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Labelling, Defining and Classifying the Active Ingredients in Oral Language Interventions for Children With or at Risk of Developmental Language Disorder: A Systematic Review and Qualitative Synthesis

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ABSTRACT

Background: In recent years, there has been an increase in studies reporting on effective child language interventions for people with or at risk for (Developmental) Language Disorder ((D)LD). However, the translation of this evidence into practice has been impeded by under-specified intervention reporting, specifically on what the active ingredients of therapy are and how they are defined. This systematic review forms part of a larger research programme conducted by the Intervention Consensus for Language Disorder group.

Aim: To identify, summarise, and synthesize how the active ingredients of oral language interventions for children with or at risk for (D)LD have been labelled, defined, described, and classified in empirical and clinical literature.

Methods: This registered review (PROSPERO ID CRD42024541407) adhered to PRISMA guidelines. Search terms were included in seven electronic databases. Included literature comprised peer-reviewed oral language intervention studies (published in English, German, Portuguese, Croatian, Italian, or Finnish; between January 2019 and May 2024; and reporting on participants who were ≤ 18 years, with/at risk for (D)LD); intervention-focused taxonomies; intervention manuals (published in the last 10 years); and textbooks used to teach child language interventions in pre-registration Speech and Language Therapy/Pathology courses (identified through the Whatworks database and a social media survey, respectively). Data extraction was guided by the TIDieR checklist with additional items deemed relevant for this review.

Results: 9576 articles were identified and screened; 619 were included for full text screening; and 243 articles were included in the review. Significant reporting inconsistencies were evident, including identical labels masking different mechanisms, as well as similar mechanisms operating under different labels; conflation of discrete techniques and procedures; the application of

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common labels in multiple ways; the use of unfamiliar terminology to refer to familiar techniques; and the use of broad terms masking multiple active ingredients. These inconsistencies do not align with what is considered well-specified active ingredients and consequently, significantly impede intervention replication and cross study comparisons.

Conclusion: This review highlights the need to develop consensus on (1) how active ingredients of intervention are labelled and defined so that they are consistent, precise and non-overlapping and (2) a comprehensive integrative taxonomy for ease of understanding and use, when reporting on oral language interventions for children with or at risk for (D)LD.

WHAT THIS PAPER ADDS

What is already known on this subject

- Oral language interventions contain numerous proposed 'active ingredients', but these are reported with substantial inconsistency across studies, textbooks, and intervention manuals. In addition, different taxonomies classify similar elements in divergent ways.

What this paper adds to the existing knowledge

- We have provided the first comprehensive analysis demonstrating the extent of inconsistency, ambiguity, and conceptual overlap in how active ingredients are labelled and described in the oral language intervention literature. There is misalignment across current taxonomies and we lack an internationally agreed framework that integrates discrete active ingredients along with dosage and contextual active support ingredients.

What are the potential or actual clinical implications of this work?

- Without clear, shared definitions of active ingredients, clinicians cannot reliably interpret research, replicate interventions, or implement evidence-based practices with fidelity. A unified internationally agreed lexicon and taxonomy would enable clinicians to understand precisely what constitutes a given technique, how it should be delivered, and what child behaviours it is intended to influence, strengthening the quality and consistency of intervention delivery.

1 | Introduction

Oral language interventions for children with or at risk of (Developmental Language) Disorder ((D)LD) are typically complex, involving multiple interacting components. Consequently, it is challenging to identify the active and effective 'ingredients' within them. However, if we are to inform the design and development of future effective interventions, we need to clearly identify these 'ingredients' so that we can propose and understand the mechanism of change within our treatment approaches. If interventions are not clearly specified, we cannot implement them in practice with fidelity or confidence, replicate evaluations, or conduct meta-analyses. The under-specification of interventions in the literature is further complicated by inconsistent reporting with the same labels being applied to different techniques, resulting in uncertainty and confusion (Frizelle et al. 2022). The absence of agreed standardised definitions is therefore a significant barrier to both translational and scientific processes within speech and language therapy/pathology (SLT/P), undermining our ability to deliver interventions with fidelity in practice and to accumulate evidence across reviews. This points to an urgent need to develop consensus on a standardised set of labels and definitions which would improve clarity regarding active ingredients of (language) interventions; how those active ingredients interact; and what the mechanism of action is in driving change. In 2022, we published a call to action for international consensus on standards of reporting in intervention studies for children with and at risk for (D)LD (Frizelle et al. 2022). The work reported here represents the first stage of this program of research to develop an international taxonomic classification system of the active ingredients of oral language interventions for this population. Here we report on a systematic review and synthesis of how the active ingredients of oral language interventions are defined and classified in the empirical and clinical literature for children with or at risk for (D)LD, highlighting where definitions and classifications align and differ.

1.1 | The Need to Understand Active Ingredients

Over the last number of years there has been a significant increase in the number of published intervention studies relevant to children with or at risk for (D)LD, with many showing efficacy and real-world effectiveness (Frizelle et al. 2021; Greenwood et al. 2019; Heidlage et al. 2019; Tarvainen et al. 2025). Clearly, it is essential to deliver effective interventions for children with or at risk for (D)LD, however, within the context of significant financial constraints, it is also critical that clinicians cease delivering interventions which are ineffective. In addition, if there are ways of effecting change more efficiently it is essential to understand how that can be achieved—being intentional about what active ingredients are included in a given intervention, understanding how they interact with each other, as well as how they interact with children of different ages and language ability. Increased efficiency goes beyond financial constraints. By ensuring interventions are efficient (as well as effective), clinicians remove the opportunity costs to children for example, missing school lessons to attend intervention. In addition, clinicians can decrease the burden for families attending intervention sessions and children can get the benefits of treatment more quickly such that the level of difficulty they are living with is reduced, resulting in better outcomes. Moreover, understanding the active ingredients of our

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interventions more precisely, will enable speech and language therapists to advocate with service providers about *what* and *how* interventions need to be delivered to children across all ages, and will allow children and their families to advocate for themselves, to receive a level of support that will result in meaningful differences to their quality of life.

1.2 | Barriers to Understanding Active Ingredients

A number of frameworks have been posited to capture the complexity of the active ingredients of SLT/P. One by Warren et al. (2007), focuses primarily on the quantitative active ingredients, characterising different components of dosage (*dose, dose frequency, total intervention duration, cumulative intervention intensity and dose form*). Building on Warren's work and that of Proctor-Williams (2009), another was put forward by Frizelle et al. 2021b) concentrating on within session qualitative active ingredients (techniques, procedures, method of instruction, intervention context). An additional taxonomy was developed by Denman et al. (2021), which focused more broadly on modality/domain, purpose, delivery, form, and teaching techniques. Although this was developed by consensus it was completed within Australia only. In addition, while consensus was easily achieved on the structure and definitions of the taxonomy, participants were not in agreement on the application of the teaching techniques to specific case studies (designed to reflect use in practice). While helpful in attempting to characterise the multiple components of our complex interventions, the application of current taxonomies and our understanding of them appears to be problematic for both researchers and practitioners, particularly with respect to inconsistent applications of current taxonomies, the absence of international consensus on the use of active ingredient terminology, and the lack of standardised reporting guidelines.

Two systematic reviews carried out within the last five years have specifically highlighted these significant barriers to our understanding of optimal active intervention ingredients, within the large body of evidence available. In the first review (Frizelle et al. 2021a) the authors aimed to synthesise findings from studies in which the quantitative active ingredients of therapy (dose, dose frequency and total intervention duration) were specifically manipulated and compared in intervention studies, with the intention of identifying optimal dosage for phonology, vocabulary and morphosyntax outcomes. However, issues arose in relation to the consistent use of terminology and the level of study detail reported. For example, with respect to how *dose* has been defined, some authors applied the Warren et al. (2007) definition (the number of properly administered teaching episodes during a single intervention session) while others, such as Justice et al. (2017) defined *dose* as the total amount of time spent on a given target. When describing *dose*, some studies consider only the expressive component of a teaching episode (e.g., the number of times the child produces a given target) without giving any information on what the child hears, that is, the receptive element. Moreover, *dose* subcomponents, such as the average rate of teaching episodes per unit of time, the distribution of episodes within a session, or the distribution of sessions over time, are usually omitted. With reference to *dose frequency* there is significant variation in what is deemed to be distributed versus massed practice (in one intervention a *spaced* protocol is described as 30-min of input daily while in another *spaced* is described as 1 h of input weekly, making cross-study comparisons and clinical application difficult). In addition, the concept of *cumulative intervention intensity* put forward by Warren et al. (2007) (defined as dose × dose frequency × total intervention duration), does not distinguish between a frequency of once a week versus once a month, and therefore cannot be applied consistently.

In the second review (Frizelle et al. 2021b), the aim was to synthesize findings in studies in which the qualitative active ingredients were manipulated or statistically analysed (comparing one intervention to an alternative) across phonological, morphosyntactic or semantic domains. Included studies were those in which the qualitative active ingredients were in some way controlled, with the aim of the authors drawing conclusions about what qualitative active ingredients are optimal. As was the case with the first review, reporting discrepancies were highlighted in relation to how the active ingredients were defined and the level of detail reported. Interventions with similar labels employed different techniques or procedures, and terms like *prompting* or *cueing* were often not explicitly described and were used inconsistently to describe a range of techniques, such as *imitation*, *questioning*, or *sentence completion*. Inconsistencies in how techniques are defined have been previously highlighted by Eisenberg et al. (2020), specifically with respect to *imitation* and by Proctor-Williams (2009) with reference to *imitation* and *modelling*. Other aspects of reporting were also problematic. For example, there is a lack of information regarding the uniformity or variability of the linguistic input and materials used, as well as whether techniques were implemented implicitly or with explicit methods of instruction—even though each of these 'active ingredients' have been shown to impact children's learning (e.g., Aguilar et al. 2018; Finestack 2018; Plante et al. 2014).

1.3 | The Current Study

The problem of under-specified and inconsistent intervention reporting is neither specific to SLT/P nor to intervention studies. Jingle-jangle fallacies, as they are known in the field of psychology, refer to situations in which different constructs are labelled with the same term (jingle) or a single construct is labelled with multiple terms (jangle) (Thorndike 1904; Kelley 1927). The problem, which is especially common in interdisciplinary and applied research fields, not only causes confusion but also threatens the validity of the scientific enterprise (Hanfstingl et al. 2025). In the context of research aimed at developing and evaluating complex interventions, the UK Medical Research Council (MRC) has called for improved methods of specifying and reporting intervention content. As a first step towards developing global standards of reporting for SLT/P, and to inform an internationally agreed classification system of the active ingredients of oral language interventions for children with or at risk for (D)LD, this review article presents a systematic review and narrative synthesis of how these active ingredients are currently labelled, defined and classified in the empirical and clinical literature. The review focuses on oral language interventions across the domains of vocabulary; semantics; morphosyntax; discourse/conversational skills; narrative; pragmatics; and phonological knowledge, representations, or awareness, and highlights where definitions

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and classifications align and differ. A broad range of language domains were included because the findings will inform the development of a comprehensive list of active ingredients which will then be agreed internationally through a consensus process. The scope of this review is outlined in the research questions below. We chose to examine how active ingredients are labelled, defined, and described (RQ1 and RQ2) before analysing how they are classified (RQ3 and RQ4) because the interpretation of classification systems depends on assumptions about what constitutes an active ingredient.

The following research questions were addressed:

1. How have the 'active ingredients' of oral language interventions been labelled, defined or described for children with or at risk for (D)LD)?
2. What are the differences in how the active ingredients are labelled, defined or described?
3. How have the 'active ingredients' of oral language interventions been classified for children with or at risk for (D)LD)?
4. Where do the classifications align and where do they differ?

2 | Methods

The protocol for this systematic review is registered with PROSPERO (ID CRD42024541407; Frizelle et al. 2024). Our methods adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for systematic reviews (Moher et al. 2015). As the review is not a standard intervention effectiveness review, a meta-analysis was not appropriate, and results are presented as a qualitative synthesis. Given the aim of this systematic review was to create a comprehensive list of 'active ingredients' of oral language interventions and their definitions, regardless of the study quality in which these 'active ingredients' were reported, there were no restrictions in terms of study design or quality appraisal. The risk of bias was therefore not calculated within or across studies. Covidence, a web-based collaboration software platform (https://www.covidence.org/), was used to facilitate manuscript screening and thereby streamline the review process.

2.1 | Search Procedure

Searches were conducted to identify relevant empirical peer-reviewed articles and book chapters that related to oral language interventions for children with or at risk for (D)LD. Seven electronic databases were used, including Web of Science (including MEDLINE, SSCI), MEDLINE (PubMed), ERIC, PsycINFO, Cochrane Library, Scopus, and LLBA. The intended timeline for the search for empirical publications was the previous 5 years and was therefore limited to peer-reviewed studies and chapters, published between and inclusive of January 2019 to May 2024. Search terms were developed through discussion between authors and consultation with a research librarian. The search string is given in Supplemental Material S1. Reference lists of all articles included on full-text and relevant systematic reviews were also hand-searched for any additional articles.

Taxonomies and seminal book chapters describing oral language interventions for children with or at risk for (D)LD, or outlining active intervention ingredients, were identified through a short survey disseminated through social media (Bluesky, Instagram, and LinkedIn) in January 2025. Emails were also sent to personal contacts requesting that they complete and share the survey. The survey included published taxonomies already known to the authors and key textbooks commonly used in the teaching of child language interventions. Participants were asked to list any other taxonomies that the authors were not aware of (published in any year) with respect to child language disorders. With respect to textbooks, participants were provided with a drop-down menu and asked to indicate which books (if any) they used in the teaching of child language interventions, in pre-registration/ pre-service SLT/P training courses. If the books participants used were not in the drop-down menu, they were asked to add them to the list.

Assuming that the active ingredients of many interventions would be captured in more detail in intervention manuals (and may not have been reported on empirically within the last 5 years), the What Works database (Speech and Language UK, n.d.) was used to identify relevant interventions published within the last 10 years. The justification for searching within different time frames was that we would capture novel active ingredients as well as their description in the peer-reviewed intervention literature published within the last 5 years, while capturing more long-term established ingredients from textbooks, taxonomies, and the What Works database. With respect to interventions for which manuals were not available, we identified the papers on What Works from which the evidence had been taken and included them in our data extraction.

2.2 | Inclusion Criteria

2.2.1 | Peer-Reviewed Articles and Recent Book Chapters Reporting Empirical Studies

The empirical articles were included on the following basis:

- Described or examined an oral language intervention, which aimed to effect change in any of the following domains of oral language: vocabulary, semantics, morphosyntax, discourse/conversational skills, narrative, pragmatics, and phonological knowledge, representations, or awareness; AND/OR communicative participation AND/OR quality of life or wellbeing.
- Research design—(1) RCTs, (2) quasi-experimental designs (non-random assignment) (3) cohort analytical designs, observational studies in which groups were assembled according to whether they received the intervention/different interventions.
- Published in languages spoken by the Intervention Consensus for Language Disorder (TICLD) team (i.e., English, German, Portuguese, Croatian, Italian, and Finnish) between January 2019 and May 2024.

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- Study participants were between 0 and ≤ 18 years and identified as having or being at risk for (D)LD (or an equivalent term previously used such as Specific Language Impairment). Risk factors included socio-economic status, parental education, family history, home learning environment.

2.2.2 | Textbooks

With the exception of a specific research design or publication timeframe, textbook chapters were required to meet the same criteria outlined above. Included textbooks were (1) those ranked as the top five most commonly used to teach child language interventions in English, on SLT pre-registration courses; (2) the single most used textbook in our other named European languages (i.e., Croatian, Finnish, German, Italian and/or Portuguese).

2.2.3 | Taxonomies (From Included Textbooks, Peer-Reviewed Articles and Survey)

Taxonomies were included on the basis that they specified and classified the active ingredients of oral language interventions for participants as described above and were extracted from included textbooks as well as stand-alone peer-reviewed papers.

2.2.4 | Intervention Manuals

The intervention manuals were included on the basis that they:

- Described oral language interventions developed for the population previously described
- Were listed in the What Works database within the last 10 years (up to December 2024)
- Were written in any of the languages spoken by the team.

2.3 | Exclusion Criteria

The empirical articles, textbooks and taxonomies and intervention manuals were excluded If they:

- Addressed other communication impairments (such as voice disorders or speech sound disorders)
- Reported on a cohort with language impairments secondary to those conditions identified by the CATALISE criteria (Bishop et al. 2017) as precluding a DLD diagnosis (e.g., Autism, Intellectual disability, Genetic syndromes).
- Reported on late talkers with no other risk factors for (D)LD, such as low socio-economic status or family history.
- Described interventions aimed at treating written language impairment, childhood apraxia of speech, speech sound disorders, fluency, or voice.

2.4 | Article Selection and Reliability of Search Procedures

2.4.1 | Stage 1

2.4.1.1 | Database Search. A total of 15 458 papers were identified, 5882 of which were duplicates. This resulted in 9576 papers for inclusion in title and abstract screening. Twenty per cent of the identified papers ($n = 1916$) were double screened by two independent reviewers (DM and NO'L), with 95% agreement. Conflicts were discussed with the research team, and consensus was reached. The remaining papers were screened independently (by DM or NO'L), and 616 papers were identified for full text screening.

2.4.2 | Stage 2

Of the 616 papers included for full text screening, 35 were registered clinical trials that were ongoing, and the interventions were not reported in sufficient detail to extract the active ingredients. Authors were contacted for all papers and chapters that were difficult to access, with four of the 616 remaining inaccessible. To increase consistency between team members the first 10 papers were jointly screened by DM and NO'L. Twenty per cent of the sample were then double screened independently by the same team members ($n = 123$), with an agreement rate of 95%. Conflicts were discussed with the research team, and consensus was reached. At this stage, systematic reviews were excluded if the papers detailed within them were outside of our specified date range. At the end of this process, 243 papers were included for data extraction (see PRISMA flowchart in Figure S1).

2.4.2.1 | Textbooks. Following our social media survey five English-language textbooks were identified, and the chapters within were subsequently screened by DM and NO'L. This resulted in 20 chapters included in the review with 100% agreement. A series of five German textbooks were identified, and then screened by M.F.D., J.J. and S.F. One Finnish textbook was identified, and screened by S.K. Two Croatian textbooks were identified, but M.K. confirmed that they did not fit our inclusion criteria. No Italian or Portuguese textbooks were identified in the survey.

2.4.2.2 | Taxonomies. Three taxonomies were presented in the survey. Through our social media survey, participants suggested 17 additional taxonomies. Following screening by L.F. and discussion with P.F., only one of these 17 met the inclusion criteria and was added to the original three, resulting in a total of four taxonomies. Subsequently, five additional taxonomies were identified and extracted from two of the included textbooks, bringing the total number of taxonomies included for data extraction to nine. Note: the reason for such a high number of taxonomy suggestions that did not reach our criteria was because the word 'intervention' was omitted from the survey question.

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2.4.2.3 | Intervention Manuals. A review of the What Works database (completed by D.M. and L.M.) identified 39 interventions published within the last 10 years, which met our inclusion criteria. Of these, only 22 were manualised and detailed the interventions in sufficient detail that we could extract the active ingredients. We did not have access to 15 of the 22 manuals and therefore, authors were contacted to request electronic copies, on the basis that they would be used for this research only. Ten authors forwarded their respective manuals. Intervention details were extracted from published research articles for two additional manuals, resulting in a total of 19 intervention manuals being included in the review.

2.5 | Data Extraction

A data extraction template was created, informed by aspects of the TIDieR checklist (Hoffmann et al. 2014), with additional information deemed necessary to capture the 'active ingredients' of oral language interventions. Data were extracted and tabulated in an Excel spreadsheet. Authors D.M., A.B., N.O'L., and L.F. piloted the template with different types of intervention studies (e.g., feasibility, parent child interaction, dynamic assessment). The data extraction template was then modified based on the pilot extraction process as well as feedback from the wider team. To ensure data extraction reliability D.M., N.O'L., and L.F. jointly extracted data from the first 10 papers. These papers were discussed with the P.I. (P.F.) and allowed any interpretative differences to be resolved. The 243 papers were then divided among three members of the team (D.M., N.O'L. and L.F.) who extracted data independently. Taxonomy data extraction was completed by LF and DM and English textbook chapters were completed by D.M., N.O.L., and I.L. Data extraction for chapters written in our other included languages was completed by the person on our team who spoke that language that is, JJ and MFD for those written in German, and SK for Finnish. DM met with all those completing data extraction in another language to provide training and share feedback. 20% of the papers and chapters were double coded for reliability. Initial agreement was 79% with the majority of disagreements specific to number 11 below. To ensure better reliability all data with respect to number 11 were re-extracted by two members of the team and discussed to reach consensus.

For empirical peer-reviewed studies the following information was extracted: (1) Journal; (2) Country; (3) Language of publication; (4) Language of intervention; (5) Type of paper; (6) Study design; (7) Brief name; (8) Rationale; (9) Theoretical orientation; (10) Target of intervention: Domain of language, Aspects of language, Target of intervention: Goal for adult, Goal for child; (11) What procedure: Activity, Degree of structure, Approach, Technique name and definition, Target response (adult or child); (12) What materials; (13) Who provided the intervention; (14) How: Face to face/online/hybrid, Tiered model of intervention, Group size; (15) Where intervention took place; (16) When and how much: Dose, Dose frequency, Total intervention duration, Cumulative intervention; (17) Participants: DLD/At risk for DLD/Language difficulties not labelled as DLD, number of children, age range, mean age.

The same data extraction template was used for textbook chapters and intervention manuals, while allowing for the fact that it would not be possible to include information under each heading. Because interventions were not being evaluated in book chapters or manuals, the focus of data extraction was on how potential active ingredients were labelled and described. The format of different taxonomies required a different template for data extraction. Where possible the same headings were included, but with additional headings which allowed us to capture the overall structure of each taxonomy.

As part of the data extraction process (across all documents) the team created a glossary of active ingredients and their definitions, generated from the papers as they were reviewed. An active ingredient was defined as the specific action taken by the clinician to effect therapeutic change (broadened from that proposed by Hart et al. 2014), which refers to change in the target). We adapted this definition as it is established in the literature and does not conflate the actions of the therapist with those of the child. In the absence of international agreement on what qualifies as an active ingredient we were inclusive in our application of this definition. The creation of the glossary was an iterative process. As each new paper was reviewed, the definitions and labels were amended so that they reflected all intervention descriptions and ultimately would be as comprehensive as possible. Following completion of this stage, the glossary was further reviewed and amended by two members of the expert group (P.F. and N.M.).

3 | Results

3.1 | Empirical Papers and Intervention Manuals

Research published in the 243 included papers was conducted in 34 countries. The most dominantly represented country was the United States ($n = 116$), followed by the United Kingdom ($n = 25$), Australia ($n = 13$), Switzerland and The Netherlands ($n = 10$ each), Spain ($n = 9$), Italy ($n = 7$), Canada ($n = 6$) and Ireland and Iran ($n = 5$ each). All other countries had fewer than 5 studies (the full list is available in Table S1). Intervention manuals reported on interventions published in 7 different countries, with the United Kingdom being the most dominant ($n = 9$). The list of included manuals is shown in Table 1.

Research papers were published in 89 different journals. Thirty-three papers were published in Language, Speech and Hearing Services in Schools, 24 in the *American Journal of Speech-Language Pathology*; 20 in the *Journal of Speech, Language and Hearing Research*; 18 in the *International Journal of Language & Communication Disorders*; seven each in *Child Language Teaching and Therapy* and the *International Journal of Speech-Language Pathology*; and five in Children. All other journals had fewer than five papers included in the review.

Overall, 103 papers reported on an intervention that targeted a single domain of language/cognition, while the remainder described interventions targeting multiple domains. Terms describing language domains were used inconsistently with both grammar and syntax used interchangeably, along with morphosyntax and morphology, and semantics and vocabulary. Using the descriptions given by the authors, vocabulary/semantics was the most commonly targeted domain ($n = 163$; 67%), followed by syntax/morphosyntax ($n = 119$; 49%); morphology ($n = 77$; 32%);

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TABLE 1 | List of included intervention manuals.

1. Building Early Sentences Therapy (BEST) (McKean et al. 2013)	8. Literate Language	15. Supporting Knowledge in Language and Literacy (SKILL) (Gillam et al. 2017)
2. Early Talk Boost (Reeves et al. 2018)	9. Nuffield Early Language Intervention (NELI) (Fricke et al. 2018)	16. Talk Boost Key Stage I (Pring et al. 2016)
3. Hanen It Takes Two to Talk (Weitzman et al. 2017)	10. Oral Inferential Comprehension Intervention (Dawes et al. 2022)	17. Talking Time (Dockrell et al. 2010)
4. Happy Talk (Frizelle et al. 2021)	11. Pre-Teaching Vocabulary (St John 2016)	18. Visualising and Verbalising (Bell 1987)
5. Language Focused Curriculum (Bunce 1995)	12. The SHAPE CODING system (Ebbels 2007)	19. WORD (Best et al. 2015)
6. Lexicon Pirate (Motsch et al. 2015)	13. Story Champs (Spencer & Petersen 2016)	
7. Linking Language with Secondary School Learning (Starling et al. 2012)	14. Story Grammar Intervention (Westerveld & Gillon 2007)	

pragmatics (n = 71; 29%); narrative (n = 64; 26%); phonology (n = 63; 26%) and discourse (n = 39; 16%). We note that the number of interventions explicitly targeting phonology is skewed by the fact that we included only interventions targeting phonological knowledge, representations, or awareness rather than phonological output in this review. With respect to the intervention manuals, 3 focused on a single domain of language, while the remaining 16 targeted multiple domains. Semantics/vocabulary was the most commonly targeted domain (n = 14; 74%), followed by discourse (n = 10; 53%) syntax (n = 9; 47%), narrative (n = 7; 37%), phonology (n = 5; 26%), morphology (n = 4; 21%), and pragmatics (n = 4; 21%). The full list of domains targeted in both the empirical papers and intervention manuals is given in Tables S2 and S3.

3.2 | Textbooks/Taxonomies From Survey

There was a total of 64 respondents to our survey. Response rates varied across survey questions, ranging from 21 to 63. The lowest response rate was observed for the item asking participants to name additional taxonomies related to child language disorders. Participants represented 47 institutions across 13 countries. Table 2 shows the top 5 English-language and the single most used book in our other languages, to teach childhood language disorders in SLT/P degree courses. As shown *Language Disorders from Infancy through Adolescence: Listening, Speaking, Reading, Writing, and Communicating* (Paul et al. 2024) published in the USA was reported to be the most commonly used textbook, followed by *Treatment of Language Disorders in Children* (McCauley et al. 2017, also published in the USA. The Finnish textbook that received the most votes (n = 3) was *Lasten Kielelliset Vaikeudet: Haasteiden Tunnistaminen Ja Kuntoutus* (*Language Difficulties in Children: Identifying Challenges and Rehabilitating Them*) (Kunnari and Laasonen 2022). Four German-language textbooks received an equal number of votes (n = 2). Our German-speaking team members from Austria and the UK advised on the most appropriate choice to include based on the rationale that this series of books gave the most comprehensive overview of language interventions. They selected the following three books from the *Handbook series, Handbuch Spracherwerb und Sprachentwicklungsstörungen (Language Acquisition and Development Language Disorders): Handbuch Spracherwerb und Sprachentwicklungsstörungen Kleinkindphase (Language Acquisition and Developmental Language Disorders Early Childhood Phase) (Sachse 2015), Handbuch Spracherwerb und Sprachentwicklungsstörungen Kindergartenphase (Language Acquisition and Developmental Language Disorders Preschool and Kindergarten Years) (Fox-Boyer 2014), Handbuch Spracherwerb und Sprachentwicklungsstörungn Schuleingangsphase (Language Acquisition and Developmental Language Disorders School Entry Phase) (Ringmann and Siegmüller 2013)*. No Croatian book was included as Croatian respondents reported primarily using English language textbooks. We did not receive any votes for Portuguese or Italian-language textbooks in the survey. The 9 included taxonomies (4 from the survey and 5 from the textbooks) are listed in Table 3.

3.3 | RQ1. How Have the 'Active Ingredients' of Oral Language Interventions Been Labelled and Defined/Described for Children With or at Risk for (D)LD)?

Data were analysed based on how the author of each paper, book chapter or intervention manual labelled and defined or described interventions. Building on the work of Michie et al. (2015) in relation to defining behaviour change techniques, we considered a well-specified active ingredient to be an action that is carried out by the therapist that is observable; is labelled consistently; is described in sufficient detail for reliable replication and implementation; and is sufficiently granular and well defined to be distinct from other active ingredients. Ideally, the aim would be that each active ingredient is also irreducible (i.e., described at the most granular level of action so as not to be made up of the combination of several other ingredients). However, we recognize that some active ingredients (e.g., coaching) contain multiple components. For these ingredients, we considered them well-specified if the sub-components were clearly identified.

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TABLE 2 | Characteristics of included textbooks.

Author	Book title	Country/language of publication	Chapters included	Focus of chapters	Number of votes
Paul et al. (2024)	*Language Disorders from Infancy through Adolescence: Listening, Speaking, Reading, Writing, and Communicating* (6th ed.)	United States of America English	Chapter 3: Principles of Intervention Chapter 9: Intervention for Developing Language Chapter 12: Intervening at the Language-for-Learning Period Chapter 14: Intervention for Advanced Language	Semantics Morpho-syntax Narrative Pragmatics	31
McCauley et al. (2017)	*Treatment of Language Disorders in Children* (2nd ed.)	United States of America English	Chapter 2: Hanen Programs for Parents: Parent-Implemented Early Language Intervention (Weitzman et al. 2017) Chapter 3: Responsivity Education/Prelinguistic Milieu Teaching (Fey et al. 2017) Chapter 4: Enhanced Milieu Teaching (Kaiser and Hampton 2017) Chapter 5: Focused Stimulation Approach to Language Intervention (Weismer et al. 2017) Chapter 8: Phonological Awareness Intervention: Building Foundations for Successful Early Literacy Development for Preschool Children with Speech Language Impairment (Gillon and McNeill 2017) Chapter 12: Complex Sentence Intervention (Balthazar and Scott 2017) Chapter 13: Supporting Knowledge in Language and Literacy: A Narrative-Based Language Intervention Program (Gillam et al. 2017) Chapter 14: Social Communication Intervention for Children with Language Impairment (Fujiki and Brinton 2017) Chapter 15: Parameters of Service Delivery and the Strathclyde Language Intervention Program (Boyle and McCartney 2017)	Semantics Morpho-syntax Phonological Awareness Pragmatics Discourse	24

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TABLE 2 | (Continued)

Author	Book title	Country/language of publication	Chapters included	Focus of chapters	Number of votes
Schwartz (2017)	*Handbook of Child Language Disorders* (2nd ed.)	United States of America English	Chapter 15: Morphosyntax in Child Language Disorders (Oetting and Hadley 2017) Chapter 16: Semantics in Child Language Disorders (*McGregor* 2017) Chapter 17: Syntax in Child Language Disorders (Fletcher and Frizelle 2017) Chapter 18: Pragmatics and Social Communication in Child Language Disorders (Fujiki and Brinton 2017)	Semantics Morpho-syntax Pragmatics	11
Damico et al. (2021)	*Handbook of Language and Speech Disorders* (2nd ed.)	United States of America English	Chapter 9: Developmental Language Disorder (Gillam et al. 2021)	Semantics Morpho-syntax	6
Reed (2022)	*An Introduction to Children with Language Disorders* (5th ed.)	United States of America English	Chapter 13: Considerations for Language Intervention	Semantics Morpho-syntax	6
Kunnari and Laasonen (2022)	*Lasten Kielelliset Vaikeudet: Haasteiden Tunnistaminen Ja Kuntoutus*	Finland Finnish	Chapter 14: Varhainen vanhempilähtöinen kuntoutus [Early parent-implemented intervention] (Paavola-Ruotsalainen et al. 2022) Chapter 15: Puheen ymmärtämisen taitojen kuntoutus [Oral language comprehension interventions] (Tarvainen 2022) Chapter 16: Puhehäiriöiden kuntoutus [Interventions for speech sound disorders] (Kunnari et al. 2022) Chapter 17: Nimeämisen kuntoutus [Vocabulary interventions] (Salmi 2022) Chapter 18: Pragmaattisen kommunikaation kuntoutus [Interventions for pragmatic communication] (Loukusa 2022) Chapter 19: Kerrontataitojen kuntoutus [Narrative interventions] (Mäkinen and Kunnari 2022) Chapter 20: Puhetta tukeva viestintä arjen kuntoutuksessa [Using AAC to support intervention in everyday lives] (Launonen et al. 2022) Chapter 21: Neuropsykologinen kuntoutus [Neuropsychological interventions] (Peltomaa and Laasonen 2022)	Semantics Vocabulary Morpho-Syntax Narrative Phonology Pragmatics Discourse	3

(Continues)

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TABLE 2 | (Continued)

Author	Book title	Country/language of publication	Chapters included	Focus of chapters	Number of votes
Sachse (2015)	*Handbuch Spracherwerb und Sprachentwicklungsstörungen Kleinkindphase* (1. Auflage, S. 163–184).[a]	Germany/ Austria German	Chapter: Kindzentrierte Ansätze in der frühen Therapie [Child-centered approaches in early therapy] (Siegmüller and Ringmann 2015)	Semantics Vocabulary Morpho-Syntax Narrative Phonology Pragmatics Discourse	2[b]
Fox-Boyer et al. (2014)	*Handbuch Spracherwerb und Sprachentwicklungsstörungen Kindergarten-phase* (1. Auflage, S. 187).[a]	Germany/ Austria German	Chapter: Grammatiktherapie [Grammar Therapy] (Löb and Siegmüller 2014) Chapter: Lexikontherapie [Lexicon Therapy] (Glück and Elsing 2014)	Semantics Vocabulary Morpho-Syntax	2[b]
Ringmann and Siegmüller (2013)	*Handbuch Spracherwerb und Sprachentwicklungsstörungen: Bd. 1. Schuleingangs-phase* (1. Auflage, S. 133–159, 163–187).[a]	Germany/ Austria German	Chapter: Die Grammatikerwerbsstörung im Bereich der Morphologie: Therapieansätze im Vergleich [Grammatical acquisition disorder in the area of morphology: a comparison of therapeutic approaches] (*Kruse* 2013) Chapter: Therapie der Erzählfähigkeit [Therapy for narrative ability] (*Ringmann* 2013)	Semantics Vocabulary Morpho-Syntax	2[b]

[a]Book is part of a series of books titled 'Handbuch-Reihe Spracherwerb und Sprachentwicklungsstörungen (verschiedene Herausgeber:innen)' chosen by the German speaking team members.
[b]Vote Received for the Full Book Series.

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TABLE 3 | Characteristics of included taxonomies.

Author	Title	Country of publication	Language of publication
Denman et al. (2021)	Consensus on Terminology for Describing Child Language Interventions: A Delphi Study	United States[a]	English
Warren et al. (2007)	Differential treatment intensity research: a missing link to creating optimally effective communication interventions	United States	English
Frizelle et al. (2021b)	The Impact of Intervention Dose Form on Oral Language Outcomes for Children With Developmental Language Disorder	United States	English
Justice et al. (2017)	Algorithm-Driven Dosage Decisions (AD 3): Optimizing treatment for children with language impairment.	United States	English
Paul et al. (2024)[b] (adapted from Fey et al. (2003), Owens (2013))	Language Elicitation Techniques	United States	English
Paul et al. (2024)[b] (adapted from Stehle Wallace et al. 2022)	Language-Supporting Strategies	United States	English
Paul et al. (2024)[b] (adapted from multiple authors)	Essential Ingredients of Successful Therapy	United States	English
Paul et al. (2024)[b] (adapted from Spencer and Petersen (2020))	Principles of Narrative Intervention	United States	English
Reed (2022)[c]	A Model of Language Intervention	United Kingdom	English

[a]Consensus was conducted in Australia.

[b]Four distinct taxonomies were extracted from the book Paul et al. (2024) Language Disorders from Infancy through Adolescence: Listening, Speaking, Reading, Writing, and Communicating (6th ed.).

[c]Extracted from the book Reed (2022) An Introduction to Children with Language Disorders (5th ed.).

Finding the proposed 'active ingredients' within papers was challenging. In some papers, the active ingredients were stated/described in the introduction, in others they were alluded to where the goal of therapy was outlined, but often they were not clearly articulated where the intervention itself was described. Within peer-reviewed papers there was a strong reliance on supplemental material for more detailed intervention information, and this was not always easily accessible. In addition, ingredients were referred to or categorised in multiple ways—using terminology like *approaches, intervention components, strategies, evidence-based principles, core elements, standardized procedure, communication practices, techniques, goals, targets*, and *activities*. There were four categories of data that emerged from the author descriptions that met the definition of active ingredients outlined in the paper (1) Active ingredients—label only; (2) Active ingredient descriptions—without explicit label; (3) Active ingredient uniquely labelled—with definition, description or example; (4) Active ingredients repeatedly labelled—with definition, description or example. The following is a narrative synthesis of how active ingredients are currently labelled, defined/described within our included literature.

3.3.1 | Active Ingredients—Label Only

Numerous potential active ingredients were extracted from the data where only a label was given without either a further description or a clarifying example. Some ingredients were labelled from the perspective of the therapist (e.g., *Prosodic Emphasis*) and others based on the activity or desired response from the child (e.g., *Categorization*). For many of the items that fell into this category, one could argue that they are self-explanatory and a definition/description or example is not required. These include, for example, *Slower Speech Rate, Shortening Utterances, Providing Choices, Defining Concepts*. However, if we are reading the intervention description with the aim of replication, we need further specification, for example, to what degree utterances were shortened, how many choices were offered, whether defining refers to dictionary definitions or child-friendly versions created by the therapist. Other items could be categorized as labels/terms for which we have a general understanding; however, there are discrepancies in how we apply them. These include, for example, *Shared Book Reading, Explicit Instruction, Contextual Expansion*. For other items, broad terms are used that can be applied in a number of ways and, without specific examples, they are not transparent enough to be faithfully replicated. For example, in the case of *Demonstrating Strategies*—we need specific information on what these strategies were and how they were demonstrated as well as how many times; *Extending Child Talk*—it is unclear whether this is a grammatical or a semantic extension—or both; *Prompting Child (for correct production)*—we do not know what type of prompting occurred; *(use) Wordless Picture Books*—we might ask—is this to elicit child productions, or for language input?; *Train Macro-structure (using visual elements)*—we do not know exactly what these visual elements are or how they are used. Subtypes of *Questions* were frequently referred to, again

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with the assumption that there is a shared understanding of what they refer to, for example, *Open-ended Questions, Predictive Questions, Literal Questions, Indirect Questions, Comprehension Questions*. However, without specific examples, these terms lack precision, if an intervention is to be replicated accurately. Somewhat surprisingly, terms/labels that are not as widely used, such *as Rebuilding, Socratic Questioning, Distancing Questioning*, were not always defined or exemplified. In addition, while terms like *Elicited Production, Scaffolding, Focused Stimulation, Metacognitive Awareness* are part of the language of SLT/P, other words/labels that are frequently used, are part of a general 'non-SLT/P specific' vocabulary, for example *Encourage, Discuss, Reflect, Practice, Review, Explain*. These terms, in particular, require further specification when used in a therapeutic context.

3.3.2 | Active Ingredient Descriptions—Without Explicit Label

As part of our analysis, we extracted descriptions of active ingredients that were not explicitly labelled as a particular technique/approach. There were some instances where authors may have believed that an explicit label was not required and that the description was sufficient to allow the reader to extract the specific active ingredient/s involved. Other descriptions were less precise, potentially referring to one of a few active ingredients. For example, in the following description '*Each unfamiliar referent was paired with a familiar referent from the same semantic category that differed in the relevant visual feature*'[1], it is not clear whether the active ingredient is more about explicitly contrasting distinguishing features, identifying shared semantic features or highlighting category membership. There were other descriptions that lacked further precision making it difficult to narrow down what active ingredients were at play. For example, in the description *'The participant (…) was asked to create a sentence that 'sounded like' the sentence that the examiner had produced for the previous picture'*, it is difficult to know if the intention is to *elicit a specific grammatical construction or any multi-word response—in either verbal or written form*. Some descriptions lacked granularity, obscuring the specifics of the therapeutic actions taken. As an example, in the description '*The puppet Tom, serves as a model that repeatedly demonstrates different semantic and learning strategies*', we do not know what the *semantic* or *learning strategies* encompass. Similarly, in the example, '*The professional explores whether parents want support regarding communication with their child or other parenting issues*', the word *explores* is ambiguous and therefore does not meet our criteria for a well-specified active ingredient. Many descriptions are not written with 'active ingredients' in mind and often conflate the specific actions taken by the therapist with the goal or expected response from the child (e.g., In the example *Teachers and therapists provided support through intervention techniques such as phonological awareness*—phonological awareness is the goal, what the therapist actually did was model segmentation). Some papers provide clear procedural descriptions outlining a sequence of steps of what the child has to do but again, do not necessarily explicitly express what it is that the therapist does to elicit a particular response/action from the child or to effect therapeutic change.

3.3.3 | Active Ingredient Uniquely Labelled—With Definition, Description or Example

Throughout the literature that we reviewed there were also many instances where a particular 'active ingredient' label was used only once (uniquely labelled) with an associated description or definition. This occurred for a myriad of reasons. Some labels used were simply unusual/not commonly found in the literature (e.g., *Redirect, Vertical Organisation* [with reference to complex sentences], *Pictographic Planning)*. For many other items, the descriptions/definitions represented commonly used active ingredients but the label itself was untypical (e.g., an action often labelled *Focussed stimulation* in other papers was referred to as *Input optimisation*; a *Request for Imitation* was called *Say prompting;* and *Self* or *Parallel talk* referred to as *Verbal Mediation or Self Narration)*. Some terms referred to a particular approach or resource (e.g., *Story Braid, Syntax Stories, Transition flower)*, without elucidating the active ingredients within them, while others used overarching terms like *Story Strategies, or Literacy Related Strategies* without unpacking what those strategies referred to and were therefore not sufficiently granular. There were also instances of the use of a memorable phrase or acronym (e.g., '*say less, stress, go slow, show')* to capture several active ingredients, particularly in the context of giving parental instruction or advice. Some of the 'unique terms' named or described what the therapist used to deliver the active ingredients (e.g., *Presentation slides* [for cueing], *Predictable books)* rather than the active ingredients themselves. Finally, there were families of potential active ingredients for which variation in terminology was more prevalent. For example, those that related to semantics (e.g., *Semantic Elaboration, Semantic Descriptions, Semantic Mapping, Make Explicit Word Associations, Make explicit Word Connections);* those that were reward focused (e.g., *Praise, Share the Successes, Social Reward -Behaviour, Positive Feedback)*; and those that related to word retrieval, which were usually described from the perspective of what the child had to do rather than the therapist (e.g., *Recall, Recall testing, Spaced Word Retrieval, Retrieval Probes, Request Retrieval)*. In addition, the concept of creating communication temptations was expressed in a particularly varied way, including terms such as *Strong Silent Type, Violate Expectations, Sabotage, Provide Inappropriate Objects, Create Opportunities to Gesture, Misplace Objects, Misuse Objects*. As another example, the terms *Self-correction, Self-evaluation, Self-monitoring, Self-feedback*, were all used to describe slightly different actions (required of the child), but all encompassed a significant element of reflection.

3.3.4 | Active Ingredients—Labelled and Defined/Described or With Example, Multiple Times

A total of 126 potential active ingredients were extracted where the same label was used multiple times (within the literature as a whole) with an associated definition/description or example. A full list of author definitions /descriptions or examples is available in Table S4. *Prompting* was the most commonly used term (n = 61), followed by *Questioning* (n = 58), *Modelling* (n = 50), *Recasting* (n = 44), *Expanding* (n = 36), *Cueing* (n = 36), *Feedback* (n = 33), *Repetition* (n = 32), *Explanation* (n = 27) and *Imitation* (n = 21). As with the previous data, the ingredients vary in how they are labelled—sometimes as a verb,

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which can be attributed to the therapist—for example, *Priming, Goal-setting, Embedding, Signing*, but more often in the form of a noun, to describe a task (e.g., *Role play, Cloze task*) or something that happens or is provided (e.g., *Simplification, Visual Cue, Time Delay)*. While there were commonalities in how terms were used and described between and within papers, there were also significant differences in how labels were operationalised. These commonalities and differences are addressed in our second research question.

Importantly, our analysis of how active ingredients are labelled, defined or described allowed us to create a glossary of terms and comprehensive definitions which were informed iteratively by all the literature included in this review. This glossary is currently being used as the basis for the development of a comprehensive active ingredient set with international consensus through Electronic Delphi processes (Hasson et al. 2025). The glossary and its accompanying definitions are therefore not presented here as they are preliminary, and a fully specified list will be published on completion of the consensus methodology (see TICLD website, https://www.ucc.ie/en/ticld/).

3.4 | RQ2. What Are the Differences in How the Active Ingredients Are Defined/ Described?

Below is a narrative summary of the 5 most commonly extracted active ingredients, each of which had a minimum of 35 definitions, descriptions or examples. Table 4 summarises the top 10 most commonly extracted ingredients, showcasing their similarities and differences and where they overlap with other terms.

3.4.1 | Prompting

Prompting was the most commonly extracted active ingredient. Prompting, when used to describe aspects of an intervention, is much more specific than its everyday meaning. Overall *prompting* encompassed any kind of phonemic, semantic, gestural, physical, visual or non-verbal cue or technique intended to elicit a target response or increase child participation. For some, *prompting* was given in a graduated manner to provide increasing/decreasing support, but for most, this level of specification was not provided. *Prompting* can be in the form of giving information, questioning, commenting, providing a choice, using 'say' or 'tell me' instructions, modelling or acting out a task. Less common examples included using a time delay before the therapist's response; pausing with prosodic emphasis; following the child's lead; sending reminder text messages; or using in-class visual reminders to support engagement. task. This inconsistent and overlapping use of the term *prompting* does not allow for reliable replication and implementation and therefore does not meet our criteria for a well-specified active ingredient.

3.4.2 | Questioning

Questioning was the next most common technique extracted. Variation in how *questioning* was described lay in both the function of the question as well as the cognitive or linguistic complexity required to respond. *Questions* aiming at eliciting a specific linguistic construction or targeted vocabulary item included—closed (yes/no) questions; open-ended questions, intended to elicit more than a one word response (who, what, where, how, why); and inference/prediction based questions, where a student is required to combine what they already know with information provided in a story. *Questions* were core to discourse interventions and were categorised by some authors at 4 levels (i.e., Blanks Levels), determined by what the child was required to do, rather than specifying the content of the question: provide 1) concrete information 2) a description of a sequence of events or an event that occurred in the past 3) an analysis or reflection on events or the integration of information in an explanation and 4) an analysis, evaluation and synthesis of information. *Questions* were not always presented using the syntactic form of a question. For example, in one paper a cloze procedure was described as a question (*from this information we can conclude that*…. .? assuming rising intonation at the end of the utterance). The use of *questioning* was also described as a learning strategy for a child to probe their own knowledge. More broadly, *questions* were used to determine how a student felt about something (labelled *evaluative questioning*); to establish why something was important to a child or how they might implement something in their daily schedule; as a technique to engage a child; and as a way of encouraging general conversation. With respect to parents and early years educators, *questioning* was described as something used to prompt discussion and to promote reflection and learning. Due to the broad/overarching way that *questioning* was often used, it was not irreducible or sufficiently granular to meet our criteria for a well-specified active ingredient.

3.4.3 | Modelling

Modelling was a commonly described ingredient and, like prompting, was used in an overlapping and loose manner, encompassing many sub-types. For many authors *modelling* refers to providing linguistic input to the child to demonstrate target structures, while for others *modelling* is broader, in that it is about providing an example of skills that you want a child to learn. Some describe *modelling* as something that facilitates implicit learning '*through listening, the child is expected to induce and later produce the target structure. The child never has to imitate a structure immediately after the model*', while for others *modelling* always has the expectation *of an imitative response from the child*. Depending on the therapeutic goal, *modelling* can involve labelling a corresponding action, explaining morphological rules or word meanings (with the expectation that the child will repeat back the information), or providing examples of new words in everyday contexts, as a general language stimulating technique. Some authors refer to antecedent and consequent *models*, others describe the technique as corrective (used following an inadequate response from the child) and as a form of feedback. In addition, some authors describe *modelling* as a technique that implies frequent, multiple exemplars of a given target. Finally, *modelling* is frequently used with respect to the learning of language promoting strategies in parent and educator mediated interventions. Variation in how modelling is applied in

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TABLE 4 | Ten most commonly extracted active ingredients with examples.

Active Ingredient	Number of times coded	Example 1	Example 2	Example 3	Example 4	Example 5	Examples of overlap
Prompting	61	Prompting involves the use of different cues or techniques in order to encourage a child to use particular sounds/structures or words. Prompts may be graduated.	The first prompt was the initial sound	Use questions or completion prompts	Cueing parent to respond to child within an interaction	Teachers were prompted to review target words with text message reminders	Cueing, Questioning, Commenting, Modelling
Questioning	58	Use of questions to elicit a targeted response	The questioning strategy asks parents to intersperse open-ended or wh-questions	The child can use various questioning strategies to pinpoint the segments of lexical knowledge that he is currently lacking.	The teacher asked questions to help the children to draw inferences about the course of the story, determine why certain things happened, predict the plot line and infer meanings of novel words.	An evaluative question asks the student to evaluate the information with an affective influence	Prompting, cloze procedure, learning strategy,
Modelling	50	Mother modelled what she or the child was doing	Demonstration of strategy use that includes real-time explanation of implementation	Say the word the right way for your child.	Involves the use of a third person besides the client and clinician. Through listening, the child is expected to induce and later produce the target structure	Modelling coping with wrong and dysfunctional reactions and beliefs about language disorders	Recasting, Imitation, Explicit Instruction, Correction

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TABLE 4 | (Continued)

Active Ingredient	Number of times coded	Example 1	Example 2	Example 3	Example 4	Example 5	Examples of overlap
Recasting	44	Conversational recasts are repetitions of a child's utterance that maintain the child's meaning while changing or adding grammatical information	Recasts serve to add or correct information	SLP responds to the child's own utterance, termed a platform utterance, by transforming the utterance into the targeted structure, using as much as the child's original utterance as possible	Recasts could either be corrective or noncorrective, depending on whether the child used their target utterance correctly	For example, Michael: 'It would make me feel bad.' SLP: 'Yes, it would make you feel bad, and maybe a bit angry, confused and anxious too?'	Expansion, Correction, Modelling
Expanding	37	(Expanded Recasts) Recasts with more complex morphosyntactic structures than the child used	Adding words they may not know	Adult repeats a child's utterance and adds a word or phrase	Expanding the child's turns	Included all or part of the child's communication act with an addition of one to two content words, or replaced a word in the child's communication act to make the statement grammatically correct.	Extension; Recasting; Modelling, Expatiation, and Contingent Elaboration
Cueing	36	Cueing parent to respond to child within an interaction	Explicit articulatory instruction was introduced…to elicit correct target forms	(Attentional Cues) Methods such as light touch, a short verbal direction	Increase focus on specific cues available in the context to make guesses about the meaning of unfamiliar words	…to prompt the child to produce the targeted sound/word/phrase/sentence. The cues will usually (though not always) be arranged based on providing the least to most help the child needs to produce the target	Prompting, Cloze procedure, Questioning, Use of gestures.
Feedback	33	Give feedback to parent about their performance of a language technique	Frequent positive feedback…to boost child's motivation	Child's own response is repeated as a means of encouraging the child to correct their response.	Sounds and movements such as raising the arms or conveying different forms of feedback to reflect behaviour approval and positive reinforcement.	for example. including indirect verbal cues, recasts, and direct models	Modelling, Praise, Repetition, Reflection

(Continues)

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TABLE 4 | (Continued)

Active Ingredient	Number of times coded	Example 1	Example 2	Example 3	Example 4	Example 5	Examples of overlap
Repetition	33	Classroom educators should use the new words lots of times to support word learning	Providing many opportunities for clients to use or process a new target, but vary the context of words, materials, place and people.	The prompt was repeated if the participant used a different verb than the prompted one,	Repeating key information	Simple repetition rather than effortful recall of the target morpheme by the child	Imitation Expansion, Feedback
Explanation	27	Learning intentions, goals or task expectations are described in an age-appropriate manner	The explanations of story elements, icons, and storyboards are used to help the student to connect the meanings of the words, phrases and sentences in the discourse to word meaning, image or experiences stored in Long Term Memory (LTM)	Difficult words received a short explanation	Explained strategy implementation using video exemplars	Explain how visualizing improves the ability to understand/remember what we read/hear	Defining, Explicit instruction
Imitation	21	The clinician presented a prompt, modelled a sentence, and then instructed the child to repeat it	Elicited imitation within the context of highly structured drill activities	The child's playmate revealed a random facial expression and waited until the child emulated the same emotional state	. .imitate what the child says. If the child repeats our imitation, we can go on to use some of the other forms of contingent responses to carry on the conversation	Multiple exposures to the same utterances where one component is varied across exposures	Repetition, Feedback

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the literature means that it is often not distinct from other active ingredients, resulting in difficulties with reliable replication.

3.4.4 | Recasting

Overall, there was more consistency in the use of the term *recasting* compared to prompting or modelling. Almost all authors agreed that *recasting* builds on a child's platform utterance and in that sense serves to endorse what the child has said in an implicit manner. However, for some, *recasts* are only used correctively while for others they serve to correct, expand or modify the child's utterance. While most authors describe using *recasting* as a way of providing exemplars of more complex language, it has also been used as a simplification technique. *Recasting* is often used with a predetermined specific grammatical target and described such that the semantic information is retained while the syntactic structure is altered. However, it is also described as a technique in which an adult can add or modify phonological, semantic or syntactic information and can include additional techniques like *variable input and drawing the attention of the child prior to the recast*. In contrast to its use with specific targets, some authors describe it in the context of spontaneous conversation, where it is used as a general language stimulating technique that is child-centred, and does not obstruct the natural flow of communication. Although, overall recasting was more consistently used than some other terms, the significant overlap with terms like *expansion* and *modelling* means that it lacks precision which impedes reliable implementation.

3.4.5 | Expanding/Expansion

In general, expansion was used in a very overlapping manner, such that it was conflated with terms such as *extension, recasting, expatiation*, and *contingent elaboration*. Most commonly *expansion* overlapped with *recasting* across papers, with both terms sometimes used interchangeably and in combination to create the term 'expanded recasts'. Most definitions/ descriptions of *expansion* specified adding to or modifying what the child said. Some referred specifically to making the child's utterance longer by extending the meaning while others specified adding or correcting grammatical elements. Some authors included imitating the child's utterance ('*while filling in the missing features*') as part of their description of *expansion* while others described it as a way of modelling more complex vocabulary or grammar. The term *expansion* was also used if no response was given where the clinician gave an '*expansion of the targeted response*'. Some authors specified how *expansions* are well formed utterances that are not telegraphic while others included telegraphic phrasing. Occasionally, *expansions* were described from a communicative function perspective, where they were described as '*making the message more complete'* or where a response included '*all or part of a child's communication act'* with the addition of content words or the replacement of a word to make the statement grammatically correct. Finally, the term *expansion* was used to refer to when clinicians made inferences and comparisons to expand a student's understanding or thinking rather than a specific linguistic form. Such significant variability in how the term *expansion* is applied makes replication problematic.

3.5 | RQ3. How Have the 'Active Ingredients' of Oral Language Interventions Been Classified for Children with or at Risk for (D)LD)?

The following is a narrative overview of the four taxonomies reported within peer-reviewed papers along with 5 further taxonomies extracted from our included textbooks.

The most comprehensive taxonomy/framework of the active ingredients of SLT/P child language interventions is that published by Denman et al. (2021). Significantly, this is also the only taxonomy that has been developed through consensus. The taxonomy is muti-dimensional with five key aspects. Aspects I–IV outline the broader contextual features of therapy, while Aspect V (which is most relevant to the current review) captures the mechanisms that directly facilitate learning. In brief, Aspect 1 (Modality and Domains) identifies the communicative modality (spoken or written, including AAC) as well as the linguistic, and cognitive, domains targeted for change. Aspect II (Purpose) differentiates interventions aimed at developing specific communication skills from those designed to facilitate the use of strategies. *Skill development* targets underlying linguistic or cognitive abilities, whereas *strategy-use* promotes the use of compensatory approaches. Aspect III (Delivery) describes the delivery conditions under which intervention occurs. This includes the agent of delivery (speech-language pathologist/therapist or other provider), the delivery format (face-to-face, ICT-mediated, or software-based), the tier of support (whole class, small group, or individualised), and the setting (clinical, home, school, or community). These variables frame the environmental and organisational context for therapy. Aspect IV (Form) describes the degree of naturalness (contextualised versus activity focussed) and structure (decentralised–hierarchical versus decentralised–non-hierarchical) within intervention tasks, in particular, specifying the degree of alignment between intervention tasks and natural communicative contexts. Finally, Aspect V (Teaching Techniques) specifies the discrete instructional behaviours through which therapists enact intervention. The teaching techniques are grouped into three categories, *prompting*, *linguistic*, and *regulatory* techniques, which collectively aim to describe the active processes through which communication interventions exert their effects. *Prompting techniques* are those that elicit or shape communicative responses using graduated levels of support (e.g., physical or gestural prompts, questions, cloze procedures, suggestions); *Linguistic techniques* are those that modify the linguistic environment in some way, to promote the development and refinement of communication/linguistic forms (e.g., modelling, recasting/expansion, focused contrast); and *Regulatory techniques* are those that support engagement and behavioural organisation during treatment activities (e.g., verbal and visual instructions, feedback and rewards). Overall, Aspect V represents the primary mechanisms of change within the taxonomy.

An additional taxonomy, also reported in 2021, was that proposed by Frizelle and colleagues. Building on the work of Proctor-Williams (2009), this taxonomy focused on the qualitative active ingredients of language interventions. The taxonomy described four components (techniques, procedures, method of instruction, and intervention contexts) which aimed to describe not only

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what is delivered within an intervention, but also *how*, *in what sequence*, and *under what contextual condition. Techniques* are described as the discrete teaching behaviours intended to drive change, such as providing word definitions in vocabulary interventions or using recasts and imitation in morphosyntax. *Procedures* describe how these techniques are combined and sequenced during intervention sessions, therefore determining the temporal organisation of learning opportunities. For example, vocabulary interventions may involve repeated exposures followed by explicit definitions, while morphosyntactic treatments may incorporate recasting followed by auditory bombardment. The *method of instruction* captures whether input is delivered primarily implicitly or with some form of explicit explanation. For example, word exposures, recasts, or models may occur without overt explanation, whereas explicit approaches provide metalinguistic information about meanings or grammatical rules. Finally, *intervention contexts* describe the activities and conditions in which instruction occurs, including whether tasks are child centred or clinician directed, and the degree of variability in linguistic input. Contextual choices, such as interactive book reading or targeted manipulation of lexical or syntactic variability, shape engagement, processing demands, and generalisation. By distinguishing the discrete behaviours (techniques), their temporal organisation (procedures), the instructional orientation (implicit vs. explicit), and the embedding context, the taxonomy aimed to promote more precise descriptions of what constitutes the active ingredients of an intervention.

Recall Warren et al. (2007) proposed a taxonomy with the primary aim of conceptualising and measuring intervention dosage in language and communication interventions. Using terminology more typically associated with medical and pharmacological contexts, their framework comprises five core constructs, four of which relate to quantitative aspects of therapy: *dose, dose frequency, total intervention duration, and cumulative intervention intensity*, and one which specifies the qualitative components of therapy—*dose form*. Together, the constructs are intended to provide a systematic way of quantifying how much intervention is delivered, in what manner (how spaced or concentrated), and over what period. In Warren's framework, *dose form* is the task or activity in which the teaching episodes occur, and a teaching episode consists of one or more clinician actions that directly progress a child toward an intervention goal. *Dose* is defined as the number of properly administered teaching episodes within a single intervention session—determined by the rate of episodes per unit time, session length, and the distribution of episodes across the session. For example, one episode per minute in a 60-minute session yields a dose of 60 episodes. *Dose frequency* describes how often a dose is delivered within a given time frame, typically per day or per week. Interventions of equal dose may differ substantially in frequency, for instance, sessions given once weekly versus five times weekly of equal duration and dose rate. *Total intervention duration* denotes the overall time span for which the intervention is delivered (e.g., six weeks). Finally, *cumulative intervention intensity* is conceptualised as the product of dose × dose frequency × total duration (and can optionally incorporate dose form). It captures the total number of teaching episodes delivered over the course of the intervention. For example, a programme with 60 episodes delivered once weekly for 40 weeks yields 2400 cumulative teaching episodes, whereas a five-times-weekly schedule produces 12 000 episodes. Importantly, different combinations of *dose* and *frequency* may produce similar *cumulative intensity*, allowing clinicians to manipulate individual components while holding overall intensity constant, and helping us to identify optimal configurations for learning.

Building on conceptualisations of treatment intensity put forward by Warren et al. (2007) and Justice et al. (2017) describe four core parameters to characterise the amount of therapeutic input children receive during language intervention—*dose, frequency, duration*, and *cumulative intensity*. Similar to Warren et al., *frequency* denotes how often intervention sessions occur across a specified time frame, and *duration* represents the overall timespan for which the intervention is implemented. However, in contrast to Warren, Justice et al., conceptualise *dose*, not as the count of discrete teaching episodes, but as the minutes spent directly targeting language—a less discrete operationalisation. This also impacts the conceptualisation of cumulative intensity, defined as the product of dose × frequency × duration. With reference to treatment intensity, the unique contribution of Justice and colleagues is in their derivation of an algorithm-driven dosage decision (AD^3) model, a formula intended to guide clinicians to select treatment intensities that maximise language gains for individual children. Using hierarchical linear modelling (HLM), they retrospectively analysed child language datasets to estimate how baseline language ability interacts with dose, frequency, and cumulative intensity to impact gains over time and to determine the unique and combined contributions of each intensity parameter to language outcomes. Based on their findings, the algorithm incorporates children's pre-treatment language scores, the expected number of points of change and three intensity variables—dose (minutes per session), frequency (total number of sessions conducted across the year), and their product (cumulative intensity) to predict expected improvement across an academic year. Their model/framework aims to provide a quantitative method for determining recommended levels of intervention dosage tailored to children's initial language profiles.

Based on our analysis of included books we identified four additional classifications/frameworks of 'active ingredients' that inform oral language interventions. Paul et al. (2024) present a number of frameworks including, *Essential ingredients of successful therapy* (chapter 3 – adapted from eight peer-reviewed papers); *Ten principles of narrative intervention* (chapter 12 – adapted from Spencer and Petersen); *Language elicitation techniques* (chapter 9 adapted from Fey and Finestack (2003) and Owens (2013)); and *Language supporting strategies in the classroom* (chapter 12 - adapted from Stehle Wallace et al. 2022). *Essential ingredients of successful therapy* identifies overarching therapeutic principles designed to optimise the conditions for learning, rather than discrete techniques. Ingredients such as *complexity control, intensity*, *working with schemas* and *distributed practice* all serve to maximise the likelihood that children will acquire and generalise targeted skills. The *narrative intervention framework* is also labelled as principles-based; however, many of the principles have discrete techniques embedded within them (e.g., the use of modelling, questioning prompts, visual cues, multiple exemplars, corrective feedback). *Language elicitation techniques* outlines specific interactional triggers (e.g., misplace, misuse or withhold objects, violate routines) that adults can use to engineer communicative temptations or opportunities for children to produce a communicative act or linguistic form.

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Lastly, *language supporting strategies in the classroom* focuses on enhancing the richness and responsiveness of linguistic models (e.g., model, expansion, open/closed questions) as well as scaffolding children's participation (e.g., through strategies such as joint participation, restricting choices and reasoning prompts).

Reed (2022) presents a model of language intervention, as a co-ordinated multi-component system/taxonomy. The model conceptualises one child's language intervention as the central outcome, with four connecting clusters representing the domains that contribute to that outcome (i.e., *Approaches to intervention; highlighting targets; facilitating techniques; and intervention considerations)*. *Approaches to intervention* represents service delivery variables (e.g., group/individual, direct/indirect). *Highlighting targets* focuses on input variations (e.g., modality and suprasegmental variations). *Facilitating techniques* are the discrete behaviours used by therapists to effect change (e.g., self and parallel talk, recasting). *Intervention considerations* showcase not only direct areas of intervention focus (e.g., comprehension, production, metalinguistic, generalisation/reinforcement) but also child-centric considerations such as intervention usefulness and child characteristics. The circular and interconnected layout of Reed's model implies that these aspects of intervention are not independent, rather they interact dynamically. As such, this model of intervention advocates for effective language interventions to be integrated with and responsive to the learner's broader communicative context.

3.6 | RQ4. Where Do the Classifications Align and Where Do They Differ?

Across the set of nine taxonomies identified in the literature, a picture emerges of how language interventions are conceptualised. These taxonomies vary widely from describing discrete clinician behaviours to broad overarching principles. However, collectively they converge on the idea that treatment effects arise from an interaction between the discrete actions taken by the clinician; how sessions or activities are designed; how much intervention is delivered over time; and the broader therapeutic context/models of delivery. The taxonomies differ primarily in their unit of analysis/reference (e.g., techniques vs. dose vs. modality), level of granularity and intended use (description vs. measurement vs. support for decision making). Table 5 highlights the key similarities and differences across each of the taxonomies reviewed here.

3.6.1 | Similarities

All frameworks, whether they specify 'language elicitation techniques', 'classroom discourse strategies', 'narrative principles', or 'dose form' procedures, foreground clinician actions as the primary mechanism of change. Even in the taxonomies that primarily focus on intensity (Warren; Justice) 'teaching episodes' and 'minutes of active targeting' are the quantifiable descriptors within which clinician actions take place. Taxonomies recognise both content (what is modelled, instructed, elicited) and structure (how input is organised over time [e.g., dose, frequency]) as active ingredients. In addition, most of the taxonomies share a dual emphasis on rich/contingent language input, such as modelling, expansions, and multiple exposures, with opportunities for production, such as cloze completion, questioning, and expansion invitation. This dual emphasis is apparent in the example technique lists as well as in the broader principles of practice, such as complexity control and distributed practice. The importance of contextualisation and scaffolding is also a common thread. Whether framed as context/delivery (Frizelle; Denman), authentic activities (classroom strategies; narrative principles), or as intervention moderators (Reed), the models converge on the need to embed targets in meaningful contexts with hierarchical scaffolds that are faded to promote independence. Across the *Essential Ingredients of Successful Therapy*, *Principles of Narrative Intervention*, and *Language Supporting Strategies* taxonomies, a shared commitment to creating opportunities for repeated practice is evident, along with an acknowledgement of the need for varied exemplars and controlled complexity. Overall, the impetus behind creating the taxonomies has been to articulate, with greater precision, the important components of child language interventions and/or to address the ongoing issue of inadequate reporting impeding research syntheses and replication.

3.6.2 | Differences

The main differences in the current taxonomies proposed lie in what might be referred to as the 'unit of analysis' as well as the level of granularity specified. If we categorise the frameworks as encompassing either micro-, meso-, or macro-level active ingredients or a mix, the micro-level frameworks, such as Elicitation Techniques and Language Supporting Classroom Strategies, list discrete moment-to-moment teaching techniques that are used within a given interaction. In contrast, meso-level frameworks (e.g., Frizelle, Denman) additionally specify how these techniques can be organised (procedures, scaffolds, principles) and how they are situated within an intervention context (delivery/form/context/ teaching technique categories in Denman). Macro-level frameworks, on the other hand (Warren; Justice; the service delivery part of Reed) quantify how much intervention is delivered (dose, frequency, duration, cumulative intensity) and, in Justice's case, use predictive modelling to derive algorithm guided dosage recommendations. These differences have also been driven by the intended use of each taxonomy. Both Denman (consensus categories), and Frizelle (dose form content) are descriptive, with a focus on consistent use of terminology. In contrast, much of what is presented in Paul et al. (2024) is more principles driven, while frameworks presented by Warren et al. (2007) and Justice et al. (2017) focus on dosage. In addition, while most taxonomies have broad application to a range of different target outcomes, that put forward by Spencer and Peterson is focused solely on narrative interventions. Finally, the micro-technique compilations and the principle-based frameworks are mechanism oriented; they primarily focus on how learning is prompted, scaffolded, and consolidated. In contrast, Warren and Justice are more about measurement, providing tools to quantify teaching and learning opportunities. In summary, to fully characterise an intervention, a researcher/practitioner would need to draw from a range of taxonomies. For example, researchers/practitioners can specify an intervention with Denman/Frizelle for content and procedure, and add to the granularity of specifi-

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TABLE 5 | Comparative overview of included taxonomies.

Taxonomy	Focus	Unit of analysis	Primary level	Strengths	Limitations
Dose Form - Frizelle et al. (2021b)	Qualitative structure of intervention input	Techniques, procedures, method of instruction, context	Micro/ meso	Fine-grained- description of what clinicians do	No intensity quantification
Differential Treatment Intensity—Warren et al. (2007)	Quantitative dosage	Dose, frequency, duration, cumulative intensity	Macro	Clear quantification and adaptable	Does not describe content of episodes
Algorithm Driven Dosage decision—Justice et al. (2017)	Predictive dosage modelling	Dose (minutes targeting), frequency, duration	Macro	Produces dosage algorithms	Does not describe instructional techniques
Terminology for Describing Language Interventions—Denman et al. (2021)	Standardised intervention terminology	Modality, purpose, delivery, form, teaching techniques	Micro/ meso	Developed through consensus; Integrates delivery context with techniques	Not tied to intensity or learning theory
A Model of Language Intervention - Reed (2022)	Systems level- model	Approaches to intervention, Highlighting targets, Intervention considerations, Facilitating techniques	Macro/ meso/ micro	Holistic; integrates multiple domains	Not designed to specify techniques or dose
Language Elicitation Techniques—Paul et al. (2024)—(adapted from Fey et al. 2003; Owens 2013)	Techniques to prompt output	Clinician triggers (violating routines, withholding etc.)	Micro	Anchored in clinician behaviour	Expressive language-focus only
Language Supporting- Strategies - Paul et al. (2024), adapted from Stehle Wallace et al. (2022)	Enriching language input; scaffolding	Modelling, questioning, expansion	Micro/ meso	Strong integration of cognitive & linguistic supports	Classroom specific
Essential Ingredients of Successful Therapy - Paul et al. (2024) (adapted from multiple authors)	Maximising learning conditions	Priming, intensity, complexity, engagement	Meso/ macro	Theory aligned; evidence-based	Not technique specific
Principles of Narrative Intervention - Paul et al. (2024) (adapted from Spencer and Petersen 2020)	Narrative based- language learning	Principles (story grammar, scaffolding, repetition)	Meso	Integrates micro and -macrostory-grammar structure	Focused on narrative domain only

Note: Micro refers to discrete teaching techniques; meso refers to how techniques are organised/situated in an intervention context; and macro refers to how much intervention is delivered.

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cation with the techniques outlined for example, in the *Elicitation Techniques* and *Language Supporting Classroom Strategies*, while being governed by the learning principles (*Essential Ingredients; Narrative principles* where relevant) presented by Paul et al. (2024). Intervention descriptions can be further contextualised by Reed's moderators, and quantified/optimised using Warren/Justice intensity parameters. However, these taxonomies have emerged in isolation, and therefore operate at different levels, with a lack of agreed terminology within and between them. As a result, our ability to use them is limited, impacting our capacity to compare interventions, to replicate protocols, or to synthesise evidence across studies.

4 | Discussion

Our review of the literature summarizes the large number of oral language intervention active ingredients labelled or described across SLT/P intervention studies, intervention manuals, and textbooks, as well as how they are classified in a range of taxonomies. With respect to how these ingredients are labelled, defined or described and the differences between these labels/descriptions, the review reveals the significant inconsistencies and lack of transparency in current reporting. Consequently, it is extremely difficult to understand what was actually done in a given intervention before we even consider the problems of replication and comparison. Recall our requirement for a well-specified active ingredient: labelled consistently; sufficiently detailed for replication and implementation; sufficiently granular to be distinct; and where appropriate, irreducible. Many labels are assumed to be 'self-explanatory' yet, even apparently simple labels (such as *expansion* or *modelling*) are applied in multiple different ways. A considerable portion of labels fall into everyday vocabulary (e.g., *explain, encourage, discuss*) and without further specification are not inherently therapeutic techniques. Other broad labels encompass multiple active ingredients making it impossible for the reader to ascertain how they were combined in a procedure and which specific actions drove change. In addition, discrete techniques and procedures are often conflated so that the therapist's action, the child's expected behaviour and the intended goal are merged. We also see many examples of familiar techniques being labelled using unfamiliar names (e.g., *Parallel Talk* labelled as *Verbal Mediation*) making it difficult to discern whether interventions differ in substance or merely in terminology. Even when techniques are named using more typical terminology, the lack of explicit detail makes replication almost impossible. One of the most striking findings from our review is that identical labels may mask different mechanisms, while similar mechanisms can operate under different labels. This directly limits our ability to identify which active ingredients are associated with positive outcomes and slows down both our theoretical as well as our clinical discovery. Our analysis shows that the issue is not simply that authors fall prey to the jingle-jangle fallacy but that our field lacks a shared conceptual structure for describing interventions. Consequently, interventions are being described in an ad hoc manner, as opportunities arise, which results in semantic drift in how terminology is being used.

The issue is further complicated by the fact that the majority of interventions reported on, targeted multiple rather than single language domains, making it impossible to tease apart how active ingredient labels and definitions differ across domains. By defining active ingredients as 'the specific action taken by the therapist to effect therapeutic change' we aim to facilitate more consistent definitions that can be used across different domains. Future research could then explore how consistently these definitions are used within and across domains.

Regarding how the active ingredients of therapy are classified and how those classification systems align and differ, it is clear that current taxonomies share the goal of articulating the active ingredients through which language interventions exert their effects. However, current taxonomies are misaligned in that they operate at different levels, with critical ingredients presented across frameworks that were never designed to seamlessly integrate (e.g., Warren compared to Denman). In many intervention studies, micro-level techniques are underspecified such that their features are not adequately described; the boundaries between them are unclear; the conditions under which they are used are not indicated; and how they combine into systematic procedures is usually not defined. In addition, mirroring intervention studies, there are discrepancies in how taxonomies label, categorise and operationalise active ingredients. Moreover, no taxonomy integrates dosage with detailed characterizations of discrete techniques. Lastly, most taxonomies do not consider contextual moderators in a sufficiently detailed way, with many ignoring what might be termed 'active support ingredients', such as caregiver involvement and the linguistic environment (including cultural or linguistic diversity), as well as not distinguishing between different delivery contexts. While Denman et al. (2021) have attempted to develop a consensus-based taxonomy to enable consistent reporting across 5 key aspects, consensus was completed in one country only. In addition, it is noteworthy that the lowest level of consensus within Denman's work was in relation to the discrete 'teaching techniques'—which could be argued to be the *true* active ingredients that clinicians implement and are necessary for replication and training.

4.1 | Recommendations

In keeping with previous recommendations from Frizelle et al. (2021b) and Frizelle et al. (2022), our review findings underscore the need for an internationally agreed lexicon of active ingredient labels with clear operational definitions, embedded in a taxonomy that is both hierarchical and flexible. Such a taxonomy would underpin the development and adoption of international intervention reporting guidelines within the field of SLT/P. To address the significant inconsistencies in how active ingredients are labelled, defined or described, operational definitions should indicate boundaries (to avoid overlap) and ensure precision. To avoid ambiguity, the application of these definitions should also include at least one exemplar or example procedure for each technique reported. The aim would be that future studies would use these terms consistently (paired with intervention-specific examples), as part of the reporting of all oral language intervention studies. If we define an active ingredient as the specific action taken by the therapist to effect change, operational definitions need to be anchored in the behaviour of the therapist, with some specification of how an active ingredient is delivered,

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and an indication of what child behaviour it is intended to influence. Although definitions require a level of specificity, we recommend that they are also general enough to allow for extensive application, with specific parameter recommendations (for example, in relation to density and frequency) sitting outside the definition, but within the scope of the overall reporting guidelines. As part of a consensus exercise, the aim would be to minimise the use of unique or local terms by mapping them on to a standardized lexicon. If carrier activities are used to describe an intervention approach (e.g., *shared book reading)*, we recommend that authors specify which ingredients are contained with them. In a related point, our review clearly indicates that there are active ingredients that contain a single component, such as *parallel talk*, while there are others that are multi-component, such as *coaching*. We need to ensure that these multi-component ingredients are also unpacked. Moreover, it is important that every description is connected to an explicit named ingredient from our agreed lexicon and, if multiple active ingredients are involved, they should be listed individually rather than embedded within a narrative prose. Our preliminary list of proposed active ingredient labels and definitions, generated through an iterative process from this review, will serve as a starting point to develop an internationally agreed list of what we consider to be active ingredients, as well as a lexicon of labels and definitions.

With respect to the development of a taxonomy, we recommend a unified approach to classification that integrates the different levels that currently exist independently or with some overlap. Building on an agreed lexicon of active ingredients, an internationally agreed taxonomy needs to explicitly separate discrete techniques from procedures (the structure in which the techniques occur). In addition, the broader context of delivery/form/setting needs to be captured. As part of this broader context, we also need consensus on how the 'active support ingredients' are labelled and defined—these are the behaviours or actions taken by the therapist that enable or enhance the delivery of active ingredients, ensuring that intervention is implemented optimally. They do not directly change the child's communication skills themselves; rather, they support, organise, and optimise the conditions under which learning occurs. In addition, given the interaction between quantitative and qualitative active ingredients, dosage information needs to be integrated into any agreed taxonomy. There are numerous ways in which the active ingredients of therapy could be structured into a taxonomy to optimise understanding and usage. We recommend that this is completed through an international consensus exercise with input from knowledge users and researchers, including from countries beyond those that are English-speaking.

5 | Conclusion

To conclude, our findings strongly justify the development of a precise internationally agreed taxonomy that integrates broad contextual understanding with an agreed lexicon of fine-grained active ingredients. Such a taxonomy would standardize terminology and avoid the proliferation of one-off labels and inconsistent definitions. This in turn would allow researchers to code and compare interventions systematically; support intervention replication and fidelity; and promote shared understanding with other researchers as well as clinicians, educators, and policy makers. Moreover, it would be fundamental to the creation of SLT/P-specific international reporting standards, a necessary resource to advance intervention evidence for children with or at risk for (D)LD.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data that support the findings of this study are openly available in OSF at https://osf.io/94tse/metadata/osf.

Endnotes

[1]None of the quotes include citing authors or page numbers as the intention here is to show examples of descriptors and inconsistencies in reporting, not to criticize fellow researchers.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.

Supplementary Figure S1: PRISMA Flowchart. **Supplementary Table S1**: Number of articles per country. **Supplementary Table S2**: Full list of Included Articles and their characteristics. **Supplementary Table S3**: Characteristics of Included Manuals. **Supplementary Table S4**: Full List of Coded Active Ingredients and number of times coded (n).

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