pedagogy	Book	Pragmatic-semantic-syntactic interaction	<p>Pragmatics interacts with syntax (relatedness), semantics (meanings), signatics (denoting something), and pragmatics (communication). (p. 9)</p> <p>It includes attitudes of language user at the sentence level, and indexical expressions at all levels with more focus at words. (p. 24)</p> <p>Pragmatics is the "ego of the text". (p. 32)</p>
4	(Verschuere, 1987)	Linguistics	Book chapter	Pragmatics scoping and confusion among researchers	<p>Today, pragmatics is a large, loose, and disorganized collection of research efforts. Researchers in an ever-increasing number of different disciplines make constant or occasional use of pragmatic notions. But their contribution to our understanding of human verbal communication often does not reach its fullest potential as a result of the emerging theoretical, methodological, and terminological diversity. Though, when confronted with the complexities of language use and human communication, such diversity could mean strength, this strength has turned into the weakness of frag: mentation in the absence of a more or less coherent general framework in terms of which one can compare the results of various forms of research dealing with basically similar or related forms of functionality (p. 4)</p>

(Continues)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
5	(Adams & Bishop, 1989)	Audiology, Psychology	Research article	Semantic- pragmatic disorder	...although their speech may be fluent and grammatically well formed, the content of what they say has an odd quality and the way in which they use language in social interactions may be unusual Several authors have suggested that this constitutes a specific subtype of language disorder, variously termed "semantic-pragmatic syndrome" (Rapin & Allen, 1983), "semantic-pragmatic disorder" (Bishop & Rosenbloom, 1987) or "conversational disability" (Conti-Ramsden & Gunn, 1986) (pp. 211–212)
6	(Bishop & Adams, 1989)	Audiology, Psychology	Research article	Semantic- pragmatic disorder	A wide range of semantic, syntactic and pragmatic peculiarities was identified as leading to a sense of inappropriacy. Some instances of inappropriacy appeared to indicate cognitive rather than linguistic difficulties. Children with semantic-pragmatic disorder resembled younger normal children in that they frequently misunderstood the literal or implicit meaning of adult utterances and they violated normal rules of exchange structure. In other respects, however, the semantic-pragmatic group did not resemble normally developing children of any age. In particular, they tended to provide the listener with too much or too little information (p. 241)
7	(Bishop et al., 1994)	Applied (Psychology)	Research article	Semantic- pragmatic disorder	Rapin and Allen (1983) described a form of language disorder that they term [semantic-pragmatic deficit syndrome] Adams and Bishop (1989), who preferred to use the term "semantic-pragmatic disorder" ... found that children who fitted the clinical picture described by Rapin and Allen did not produce more utterances per turn than normally developing or other language-impaired children when interviewed by an adult (p. 178)
8	(Jucker, 1995)	English linguistics	Book	Pragmatics elements	It ranges from discourse analysis to speech act theory and from the study of presuppositions to relevance theory. Some approaches in pragmatics focus on communication in general and on the human cognitive processes that make communication possible, while others concentrate on specific languages and on the communicative meaning of specific elements (e.g. speech acts or discourse markers) in specific languages (p. 3)
9	(Paradis, 1998)	Linguistics	Research article	Pragmatic breakdown/ disorder/ deficit/ impairment	(1) as a compensatory strategy for individuals whose implicit linguistic competence has been impaired, and (2) as an element affected by a variety of neurogenic conditions, from focal damage to the right or the left hemisphere to various types of progressive dementias (p. IX)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
10	(Leinonen & Kerbel, 1999)	Linguistics	Research article	Pragmatic impairment (relevance theory)	What could be thought of as semantic difficulties (e.g., ambiguity, ellipsis, pronouns) are now squarely placed within the domain of pragmatics, since the principle of relevance is involved in working out the propositional content of utterances. In other words, the principle of relevance has a role to play in working out the explicit meaning of utterances (i.e., explicatures) (p. 371) Semantic deficits would then constitute difficulty with the acquisition of non-propositional meaning (linguistic meaning). Given this clearer delineation of semantics and pragmatics, it should now be easier to infer whether a particular communication breakdown occurs at the level of semantics or pragmatics. (p. 372)
11	(Conti-Ramsden, 2000)	Educational needs	Book chapter	Pragmatic language impairment	Classified language impairments and included PLI in complex language impairment in two forms: pure PLI and plus PLI (with autism or others)
12	(Perkins, 2000)	Human communication sciences	Book chapter	Pragmatic disability	The author proposed a classification and taxonomy for pragmatic disabilities and their causes: primary pragmatic disability due to cognitive dysfunction, secondary pragmatic disability due to linguistic dysfunction and/or sensorimotor dysfunction, and complex pragmatic disability due to a multiple cause from the previous two. (p. 22)
13	(Norbury & Bishop, 2002)	Experimental psychology	Research article	Pragmatic language impairment	It should be borne in mind that the original description of "semantic-pragmatic deficit syndrome" (referred to here as PLI) was used as a descriptive term that could be applied to both autistic and non-autistic children One potential subgroup of SLI that has generated particular research interest in recent years are those children with "pragmatic language impairment" (PLI, previously known as "semantic pragmatic disorder". (p. 228))
14	(Bishop, 2003b)	Experimental psychology	Symposium	Pragmatic language impairment	Rapin & Allen (1983) coined the term "semantic pragmatic deficit syndrome" to refer to children who used fluent and complex language, but had abnormalities of language use, producing tangential or irrelevant utterances. Bishop (2000), who described similar cases, suggested the term "pragmatic language impairment" (PLI) is preferable. (p. 217)
15	(Laws & Bishop, 2004)	Experimental psychology	Research article	Pragmatic language impairment	The CCC can be completed by parents or teachers and was designed to identify pragmatic abnormalities that may be difficult to evaluate in a formal assessment. (p. 48)

(Continues)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
16	(Bishop, 2004)	Experimental psychology	Book chapter	Pragmatic language impairment	In the past, I adopted the terminology based on the nosology of Rapin and Allen (1983), referring to these children as cases of semantic-pragmatic disorder, but there is little evidence that semantic and pragmatic difficulties tend to co-occur, and I now prefer the term pragmatic language impairment. (p. 321)
17	(Catherine Adams & Lloyd, 2005)	Human Communication and Deafness	Research article	Pragmatic language impairment	Tasks that attempt to discriminate children with PLI from other groups, however, must be employed with reference to the child's age and linguistic ability and must take the availability of supportive context into account. In this case, the elicitation task is well within the PLI children's capacity. (p. 343)
18	(Landa, 2005)	Autism and Related Disorders	Research article	Social communication impairment (pragmatic difficulties)	Severe social communication impairment may indicate the presence of autism or Asperger syndrome, in which linguistic skills may be minimally affected or unimpaired. Such children may fail to qualify for, but sorely need, language intervention services. (pp. 247–248)
19	(Marder & Ní Chollmáin, 2006)	Community child health, clinical speech, and language studies	Research article	Communication impairments	Some may experience difficulties with the content (semantics) or the form (grammar, phonology) of the language, or with its use in interpersonal communication (pragmatics). (p. 495)
20	(Bishop et al., 2006)	Experimental psychology	Research article	Pragmatic deficits/problems/impairments/difficulties	Although pragmatic deficits are a core feature of autism, there is a dearth of clinical instruments suitable for assessing this aspect of communication. (p. 117)
21	(Hyter, 2007)	Speech pathology and audiology	Research article	Pragmatic language difficulties	frequently are a primary area of disability for children diagnosed with autism, Asperger's syndrome, fetal alcohol spectrum disorders, or with a history of maltreatment, but difficulty in this area also can occur for children who do not have specific developmental disabilities. (p. 128) Assessing pragmatic language skills is complex, given the variability of pragmatic aspects of language and their relationship with context and culture. (p. 143)
22	(Westby, 2007)	Speech pathology	Research article	Semantic-pragmatic language disorder (SPLD)	Initially, the term SPLD was used to refer to children who were not considered to be autistic. In recent years, however, it is acknowledged that verbal children on the autism spectrum disorder continuum exhibit SPLD. (p. 266)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
23	(Simms, 2007)	Paediatrics	Research article	Pragmatic language disorder	Pragmatic language impairment often occurs in the context of SLI, but it has been recognized as a symptom of a number of other disorders, including autism and pervasive developmental disorder, Asperger's syndrome, nonverbal learning disability, and right-hemisphere brain damage. Some also recognize pragmatic language disorder as a distinctive developmental language disorder and not solely a symptom of another condition, like autism. (pp. 444–445)
24	(Perkins, 2007)	Human communication sciences	Book	Pragmatic impairment	<p>“Pragmatics in the absence of verbal language”. Others feel a need to distinguish at least implicitly between linguistic and non-linguistic pragmatics by using terms such as “pragmatic language impairment (PLI)” (Bishop, 2000) and “pragmatic language dis- orders” (Martin and McDonald, 2003; my emphasis). (p. 9)</p> <p>Terms such as “pragmatic impairment/disability/disorder/dysfunction” have been used to refer to behaviours found in conditions as disparate as aphasia, Asperger's syndrome, autism, dementia, Down's syndrome, focal brain injury, frontal lobe damage, hearing impairment, hydrocephalus, learning disability, right hemisphere damage and schizophrenia (Perkins, 2003). As such, they lack discrimination and are hardly adequate as diagnostic descriptors. This might not be a problem if the behaviours thus referred to were the same across all of these conditions. Unfortunately, they are not. The waters are further muddled by inconsistencies in the way the terms are used. (p. 30)</p>
25	(Cummings, 2008)	Linguistics	Book	Introduced major topics arguably and questionably	This disorder has elicited at least four different opinions among clinicians regarding its nature and status – it is a subtype of SLI, it is a separate disorder that is unrelated to SLI, it describes pragmatic impairments in autistic spectrum disorder and it does not exist in any capacity. This lack of clinical agreement has even extended as far as the role of organic factors in a diagnosis of semantic–pragmatic disorder. Where Rapin and Allen (1983) applied “semantic pragmatic deficit syndrome” to children with known organic aetiologies, Bishop and Rosenbloom (1987) excluded such aetiologies from their diagnostic category “semantic– pragmatic disorder”. (p. 21)
26	(Hua & Wei, 2008)	Applied linguistics	Book	Pragmatic impairment Pragmatic deficit	<p>An issue that needs to be considered here is the status of pragmatic impairment. There is controversy as to whether children with pure pragmatic impairment exist or the so-called pragmatic impairment is a secondary con- sequence of SLI or other dysfunctions. (p. 150)</p> <p>Pragmatic deficits can occur as a consequence of brain damage or aphasia. Some studies document the pragmatic behaviours of English speakers with brain damage. (p. 151)</p>

(Continues)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
27	(Perkins, 2008)	Human communication sciences	Book chapter	Pragmatic impairment	The author proposed a framework for understanding PLI as an emergent phenomenon which includes various elements: semiotic, cognitive, motor and sensory. The elements of these help define the type of pragmatic impairment among: cognitive, linguistic, non-verbal, and sensorimotor.
28	(Whitehouse et al., 2009)	Child health, psychology	Research article	Pragmatic language impairment	Pragmatic deficits are a dominant feature of the language profile and cannot be attributed to poor linguistic ability alone. This contrasts with the more typical form of developmental language disorder (most commonly called specific language impairment or SLI), where there is a core deficit in the structural aspects of language (morphology and/or syntax). (pp. 513–514)
29	(Bishop & McDonald, 2009)	Oxford study of children's communication impairments	Research article	Pragmatic language impairment (assessment: formal and informal)	Language test scores provide important information about which children are at risk of academic failure, though this varies from test to test. Reliance on language tests alone, however, is insufficient; a parental report provides important complementary information in the diagnostic process. (p. 600)
30	(Cummings, 2009)	Linguistics	Book	Pragmatic disorder (primary vs. secondary)	Developmental and acquired pragmatic disorders have diverse aetiologies and may be the consequence of, related to or perpetuated by a range of cognitive and linguistic factors. (p. 6)
31	(Cummings, 2010)	Linguistics	Book	Pragmatic language impairment	Pragmatic language impairment (PLI) refers to difficulties with the pragmatic use of language, particularly the use of relevant context in interpretation. PLI is used clinically to describe difficulties in understanding language in context, in understanding non-literal meaning, in using pragmatic cues in conversation and in communicating with others. (p. 338)
32	(Zufferey, 2010)	Linguistics	Book	Semantic-pragmatic disorder	Subjects suffering from semantic-pragmatic disorder (also called pragmatic language impairment) share with the autistic profile severe communication problems but have rather unimpaired social skills. Contrary to Asperger syndrome, which is now almost always treated as a form of autism, the status of semantic-pragmatic disorder remains a matter of controversy. From a diagnostic perspective, it should be noted that neither the DSM-IV (American Psychiatric Association 2000) or the ICD 10 (World Health Organization 1992) recognize the existence of semantic-pragmatic disorder. (pp. 56–57)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
33	(Perkins, 2010)	Human communication sciences	Book chapter	Pragmatic impairment (factors)	Factors contributing to pragmatic impairment: neurological deficits, cognitive deficits (inference, theory of mind, executive functions, memory, and emotion), linguistic deficits (syntax and morphology, semantics, discourse, and phonology), sensorimotor deficits, compensatory adaptation (intrapersonal, and interpersonal, anomalous behaviour) pragmatic impairment is emergent – i.e., it is best described not as, or in terms of, a specific underlying deficit, but as, and in terms of, the way in which interactions between cognitive, linguistic and/or sensorimotor difficulties play out in dyadic or group interaction. (p. 241)
34	(Catherine Adams et al., 2011)	Human Communication and Deafness	Research article	Pragmatic language impairment	The literature describes children with pragmatic language impairment as verbose, fluent, over- literal, with expression often in advance of comprehension and difficulty constructing coherent narratives. It is evident from our research and others (Botting & Conti-Ramsden, 1999) that a proportion of children with pragmatic language impairment fit into traditional diagnostic categories such as high-functioning autism or Asperger's syndrome, but there remains some controversy over diagnostic issues. Pragmatics. (p. 7)
35	(Meibauer & Steinbach, 2011)	Linguistics, philology	Book	Pragmatic impairment	If pragmatic competences are not innate, but acquired in the course of children's development, it is plausible that there might exist children who show difficulties with respect to an adequate pragmatic behaviour. Those children may be regarded as pragmatically impaired children. For example, a child has not grasped the felicity condition on promises, requiring that the speaker is obliged to do a future act. Then this child may be regarded as being insincere and not trustworthy, albeit he suffers from a pragmatic impairment. Pragmatic impairments nowadays are regarded as the proper object of clinical pragmatics. (p. 9)
36	(Catherine Adams et al., 2012)	Human Communication and Deafness, speech and language therapy, education	Research article	Pragmatic language impairment (social communication disorder)	Pragmatic language impairment (PLI) is present when children have disproportionate difficulty with the pragmatic domain of language in relation to relative strength in grammar and phonology. (p. 234)

(Continues)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
37	(Kujala et al., 2013)	Learning, cognitive brain research, child neurology, psychology, integrative neuroscience	Research article	semantic-pragmatic deficit	Autism spectrum disorders (ASD) are characterized by deficits in communication and social behaviour and by narrow interests. Individuals belonging to this spectrum have abnormalities in various aspects of language, ranging from semantic-pragmatic deficits to the absence of speech. (p. 697)
38	(Grant & Nozyce, 2013)	Children's health, developmental paediatrics	Research article	Social communication disorder	Changing the current diagnosis of PDD-NOS [Pervasive Developmental Disorder Not Otherwise Specified] to a "Social Communication Disorder" focused on language pragmatics in the DSM-5 may restrict eligibility for IDEA programs and limit the scope of services for affected children. (p. 586)
39	(American Psychiatric Association, 2013)	Psychiatry	Manual	Social (Pragmatic) Communication Disorder	<p>Persistent difficulties in the social use of verbal and nonverbal communication as manifested by all of the following:</p> <ol style="list-style-type: none"> 1. Deficits in using communication for social purposes, such as greeting and sharing information, in a manner that is appropriate for the social context. 2. Impairment of the ability to change communication to match context or the needs of the listener, such as speaking differently in a classroom than on a playground, talking differently to a child than to an adult, and avoiding use of overly formal language. 3. Difficulties following rules for conversation and storytelling, such as taking turns in conversation, rephrasing when misunderstood, and knowing how to use verbal and nonverbal signals to regulate interaction. (p. 48)
40	(Alduais, 2013)	Clinical linguistics	Book	Pragmatic dysphasia (used with PLU)	Similar to aphasia and developmental dysphasia, children with with developmental disorders manifesting pragmatic difficulties could be described in terms of pragmatic dysphasia.
41	(Tierney et al., 2014)	Paediatric rehabilitation, children's hospital	Research article	social (pragmatic) communication disorder (SCD) (pragmatic impairment/limitations)	Helping youth with social pragmatic deficits is vital, as these individuals report having fewer and less satisfying friendships and relationships and greater feelings of loneliness than typical peers. (p. 263)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
42	(Cummings, 2014a)	Linguistics	Book	Pragmatic disorders	Pragmatic disorders display no preference for the individuals they afflict. People of different ethnicities, socioeconomic classes, and ages can develop pragmatic disorders. Men and women appear to be equally predisposed to pragmatic disorders. Pragmatic disorders are not confined to people living in certain geographical regions, and are no more commonly found in urban over rural dwellers (or vice versa). No lifestyle, culture or type of education places an individual at an increased risk of developing a pragmatic disorder. In view of this lack of discrimination, pragmatic disorders are best examined within a life span perspective. (p. 31)
43	(Cummings, 2014b)	Linguistics	Book	pragmatic language impairment	A successor to the term "semantic-pragmatic disorder"; describes a subgroup of children with SLI in which there are marked difficulties with the pragmatics of language. (p. 199)
44	(fantidou, 2014)	Linguistics	Book	Pragmatic impairment	Recent pragmatic impairment studies have pointed out the vagueness in the way pragmatic competence is defined, and the need to be more specific in what types of ability this includes for assessment purposes. (p. 24) [citing Cummings]
45	(Norbury, 2014)	Psychology	Book	pragmatic language impairment social communication disorder	Nosologies of developmental disorders (i.e., attempts to identify their subgroups) have included children with atypical pragmatic development for more than 30 years. (p. 345) Bishop and Rosenbloom (1987) considered "semantic- pragmatic disorder (SPD)" to represent a distinct sub-group of children who occupied a diagnostic space between ASD and specific language impairment (SLI). Both systems emphasized a deficit in pragmatic language abilities in the context of relatively intact "structural" language skills, i.e. phonology, morphology and syntax were more in line with developmental expectations than use of those structural language skills in context. The term "Pragmatic Language Impairment (PLI)" became the generally accepted term for non-autistic children with primary difficulties in the use of language in social contexts. The term PLI has also been used to distinguish those who have primary pragmatic deficits from children who have specific language impairment (SLI) The addition of SCD to DSM-5 is extremely controversial at the moment; to the extent that diagnostic criteria for SCD are available, it seems that these encompass both conceptions of PLI and the social-communication deficits that characterize ASD. However, for the sake of clarity, I will use the term SCD to refer to face-to-face exchanges between two interlocutors, focusing specifically on discourse abilities such as initiation, topic maintenance, clarification, presupposition, and non-verbal communication. (p. 346)

(Continues)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
46	(Camarata, 2014)	Hearing and speech sciences	Research article	social communication disorder (pragmatic language disorder)	Bloomfield's (1933) classic text on language includes a chapter on "The use of language" and another on "Speech- communities" describing the social milieu as a part of language study. The point herein is that social communication is inarguably a language construct and social communication disorder (pragmatic language disorder) is not necessarily a form of autism spectrum disorder. (p. 62)
47	(Coury et al., 2014)	Paediatrics, genetics, ASD	Research article	Social (pragmatic) communication disorder (SCD)	SCD is not a variant of ASD. In fact, a diagnosis of SCD can only be made when ASD has been excluded as a possibility. A primary distinction between SCD and ASD is the presence of restricted, repetitive patterns of behaviour, interests, and activities (RRBs) in ASD, and their absence in SCD. A diagnosis of SCD should be considered only if the developmental history fails to reveal any RRBs or sensory issues. (p. 33)
48	(Zufferey, 2015)	Linguistics	Book	Pragmatic impairments	The pragmatic impairments reported in this section have been in most cases related to ASD subjects' deficits in theory of mind abilities and to their weak central coherence. (p. 163) [citing Loukusa & Mollanen, 2009]
49	(Cunningham & Rosenbaum, 2015)	Childhood disability research	Discussion paper	Pragmatic language delay	Children with pragmatic language delay, hearing impairment, or severe phonological impairments may engage in and initiate fewer social interactions than their peers. (p. 410)
50	(Cummings, 2015)	Linguistics	Book	Pragmatic disorders (developmental vs. acquired) [ToM]	For approximately 40 years, clinical investigators have actively pursued research into pragmatic disorders in children and adults (Cummings 2010). During that time, there has been considerably less concern on the part of researchers to explain pragmatic disorders than there has been on the attempt to characterize these disorders. The result has been a large and somewhat disjointed body of research findings, not all of which relate in a meaningful way to pragmatic disorders. (p. 559)
51	(Lockton et al., 2016)	Psychological sciences	Research article	Social communication disorder	(Also known as pragmatic language impairment—PLI) ...have long- term difficulties in participating in aspects of social communication such as responding and initiating in conversational exchanges; the ability to adhere to established topics in verbal interactions, comprehension of non-literal language and verbal hints, and the skilled use of language in peer interactions. (p. 2)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
52	(Turkstra et al., 2017)	Communication sciences and disorders, physical medicine, speech pathology and audiology, speech and hearing science	Review	pragmatic communication disorders	A broad range of terms has been used by clinicians to describe pragmatic communication disorders, including pragmatic language disorders, pragmatic-semantic disorders, social communication disorders, and, more recently, impairments in social thinking. Definitions and diagnostic criteria for these disorders may overlap and are often only loosely defined. Consistent across all of them, however, is a focus on how language is used in context. (p. 1877)
53	(Andrés-Roqueta & Katsos, 2017)	Developmental psychology, theoretical and applied linguistics	Research article	Pragmatic difficulties	... the distinction between linguistic- and social- pragmatics may help clarify for some questions pertaining to diagnostic categories ... deficits are at least partially distinct, as they include both what we called linguistic-pragmatic and social-pragmatic competences. They are also likely to be present in children with ASD, SLI and other disorders, depending on the extent of structural language and ToM impairments Screening instruments and diagnostic procedures that measure communicative and pragmatic competence may also take into account the distinction between linguistic- and social-pragmatic competences, which at present tend not to be differentiated (e.g., CCC-2) (p. 3)
54	(Ketelaars & Embrechts, 2017)	Linguistics	Book chapter	Pragmatic language impairment	The term Pragmatic Language Impairment (PLI) has a rich history in terms of both name and definition. Labels such as Semantic Pragmatic Syndrome, Semantic Pragmatic Language Disorder, and Pragmatic Language Impairment have preceded the latest term Social Communication Disorder, in an attempt to characterize the main symptoms of children with difficulties in the social use of language. Although these labels all have validity, we choose to adopt the label Pragmatic Language Impairment (p. 30) As PLI has only recently been added to DSM-5 under the term Social Communication Disorder (SCD), we know little of its exact symptom manifestation, its relation to other language disorders and to ASD, good diagnostic practices and effective treatments. DSM-5 states that SCD is diagnosed if individuals show deficits in the use of communication for social purposes, the ability to change communication according to context, the ability to adhere to conversational and narrative rules and the ability to understand implicit language. (p. 51)

(Continues)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
55	(Lorusso et al., 2018)	Science studies, industrial technology	Research article	social (pragmatic) communication disorders	Some children, namely children with autistic spectrum disorders (ASD) or with social (pragmatic) communication disorders, specifically lack the ability to efficiently use communication strategies and skills to engage in social interactions with their peers. They may present a poor speech repertoire, repetitive language, gaze avoidance, withdrawal, disorientation, and echolalia. (p. 3)
56	(Matthews et al., 2018)	Psychology	Review article	Pragmatic language impairments Social (Pragmatic) Communication Disorder (SCD)	Pragmatic language impairments are also strongly associated with other developmental disorders including Attention Deficit/ Hyperactivity Disorder Oppositional Defiant Disorder (ODD) and Conduct Disorder ... as well as hearing loss There is thus a clear need to explain why individual differences in pragmatic ability exist so that we can find the best means of supporting development and function. (p. 187)
57	(Agyemang, 2018)	Physical medicine	Encyclopaedia article	Social (pragmatic) communication disorder (SCD)	Synonyms: Pragmatic communication disorder; Pragmatic language impairment; Pragmatic-semantic disorder; Social communication disorder Social (pragmatic) communication disorder (SCD) is a neurodevelopmental disorder in the Diagnostic and Statistical Manual of Mental Dis- orders (5th ed.; DSM-5; American Psychiatric Association 2013) that is characterized by impairments in the use of verbal and nonverbal communication in social contexts. (p. 3204)
58	(Newby et al., 2018)	Neurology, developmental assessment, paediatrics	Encyclopaedia article	Semantic Pragmatic Disorder (SPD)	Synonyms: Pragmatic language impairment (PLI); Semantic pragmatic deficit disorder (SPDD); Semantic pragmatic language disorder (SPLD) (p. 3131) Semantic pragmatic deficit syndrome was first introduced as a language disorder by Rapin and Allen in 1983 and was subsequently renamed SPD by Bishop and Rosenblum (1987). Given the short number of years since publication of DSM 5, insufficient time for longitudinal research limits our knowledge about the course and prognosis of SCD, and definitional changes over time caution against extrapolating from previous literature (Swineford et al. 2014). (p. 3132)
59	(Catherine Adams & Galle, 2020)	Health sciences	Research article	Social (Pragmatic) Communication Disorder (SPCD)	Social (Pragmatic) Communication Disorder (SPCD) is defined in the Diagnostic Statistical Manual 5 (American Psychiatric Association, 2013) as a condition in which there is an early and persistent difficulty with pragmatics (the use of language in social interactions) and persistent language disorder. These children have limited social participation, but do not meet diagnostic criteria for autism. (p. 2)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
60	(Timler & Moss, 2021)	Linguistics	Book chapter	Social (Pragmatic) Communication Disorder	The distinction between pragmatic language and social communication is difficult to discern in clinical populations because a deficit in one of these developmental areas may adversely affect the other The terms “pragmatic language” and “social communication” are sometimes used synonymously. In fact, language experts are likely to label a behaviour as demonstrating both a pragmatic language skill and a social communication skill if words are required to display the behaviour. For example, effectively complimenting a peer is classified as reflecting both pragmatic language and social communication skills but complying with a teacher instruction is likely to be classified as a social communication skill only and not a pragmatic language skill ... (p. 26)
61	(Katsos & Andrés-Roqueta, 2021)	Developmental psychology, theoretical and applied linguistics	Perspectives	Pragmatics, mind reading and autism	Despite autistic people's success with many pragmatic inferences such as scalar implicatures, indirect speech acts, and metaphors—there are nevertheless aspects of pragmatics in which autistic people's performance is exceptionally lower than that of neurotypical peers. (p. e184) ... pragmatics, mind reading, and autism, Kissine has thrown into the spotlight a minority view that is nevertheless well supported by a careful consideration of the empirical evidence. (p. e195)
62	(Cummings, 2021)	Linguistics	Book chapter	Pragmatic impairment	A pragmatic impairment can best be defined in two parts. In terms of expression, it is any impairment of the ability to use language to convey a communicative intention to a hearer. In terms of reception, it is an impairment of the ability to recover the communicative intention that motivated a speaker to produce an utterance. (p. 193)
63	(Williams, 2021)	Linguistics	Research article	autistic pragmatic “impairment”	This paper challenges the way in which relevance theory has traditionally been applied to a so-called autistic pragmatic “impairment” but argues that relevance theory and in particular its central concept of mutual manifestness—may still offer crucial insights into these breakdowns of mutual understanding between autistic and non-autistic people. (p. 121)
64	(Amoretti et al., 2021)	Classics, philosophy and history, life quality studies	Review article	Social (Pragmatic) Communication Disorder (SPCD)	The latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) included the Social (Pragmatic) Communication Disorder (SPCD) as a new mental disorder characterized by deficits in pragmatic abilities. Although the introduction of SPCD in the psychiatry nosography depended on a variety of reasons—including bridging a nosological gap in the macro-category of Communication Disorders—in the last few years researchers have identified major issues in such revision. (p. 107)

(Continues)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
65	(Whitehouse, 2021)	Psychology	Encyclopaedia article	Semantic Pragmatic Disorder Semantic Pragmatic Deficit Syndrome	Synonyms: Pragmatic communication disorder; Pragmatic language impairment; Semantic pragmatic deficit disorder; Semantic pragmatic deficit syndrome; Semantic pragmatic language disorder; Social communication disorder In the mid-1980s, two taxonomies of developmental language disorders were independently published, one in the USA ... and the other in the UK... Both described a subtype of developmental language disorder in which the primary impairment was in language content and use. Rapin and Allen termed this language profile "semantic pragmatic deficit syndrome," and Bishop and Rosenbloom used the term "semantic pragmatic disorder." Since the early 2000s, there has been a transition to the alternate label of pragmatic language impairment (or PLI), particularly in the UK, after evidence that semantic and pragmatic deficits do not always occur in combination. (p. 4205)
66	(Jackson, 2021)	Child study	Encyclopaedia article	Social Communication Disorder	Synonyms: Pragmatic communication disorder; Pragmatic language disorder; Pragmatic language impairment; Semantic pragmatic deficit disorder; Semantic pragmatic deficit syndrome; Semantic pragmatic language disorder; Social pragmatic communication disorder As social communication disorder was only introduced as a diagnostic category with the release of the DSM-5 in 2013, epidemiological studies remain rare and limited in scope. Estimates on the prevalence and incidence of SCD, therefore, are still in preliminary stages. (p. 543)
67	(Adams, 2021)	Human communication development and hearing	Encyclopaedia article	Pragmatic Language Impairment	Synonyms: Pragmatic language disorder; Social (pragmatic) communication disorder; Social communication disorder Pragmatic language impairment (PLI) is a type of developmental language impairment in which there is disproportionate difficulty with pragmatics and social communication compared to the structural aspects of language such as grammar and vocabulary. PLI is not included as a category in DSM-V. PLI is a descriptive term that is used to identify the type of language problem present. PLI is still in clinical use but has been replaced in the research literature and autism diagnostic practice by the term "Social Communication Disorder" or "Social (Pragmatic) Communication Disorder" (SPCD). (p. 4205)
68	(American Psychological Association, n.d.-a, n.d.-b, n.d.-c)	Psychology	APA dictionary	pragmatic aphasia	A group of disorders caused by damage to the right hemisphere of the brain that particularly affect an individual's ability to communicate appropriately in specific contexts or situations. (p. pragmatic aphasia)

TABLE 2 (Continued)

No.	Study	Field(s)	Type	Concept	Definition(s)/argument(s)
69	(Medical Subject Headings [MeSH], n.d.-b)	Medical and health sciences	Vocabulary thesaurus PubMed	Social Communication Disorder	Persistent difficulties in the social uses of verbal and nonverbal communications. (DSM-V) Year introduced: 2016 (p. SCD) It is introduced as a category of communication disorders
70	(American Speech-Language-Hearing Association, n.d.)	Speech-language-hearing sciences	Practice portal	Social Communication Disorder	Social communication is the use of language in social contexts. It encompasses social interaction, social cognition, pragmatics, and language processing. Social communication skills include the ability to vary speech style/e, take the perspective of others, understand and appropriately use the rules for verbal and nonverbal communication, and use the structural aspects of language (e.g., vocabulary, syntax, and phonology) to accomplish these goals. (p. SCD)

Note: References are provided in supplementary files 4-5.

adaptation & interpersonal adaptation, anomalous behaviours). We used the biopsychosocial model to put these factors together to categorize the selected studies, the included elements of pragmatics used by the authors of the selected papers to define, conceptualize and assess PLI (Bolton & Gillett, 2019; Engel, 1977b). Although our extraction form did not include these aspects directly due to space limitation in the tables, we incorporated them in the synthesis of findings (i.e., these can be found in the scoping review protocol (Alduais et al., 2021)). We also included the specialization as we believe that the authors' area of research influences the used concepts, definitions, and assessment methods for PLI (see Tables 1 and 2). We elaborated on the reasons for item inclusions in the results section.

2.2.9 | Critical appraisal of individual sources of evidence

Previous research on scoping reviews reported that critical appraisal is not mandatory, albeit the authors could decide the assessment for the quality of included studies (Munn et al., 2018; Peters, Godfrey, et al., 2020a, 2020b; Peters, Marnie, Tricco, Pollock, Munn, et al., 2020). That said, there was no formal assessment of the included studies. However, the included studies were critically appraised by two reviewers of the team against the inclusion criteria. Because books, book chapters, and theoretical studies were included in this review, the JBI Critical Appraisal Checklist for Text and Opinion Papers was considered for critically appraising these studies (McArthur et al., 2020). For the assessment part, the methodology was assessed using simple criteria: availability of evidence, be it quantitative, qualitative, or mixed, the population were preschoolers and diagnosed with PLI, be it a primary or secondary disorder, and the instrument used is validated and has reported validity and reliability. The steps and guidance mentioned on PRISMA-ScR and JBI will be followed. For opinion and text papers, the main requirements are having to compete publication information in terms of format and having either theoretical or empirical evidence in terms of content about defining, conceptualizing, and assessing PLI.

2.2.10 | Synthesis of results

Collating, summarizing, and reporting the results were followed to present the results. All the data were presented using the JBI SUMARI and MAXQDA 2020 software. The PRISMA-ScR flow chart was generated to show the search strategy. The evidence tables were adapted using the JBI SUMARI to show the characteristics of the included studies. All these tables, visuals, and flowcharts show the current competing views among researchers in conceptualizing, defining, and assessing PLI in preschool children. The synthesis attempted to identify the reasons for these competing views.

3 | RESULTS

3.1 | Selection of sources of evidence

Overall, 5960 studies were identified as potentially relevant based on searches in the following databases: Web of Science, Scopus, Lens, PubMed, and others mentioned above. Upon removal of duplicate studies, 3900 remained for screening. A total of 871 studies were sought for retrieval after screening the titles and abstracts, of which 112 were deemed inaccessible. The full-text of 759 eligible studies were screened; of these, 128 studies could not be accessed in full-text, 189 studies did not contain enough content in English or lacked the language familiar to the reviewers, and 317 studies did not have clinical setting groups. We identified 125 studies that met all of our inclusion criteria plus eight studies identified by other means (manual search, familiarity with the papers). (See Figure 1).

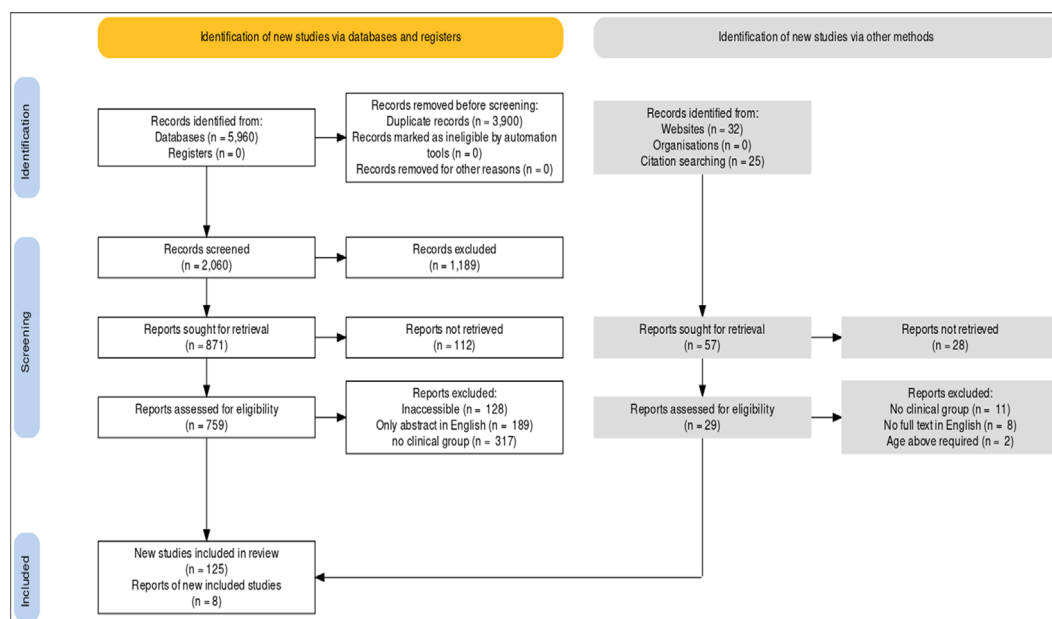


FIGURE 1 Primam flowchart for study selection

3.2 | Characteristics of sources of evidence

A total of 133 studies were included. As part of the inclusion and data extraction process, these were divided into two types matching the two objectives of the scoping review. For the first category, we considered studies using clinical groups to conceptualize and assess PLI in preschoolers. A total of 63 studies were included in this category (see Table 1). Studies that do not include clinical groups fall into a second category, which is composed primarily of books, book chapters, opinions, perspectives, or even empirical studies not meeting the inclusion criteria for the assessment category. There were 70 studies in this category (see Table 2). These studies aimed to gather evidence for conceptualizing and defining PLI.

Table 1 included 10 columns comprised of study number, citation, department or research area, population (sample size, age, and gender), publication country, diagnosis, concepts used (relative to PLI), other concepts used with PLI, instruments for assessing PLI, and type of assessment.

Table 2 includes six columns, including the following information: study number, citation, department or researcher area, type of source, the concept used to refer to PLI, and a definition or argument.

3.3 | Critical appraisal within sources of evidence

We have mentioned earlier that no formal critical appraisal criteria were applied to the decision regarding whether or not to include a relevant piece of literature or research within this review. Nonetheless, we evaluated the clinical setting studies based on our defined criteria concerning the concept of clinical studies referring to PLI, the assessment tool, the age of participants, and the clinical setting. There were reviews included in the study, but only the participants matching our targeted age group were extracted. We used three databases (Web of Science, Scopus, and Lens) to identify the most prolific and cited authors for the other types of studies. Our next step was to locate their studies and evaluate them for inclusion in the conceptualization and definition of PLI. The included studies in Table 2

do not necessarily belong to the most popular authors, but some of them include relevant arguments for our second question.

3.4 | Results of individual sources of evidence: Conceptualizing and assessing PLI

We mentioned above that Table 1 includes 10 columns for the characteristics and evidence for conceptualizing and assessing PLI from studies in clinical settings among preschool populations. We included numbers for the studies to facilitate readability other than ranking studies. The citation of the studies is presented from the most recent to the oldest, using the APA citation style.

We assumed that the author's academic major, profession, or research area might influence their choice for conceptualizing and assessing PLI. We used Excel to filter the authors' research area/department and the used concept to refer to PLI. Most authors are from psychology, medical, health sciences, and a few from either linguistics or (special) education. In contrast with our hypothesis, we did not find a systemic trend evidencing that a certain concept is being used by authors according to their research areas and/or department where they work.

The total number of participants in the included 63 studies are 13,716. Some of these include an indirect assessment where preschool children were assessed through teachers, parents, etc. These, according to our data, included: crowd workers (a large number of people performing small tasks) and experts (Myers et al., 2018), siblings of children with PLI (Miller et al., 2015), parents (Chuthapisith et al., 2014), teachers (Ketelaars et al., 2009), families (Piven et al., 1997), or even collected sample of systematic reviews (Lapadat, 1991; Parsons et al., 2017). Although we aimed to consider possible differences in concepts and assessment tools considering age and gender, this was not possible for gender because not all studies clearly stated the number of males vs. females included in their studies. Regarding age, it is important to note that in the studies that included samples of preschool and grade-school ages, we excluded those participants who were in grade-school ages and only counted the number of preschoolers. We did not find any trends related to the children's age. Most of the included participants from the studies which reported gender information were males.

We also considered that different concepts and assessment tools for PLI might be related to the country of origin, at least in terms of linguistic differences, even among the English-speaking countries. In terms of frequency, 17 countries were reported for 63 studies. Of these studies, 27 were from the USA, 12 from the UK, 10 from Australia, 6 from Spain and the Netherlands (each), 4 from Norway, 3 from China, Brazil, and Canada (each), 2 from Iran and Israel (each), 1 from Belgium, Finland, Greece, Italy, Japan, and Thailand (each). It should be noted that most of the studies from English-speaking countries included first authors from non-English speaking countries. We did not find a systemic trend for using a certain concept in a country. In other words, concepts were used variably and possibly following existing literature among the countries listed.

The diagnosis was an important factor in observing any occurring differences in concepts. We will elaborate on this point in the next section, but we will mention some points here. In the included 63 studies, PLI was diagnosed as either a primary disorder or a symptom of other disorders. Of these disorders, 31 were for (high functioning) autism, seven for specific language impairment, six for developmental language disorders, three for PLI, and a few studies or one for each of the disorders listed in Table 1. Most of the listed disorders were neurodevelopmental, but other types are also comorbid with PLI. Among these are dyslexia (Helland et al., 2017), the presence of extra X and/or Y chromosomes (Lee et al., 2012), Kabuki syndrome (Defloor et al., 2005), and fragile X syndrome (Haebig et al., 2016).

The concepts have two columns. The first column is for the main concept used in the title, abstract, or keywords. The next column shows how the author(s) used this main concept interchangeably with other concepts. The list and frequency of these concepts in the 63 studies are illustrated in Figure 2. We should note that we did not consider the concepts used in the introduction or literature review sections when authors introduced PLI by referring to other authors. Our focus was tracking the author's (s) concepts in the title, abstract, keywords, parts where there is no

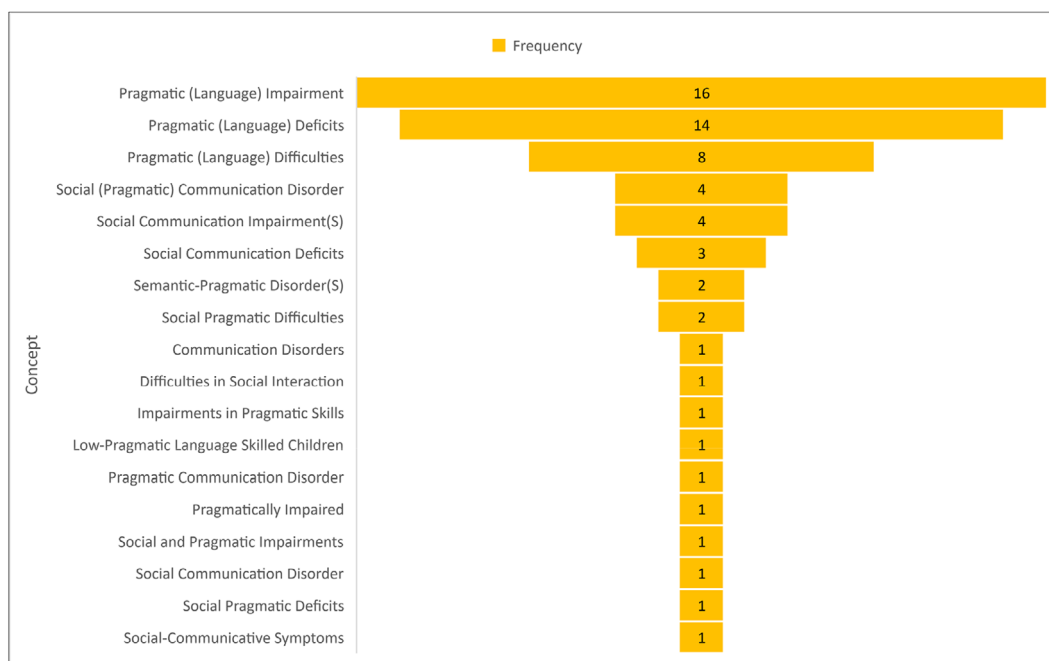


FIGURE 2 Concept frequency in the included 63 clinical studies

citation, and conclusions. These were deemed to represent the authors' use to refer to PLI. These two columns present evidence of how concepts describing PLI have been inconsistent.

We also considered the instruments used for the assessment and/or diagnosis of PLI. Since ASD was the primary disorder more frequently manifesting a PLI diagnosis, several tools were developed to assess ASD and social communication skills. Seventeen of these studies used Children's Communication Checklist CCC (either version 1 or 2) in English or a validated version in other languages (Bishop, 2003a, 2003b). Other common instruments for PLI were Clinical Evaluation of Language Fundamentals (Semel et al., 2017), CELF-Preschool (Wiig et al., 2006), and Language Use Inventory (O'Neill, 2009). Table 1 presents all these and shows several others, which are tasks the researchers developed. We classified these into formal, informal, and mixed assessment instruments. Formal instruments use pure tests to assess and/or diagnose PLI. Informal instruments use indirect methods such as parents, teachers, caregivers, or clinicians filling in questionnaires. This also includes observation methods using video-tapes recordings. Mixed instruments are those which use both formal and informal instruments. Of the 63 studies, 38 used mixed, 14 informal, and 11 formal instruments.

3.5 | Synthesis of results: Conceptualizing and defining PLI

It was mentioned above that Table 2, which has 70 studies, consists of six columns starting with the number of studies to simplify readability. The citation of authors is arranged chronologically since one purpose of this ScR is to track the use of the concept(s) used to refer to PLI. The included publications were published between 1983 and 2021. We included the research area and/or department of authors to examine the possibility that the conceptualizations and definitions of PLI differed by research area. Most authors majored in linguistics, psychology, medical and health sciences, and education or classic studies. These 70 studies were also classified with most of the books and book

chapters, followed by (theoretical) articles, encyclopaedia articles, associations' (websites) or specialized dictionaries, and review articles (See Table 2 for full list). The fifth column presents each author's used concept, followed by a definition and/or argument in the sixth column. The list of concepts and their frequency is presented in Figure 3.

What can be understood from the fifth and sixth columns is that there is an agreement among researchers about when the first term to refer to this disorder was used. This term was "semantic-pragmatic syndrome" (Rapin & Allen, 1983). A slight modification followed this to become "semantic-pragmatic disorder" in 1987 (Adams & Bishop, 1989; Bishop & Adams, 1989). This was followed by another change from 2000 onwards, with the term "pragmatic language impairment" by the same author(s) who introduced the term "semantic-pragmatic disorder" (Whitehouse, 2021). In these last two changes, the authors always stated that they "preferred" to use such a concept, albeit this was justified by the occurrence of pragmatic impairment without a semantic interface (Bishop et al., 1994; Bishop, 2003a, 2003b). What is more interesting is that other potential contributions have been introduced by other authors who reported in our databases among the most productive and cited authors in research related to PLI. For instance, the term "pragmatic disability" was introduced in 2000 by Perkins (2000) but later replaced by "pragmatic impairment" (Perkins, 2007). This author's contribution is significant as he introduced a comprehensive framework for the study of PLI, considering all factors related to assessment, diagnosis, and intervention related to PLI (Perkins, 2008) (note that we mentioned these above in the introduction and methods). Another significant contribution was Cummings, who introduced the term "pragmatic disorder" (Cummings, 2009) but soon turned to "PLI" (Cummings, 2010). It is also worth mentioning this author's attempts to classify PLI into acquired and developmental, or primary vs. secondary (Cummings, 2015).

3.6 | Additional analysis: Conceptualizing PLI

The Lens database was used to identify the number of studies utilizing the concepts outlined in Tables 1 and 2. The search was limited to titles, abstracts, or keywords containing the targeted concept. It was essential because multiple concepts were used in the literature review and reference list. To avoid this problem, the search was restricted to titles, abstracts, and keywords. We aimed to identify the most frequent terms used to refer to PLI; these are summarized in Figure 4. The orange-coloured concepts indicate the studies that employed this concept in their title, abstract, or keywords but were not related to PLI. Due to this, researchers should use these three concepts carefully when conceptualizing, defining, and assessing PLIs. For example, the term "difficulties in social interaction" referred to PLI, but mostly to social psychology and sociology studies. As with this, the concepts of "pragmatic challenges" and "pragmatic limitations" have been applied to PLI in a few studies but have been specifically applied to political science and economics in most of the studies. In this context, it is suggested that the terms be used along with the word *language* "pragmatic language challenges" and "pragmatic language limitations."

4 | DISCUSSION

4.1 | Summary of evidence

We identified 133 studies in this scoping review, 63 conceptualizing and assessing PLI and 70 conceptualizing and defining PLI. Our results indicate three major findings. (1) When conceptualizing PLI, there is no systemic use of concepts among authors from all disciplines, even within publications of the same author or the same paper. (2) In defining PLI, there is disagreement among linguists, psychologists, clinicians, and others regarding the appropriate label and definition to describe PLI, leading to several variations in the field. (3) When assessing PLI, there is an evident bias towards those tools that are used more frequently and by the most popular authors, without considering all the

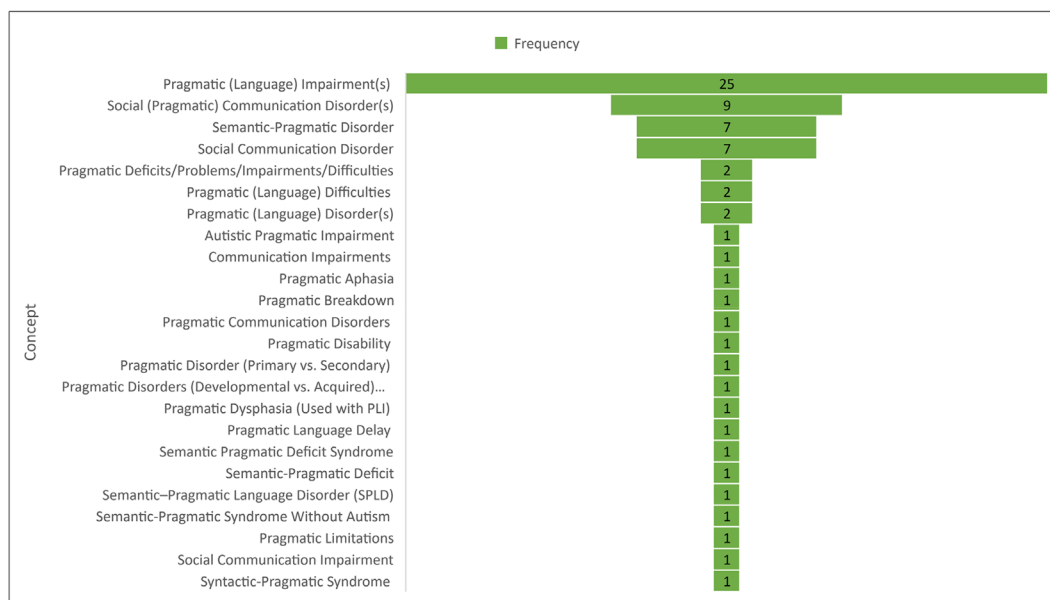


FIGURE 3 Concept frequency in the included 70 other studies

different features associated with PLI and without considering the importance of critically assessing this disorder. These findings can be interpreted in three ways, discussed further below.

To introduce the conceptualization of PLI, we have presented evidence that three trends exist in using concepts. First, our evidence in Tables 1 and 2 shows that the earliest term used to refer to this disorder was “semantic-pragmatic deficit syndrome” (Rapin & Allen, 1983), followed by “semantic-pragmatic disorder” by (Bishop & Adams, 1989), and then by “pragmatic language impairment” by (Bishop, 2003a, 2003b). This trend continued with the introduction of the term “social (pragmatic) communication disorder” (American Psychiatric Association, 2013). Others attempted to propose “pragmatic disability” (Perkins, 2000) and “pragmatic disorder” (Cummings, 2009), but these proposals were not as successful as the previous three. Among these, “PLI” is the most frequent concept, as evidenced in our scoping review and as presented in Figures 2-4. The second trend relates to the emergence of concepts, where we found a kind of subjectivity and selectivity in reporting the use of concepts. In other words, the earliest concept was “semantic-pragmatic deficit syndrome without autism” and compared by the same authors with “syntactic-pragmatic syndrome” (Rapin & Allen, 1983). This indicates that the authors were familiar with the differences in pragmatic impairment between children with and without autism and the interface between semantics versus pragmatics instead of syntax versus pragmatics. None of the studies we reviewed included this difference in their literature review and simply followed the trend for which the term to be used was “semantic-pragmatic syndrome” (later replaced by “PLI”). Third, one of our reviewed studies (Whitehouse, 2021) mentioned that the term “semantic-pragmatic syndrome” was preferred in the United States, while the term “semantic-pragmatic disorder” was preferred in the UK. Nevertheless, other studies mentioned, “In the past, I adopted the terminology based on the nosology of Rapin and Allen (1983), referring to these children as cases of semantic-pragmatic disorder” and she continued, “but there is little evidence that semantic and pragmatic difficulties tend to co-occur, and I now prefer the term pragmatic language impairment” (Bishop, 2004, p. 321). The same author continued in another study stating that “Rapin and Allen (1983) coined the term ‘semantic-pragmatic deficit syndrome’ to refer to children who used

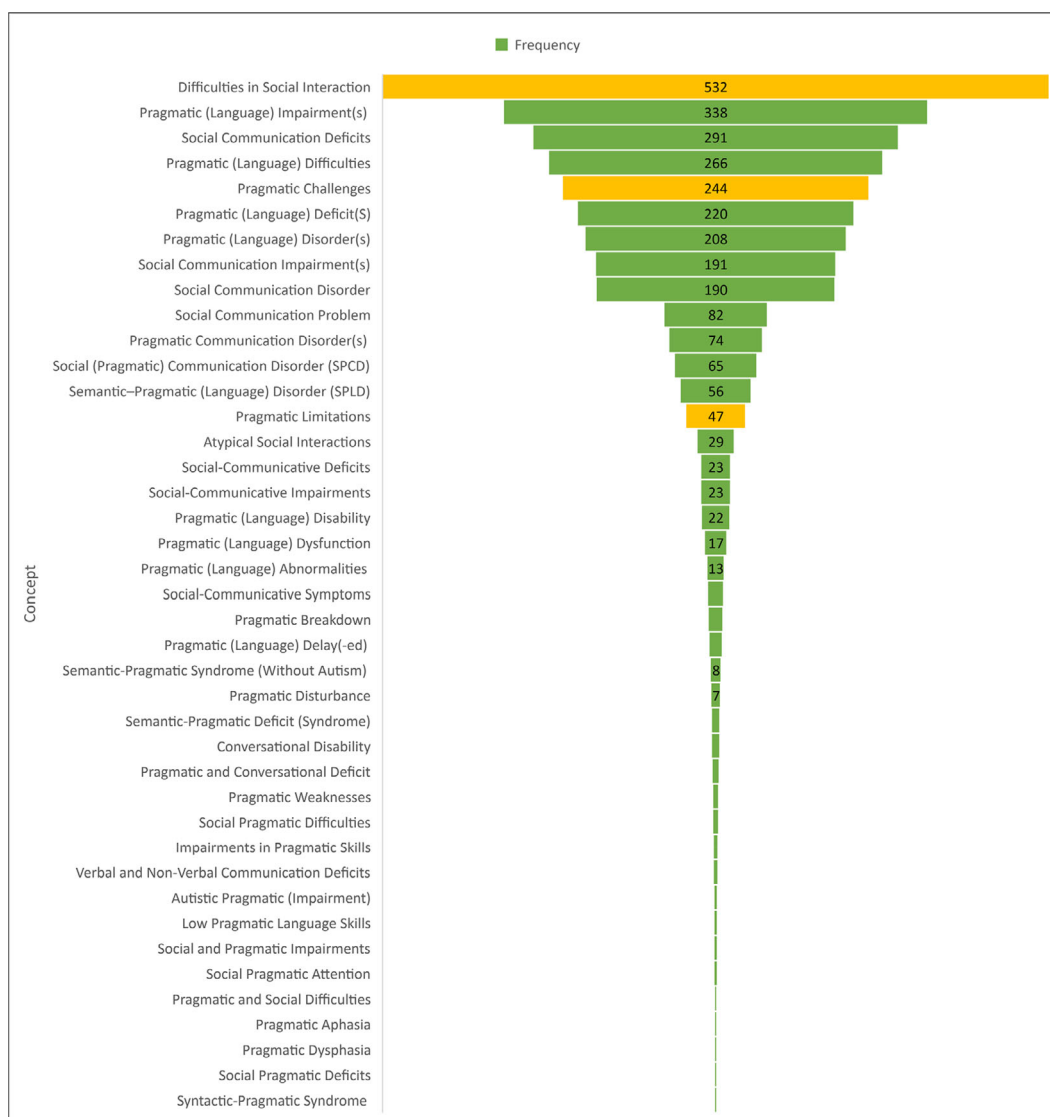


FIGURE 4 Concept frequency for pragmatic language impairment in the web of science, Scopus, and lens databases

fluent and complex language, but had abnormalities of language use, producing tangential or irrelevant utterances” and “Bishop (2000), who described similar cases, suggested the term ‘pragmatic language impairment’ (PLI) is preferable” (Bishop, 2003a, 2003b, p. 217).

The second finding regards the definition of PLI. The major debate is related to symptoms, assessment, and diagnosis of PLI. In our evidence, we have seen that PLI was diagnosed as a symptom of ASD but generally present in neurodevelopmental and non-neurodevelopmental disorders among all types of disorders. Our evidence showed consistency in referring to “pragmatic language impairment,” “semantic-pragmatic syndrome,” “semantic-pragmatic disorder” as synonyms and being used interchangeably among researchers with some disagreements (Adams, 2021; Agyemang, 2018; Cummings, 2021; Jackson, 2021; Newby et al., 2018; Whitehouse, 2021). When it comes to presenting PLI comprehensively, our evidence underlies the relevance of the framework by Perkins (2008) and the

fruitful discussions and elaborations of PLI in clinical pragmatics and clinical linguistics by Cummings (2009, 2021). Perkins proposed a framework for understanding PLI as an emergent phenomenon that includes various elements: semiotic, cognitive, motor, and sensory. These elements help define the type of pragmatic impairment among cognitive, linguistic, non-verbal, and sensorimotor (Perkins, 2008). Another important framework is the one proposed by ASHA, advocating for the use of the term “social communication disorder,” given that “social communication is the use of language in social contexts” and that it “encompasses social interaction, social cognition, pragmatics, and language processing” (American Speech-Language-Hearing Association, n.d., para 1).

The third aim of our scoping review was to investigate how PLI has been assessed. We presented evidence for using several types of instruments that researchers in different contexts widely use (e.g., CCC) (Aghaz et al., 2022; Andrés-Roqueta et al., 2021; Ketelaars et al., 2016; Reindal et al., 2021). We classified these instruments into formal, informal, and mixed measures. What is worth mentioning here are those studies that highlighted some aspects of the specific assessment techniques or procedures they followed. For instance, one of the studies (Murphy et al., 2014) mentioned using an instrument for the skills of pragmatics and another (CCC-2) for the patterns of pragmatic impairments. Another noticeable study is by Andres-Roqueta et al. (2013) where the authors mentioned the use of cognitive, linguistic, and ToM measures. The study by Ketelaars et al. (2012), similar to this, mentioned using linguistic, executive functions, ToM, working memory measures, and the CCC. Last but not least is the study by Andrés-Roqueta and Katsos (2020), who documented the use of linguistic and social pragmatics tasks. These studies align with the proposed framework by Perkins (2008), according to which PLI should be examined while taking into account all the possible factors contributing to PLD and/or PLI.

It is also noteworthy to take note of Tables 1-2 in the appendix, which provide a quick view into the production volume of research related to PLI. Nearly two thirds of the entries in Table 1 and almost half of the entries in Table 2 were published within the past decade. It appears that interest in this area has grown in recent years. Although the current ScR goes beyond the assessment of the size of the production of knowledge related to PLI, it is nevertheless a valid documentation of the need to conduct a ScR and reach consensus about the conceptualization, definition, and assessment of PLI.

4.2 | Limitations

This scoping review has a few limitations. To begin with, we limited our review to studies conceptualizing, defining, and assessing PLI in preschool populations in clinical settings. This step was taken into consideration of the time, space, and effort necessary to review all the studies. Many papers in other languages known to the reviewers (Arabic, Turkish and Italian) were not relevant, although it is possible that other publications in other languages exist but are not accessible to us.

4.3 | Implications

This scoping review has implications for clinicians, psychologists, psychometricians, paediatricians, linguists, and researchers conducting research related to PLI. Although labels might be important to psychologists, clinicians, and paediatricians, our research showed that using more than necessary can lead to confusion among researchers and specialists. This, in turn, can hinder the efficiency and effectiveness of early diagnosis and intervention for children with PLI.

Having checked some dictionaries to see the meanings of “impairment, disorder, deficit, dysfunction, syndrome,” we found consistency in definitions between US versus UK English and specialized dictionaries. Syndrome was used to indicate the existence of different causes, that is, semantic, pragmatic, and syntactic [linguistically] and a few medical, psychological, or physiological causes (American Psychological Association, n.d.-c;

Merriam-Webster, n.d.-e). There is no confusion in using this concept, but confusion started by using the rest of the concepts that do not have major differences in such dictionaries. Impairment is defined as “decrement in the body's typical physiological or psychological functioning” (American Psychological Association, n.d.-b), “deterioration in the functioning of a body part, organ” (Cambridge University Press, n.d.-b), and “diminishment or loss of function or ability” (Merriam-Webster, n.d.-d). On the other hand, the disorder is defined as “a group of symptoms involving abnormal behaviors or physiological conditions, persistent or intense distress, or a disruption of physiological functioning” (American Psychological Association, n.d.-a), “an illness of the mind or body” (Cambridge University Press, n.d.-a), and “an abnormal physical or mental condition” (Merriam-Webster, n.d.-b). At the same time, dysfunction is defined as “impaired or abnormal functioning gastrointestinal dysfunction” (Merriam-Webster, n.d.-c), and disability as “impaired function or ability” (Merriam-Webster, n.d.-a). With this in mind, we call the author for consistency in conceptualizing PLI.

Furthermore, it may be worthwhile for psychometricians to develop assessment tools with a thorough understanding of pragmatics, in particular, and linguistics, in general, along with psychometric expertise. Researchers should exercise caution when selecting their instruments and when making generalizations about the assessment of PLI in different contexts, as these are typically distinct in several ways from those met by the original instruments.

5 | CONCLUSIONS

Based on this scoping review, it appears that researchers, including clinicians, psychologists, speech-language pathologists, paediatricians, and (clinical) linguists, use different terminology to describe PLI. Several factors have led to the inconsistent use of multiple terms, including the research interest of the authors and the tendency to be innovative. Additionally, PLI has been defined in various ways because it is integrated in multiple fields from a theoretical perspective and because several factors contribute to the notion of pragmatics or PLD. There has been a flurry of publications in the PLI field, but many of these have led to misconceptions of the field in some contexts and generalizations that lack persuasive evidence. Finally, this review suggests combining direct and indirect assessments to ensure that examiners can assess the maximum number of factors that contribute to PLI and that this disorder is successfully diagnosed in preschoolers. Importantly, future research should provide more evidence on the most efficient and effective methods for assessing PLI.

AUTHOR CONTRIBUTIONS

Ahmed Alduais: Conceptualization; formal analysis; methodology; visualization; writing – original draft; writing – review and editing. **Marinella Majorano:** Conceptualization; investigation; project administration; supervision. **Clara Andrés-Roqueta:** Conceptualization; investigation; project administration; supervision; writing – review and editing. **Patricia Hamaguchi:** Conceptualization; investigation; methodology; validation; writing – review and editing. **Valentina Persici:** Conceptualization; investigation; methodology; resources; validation; writing – original draft; writing – review and editing. **Fawaz Qasem:** Data curation; formal analysis; methodology; resources; software; writing – review and editing.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the supplementary material of this article.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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