

REVIEW

Making oral comprehension interventions TIDieR: A narrative synthesis of interventions improving comprehension in children from 1 to 5 years with language difficulties

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Abstract

Background: Oral comprehension difficulties are prevalent in preschool children with language difficulties and are frequently the target of speech and language therapy (SLT) intervention. To support the implementation of research to practice, there is a need to identify effective interventions for this population and to describe their components. To date, reviews of oral comprehension intervention have not used inclusion criteria aligned with common clinical practice, particularly in the United Kingdom. No studies have previously used the Template for Intervention Description and Replication (TIDieR) checklist to describe developmental SLT interventions.

Aims: To identify intervention studies effective for oral comprehension in preschool children with language difficulties, using the UK definition of 'preschool' as children under 5 years; to describe the components of these interventions.

Method: This followed two phases: (1) an International Prospective Register of Systematic Reviews registered search, which identified 20 systematic reviews; and (2) an exploration of individual studies within these reviews. Seventeen individual studies described effective intervention for children from 1 to 5 years old with language difficulties. Data were extracted from each study against headings from the TIDieR checklist. Findings were analysed and reported using narrative synthesis.

Main contribution: A wide variety of rationales, techniques, procedures, settings and intensities were associated with effective intervention. The TIDieR checklist highlighted components that were unreported or under-described.

Conclusions: Studies show that intervention can be effective for improving oral comprehension in preschool children with language difficulties.

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Analysis of intervention components has relevance to clinical practice and research, and highlights the importance of naturally occurring interactions, cross-over between oral comprehension and expressive language and the variety in delivery models and dosage.

KEYWORDS

comprehension, language difficulties, intervention, preschool, TIDieR

WHAT THIS PAPER ADDS

What is already known on this subject

- There is a reported lack of research into interventions developing oral comprehension in children with language difficulties. Intervention checklists such as the Template for Intervention Description and Replication are valuable tools for understanding interventions and supporting the application of research to practice, but none have been used to describe interventions for children with language difficulties.

What this study adds

- There is evidence that intervention developing oral comprehension in preschool children (using UK definition, those under 5 years) with language difficulties can be effective. Analysing intervention components reveals key points for consideration by clinicians.

What are the clinical implications of this work?

- Intervention components identified by this study support the implementation of research to practice by highlighting particular areas for consideration by clinicians. For researchers, gaps in reporting demonstrate the need to describe all aspects of intervention to support replication and implementation.

INTRODUCTION

Difficulties with oral language are often first noticed between the ages of 2 and 3 years old, where they manifest as late emergence of first words and word combinations, together in some cases with difficulties understanding spoken language (Rescorla et al., 1997). Whilst some of these 'late talkers' resolve, many will have ongoing difficulties and when older may be diagnosed with language disorder, a relatively common condition affecting approximately 9.92% of children at school entry (Norbury et al., 2016). Language disorder is diagnosed when difficulties with the understanding and use of spoken language significantly impact functioning in everyday life (Bishop et al., 2017). It encompasses those for whom language difficulties exist in the presence of differentiating conditions such as autism, Down's syndrome or hearing impairment, as well as those who have difficulties in the absence of such

conditions, who are described as having Developmental Language Disorder (DLD). Difficulties with oral comprehension are amongst the predictors for the later diagnosis of language disorder in late talking children (Sansavini et al., 2021) and are a common feature in this group.

Although language disorder can be diagnosed in children younger than 5 years, this is not common practice as indicators such as risk factors, persistence, language domains affected and other differentiating conditions may be revealed only after a period of information gathering, assessment and intervention (Archibald, 2021). In the meantime, children with impairments in the use and/or understanding of language are often described as having 'language difficulties', a term encompassing a heterogeneous group of children with late language emergence, developmental delay, autism spectrum disorder, genetic or chromosomal disorders, sensory impairment or DLD. Given this context, this study investigates children with

language difficulties, some of whom will go on to be diagnosed with language disorder.

In the United Kingdom, children under 5 years old with language difficulties are generally seen by speech and language therapists (SLTs) within Early Years (EY) services and transfer to school-based services on school entry between the age of 4 and 5 years old. The description 'preschool' in this study therefore refers to children under 5 years old, in order to align with UK practice in EY services. The caseload of an EY SLT typically includes children with the range of conditions described earlier, and SLTs work within nurseries, preschools, community clinics, health centres and families' homes (RCSLT, 2021). There is evidence that oral comprehension is frequently a focus of speech and language therapy intervention for preschool children, particularly those with primary speech and language impairments (Roulstone et al., 2015).

Despite the well-documented lack of research into oral comprehension interventions, this area has been growing in the last 5 years. In their scoping review of oral comprehension interventions for 1- to 8-year-old children with language disorders or difficulties, Tarvainen et al. (2020) reported positive outcomes in 20 out of 25 studies meeting their inclusion criteria. Positive outcomes included interventions with 'reported improvements' but incalculable or statistically nonsignificant results (8/25 studies), as well as those with statistical significance or small to large effect sizes (12/25 studies). A systematic review by Rogde et al. (2019) investigating the effect of comprehension instruction on children from preschool to the end of secondary education synthesised the results of 43 studies to report tentative evidence that interventions were effective, finding small effects on vocabulary and grammatical knowledge and moderate effects on listening comprehension.

Although providing some encouraging evidence for intervention addressing oral comprehension, the design of the reviews and the studies cited within these pose challenges to clinicians seeking to apply the results to their practice. Participants do not always represent the population of children within UK EY caseloads as many studies describing preschool children as their participant group included those beyond 5 years. Whilst this aligns with educational models in many countries, it compromises the application of findings for clinicians based in the United Kingdom where children generally start school at 4 years old and services offered in EY provisions and schools can vary widely. Another challenge to application is the exclusion of children with additional conditions or diagnoses, which is not representative of a typical EY caseload. Furthermore, participant groups in research are frequently composed of those both with and 'at risk' of

language disorder. Whilst this is often necessary in large randomised controlled trials, it is not possible to determine the effect on children with language difficulties as the results are reported for the whole group. Finally, there are differences in the ways in which researchers have defined effectiveness. Whilst Tarvainen and colleagues included all studies showing change in a positive direction and/or 'reported benefits', other review authors have used statistical evaluation based on probability values or effect sizes.

Researchers promoting the implementation of research to practice describe the presence of a 'research/practice' gap whereby clinicians struggle to implement the findings of research. Frameworks or checklists specifying the core components of interventions have been promoted as a way of replicating research findings and supporting their application to practice. The Template for Replication and Description (TIDieR) (Hoffmann et al., 2014) is one such checklist, increasingly in use in several fields including speech and language therapy/pathology. It has been used in recent publications to describe the core components of interventions in aphasia (e.g., Monnelly et al., 2022; RELEASE collaboration, 2020) and elderly care (Davis et al., 2022). The TIDieR has been found to be beneficial in describing the presence and absence of key intervention components, and applying the checklist to intervention studies has led to new insights, such as the need to be explicit about the theoretical underpinnings of complex interventions.

To date, the TIDieR has not been used to describe speech and language therapy interventions for children with speech, language or communication needs. Given the disconnection between clinical and research populations and differing interpretations of benefit, there is a clear need to examine oral comprehension interventions in greater depth. The two aims of this research are therefore (i) to identify intervention studies effective for improving oral comprehension in children with language difficulties under 5 years of age (Phase 1), and (ii) to use the TIDieR checklist to isolate and describe the components of these interventions (Phase 2).

METHOD

Phase 1: Identifying intervention studies effective for oral comprehension in under 5s with language difficulties

Given the existence of several recent reviews examining oral comprehension, the first stage involved a systematic search for reviews examining oral comprehension, in order to identify intervention studies. The review was

TABLE 1 Review inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
Systematic/scoping review or meta-analysis	No description of systematic methods for searching, extracting and reporting information
Reviews intervention/s to improve aspect/s of language and/or communication	Reviews assessments or an area of theory Primary focus is an area other than speech, language or communication
Participants include those 5 years and below	All participants are 5 years and above or described as school-aged
Participants described as late talking, language delayed/impaired/disordered or having language difficulties.	All participants have typically developing language, are at risk of language impairment or language status is not described.
Review investigates oral comprehension or reports oral comprehension as an outcome measure	Oral comprehension is not a focus of the review or an outcome measure

registered with International Prospective Register of Systematic Reviews (ID: CRD42021267649). The reporting herein adheres to the Preferred Reporting of Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021).

A search of electronic databases was conducted in November 2021 covering ERIC (EBSCO), ERIC (ProQuest), Linguistics & Language Behavior Abstracts, Web of Science, PubMed, PsychINFO and Scopus. The Population, Intervention, Comparison, Outcome, Study design (PICOS; Schardt et al., 2007) study characteristics framework was used to generate the following search terms:

Preschool OR young child* OR toddler* OR kindergarten

AND comprehension OR receptive AND language impairment* OR language disorder* OR language difficult* OR language delay

AND intervention OR training OR rehabilitation OR therapy OR treatment* OR enhanc* OR improv*

AND systematic review OR meta-analysis OR review

The search also included speechBITE (<https://speechbite.com/>), American Speech-Language-Hearing Association evidence maps (<https://apps.asha.org/EvidenceMaps/>), University College London library catalogue and Google scholar (<https://scholar.google.com/>), as well as hand searches in reference lists of existing reviews and articles on the same or similar topics. Reviews were eligible for inclusion if they were published between 2000 and 2021 to ensure current relevance, written in English and matched the inclusion criteria listed in Table 1. No exclusions were made on the basis of participant diagnoses in order to gain

an overview of the range of participants included within existing intervention research.

Retrieved studies were imported into MS Excel and screening of all titles, relevant abstracts and full texts was independently completed by the main researcher (K.S.). A second researcher (P.Y.) independently screened 10% of the studies, resulting in an agreement rate of 100%. Information related to participant diagnosis/description, exclusions, age range and aim of the review was extracted and imported into MS Excel by K.S.

An additional selection process isolated studies resulting in improvements to oral comprehension in under 5s with language difficulties. The procedure was applied to all studies identified from reviews that met the inclusion criteria, together with their reference lists and additional searches of online databases. Table 2 lists the inclusion and exclusion criteria applied.

A mean age of 5 years, 0 months (60 months) was specified on the basis of existing intervention research, models of service delivery and age of school entry in the United Kingdom. In order to focus exclusively on interventions for children with language impairment, studies were included if all participants were described or identified as having language delay, impairment, disorder or difficulties. Where a description or diagnosis was not stated, a cutoff of one SD below the mean on language measure/s was taken, which aimed to capture those children falling below the typical range, whilst not excluding an unreasonable number of studies. Effectiveness was judged on the basis of probability value or effect size, with a separate criterion for single case designs (see Table 2).

Retrieved studies were imported into MS Excel and screening of all titles, relevant abstracts and full texts was completed independently by K.S. An additional researcher (a speech and language therapy lecturer) independently screened 10% of the studies, with an agreement rate of 95%.

Study quality was appraised using the indicators applied by Durán et al. (2016), adapted from Cirrin and Gillam

TABLE 2 Intervention study inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
Mean age ≤ 60 months	Mean not reported or from range provided mean >60 months
All participants described as having language impairment or individual scores provided indicate >1 SD below mean on language measure/s	Participant group is combination of language impaired and typically developing and/or at risk. Individual or group scores are <1 SD below mean on language measure/s
Results of specific measure/s of oral comprehension is/are reported as an outcome measure	Changes to measures of oral comprehension are not reported as an outcome
Intervention has a significant effect on a measure of comprehension ($p < 0.05$) or at least a moderate effect size ($d = >0.5$)	NS effect of intervention on comprehension or small effect size ($d = <0.4$)
For SCEDs, comprehension gain exceeds that expected by standard error of measurement	For SCEDs, no increase in comprehension score or scores cannot be interpreted with reference to standard error of measurement

Abbreviations: NS, non-significant; SCED, single case experimental design.

(2008) (see Appendix 1 for description of indicators). The objective of this framework is to report indicators of quality in treatment research.

Phase 2: Using the TIDieR to map components of effective interventions

Each of the eligible studies was read in detail and information relating to headings on the TIDieR checklist entered into an MS Excel spreadsheet (see table S2 for TIDieR headings and descriptions). K.S. independently completed this process for all studies and P.Y. independently extracted information for 29% reviews (five of 17 studies). Disagreements were discussed with co-authors until consensus was reached.

Narrative synthesis informed by the TIDieR checklist was identified as the method suited to this phase. It is used to synthesise evidence extracted from multiple studies, particularly where the aim is to generate new insights or knowledge (Barnett-Page & Thomas, 2009; Mays et al., 2005) and has been employed in studies using the TIDieR to examine aphasia intervention research (Monnelly et al., 2022; RELEASE collaboration, 2020). In order to facilitate an overview of the dataset, the researcher, an SLT with 20 years of experience of working with children with language difficulties, compiled a summary of every item under each of the TIDieR headings. Following this initial immersion in the data, taking each heading in turn, the researcher inductively generated initial themes from the items listed. A deductive process involving consideration of each item against initial themes identified additional component items or refined, combined or created new themes. Themes were presented to the research team for discussion and refined or confirmed.

RESULTS

A flow diagram detailing the review selection process is shown in Figure 1. There were 20 eligible reviews (see Table S1: Supplementary material for an overview of population and area of investigation) and from these, 282 unique studies were identified. A total of 17 were eligible for analysis using the TIDieR, as shown by the flow diagram in Figure 2. An overview of each study, together with number of TIDieR elements reported, is shown in Table 3.

Overall, studies cover research conducted in four countries (United States $n = 9$, United Kingdom $n = 5$, Australia $n = 2$, Canada $n = 1$) for a total of 1156 children. Quality rating is shown in Table 4. The group average was 6.75 from a possible 9 appraisal points, range: 4–9. The most commonly reported parameters were the validity of assessment measures (17/17 studies) and the reporting of statistical measures (16/17). Blinding and fidelity were infrequently described (5/17 and 6/17 respectively).

Results of mapping to the TIDieR are described against each of the 12 headings.

Brief name

Name or phrase that describes the intervention

Intervention descriptions varied widely according to the aim of the study. Several authors described their study in terms of delivery method, for example *weekly 1:1 intervention*, *nursery-based intervention*, *parent-based intervention*, *small group therapy* or *specialist intensive intervention*. Interventions were also described in terms of the approach under investigation such as *interactive book reading* or *interactive language instruction*. Two such cases cited the specific therapeutic approaches of *Enhanced Milieu*

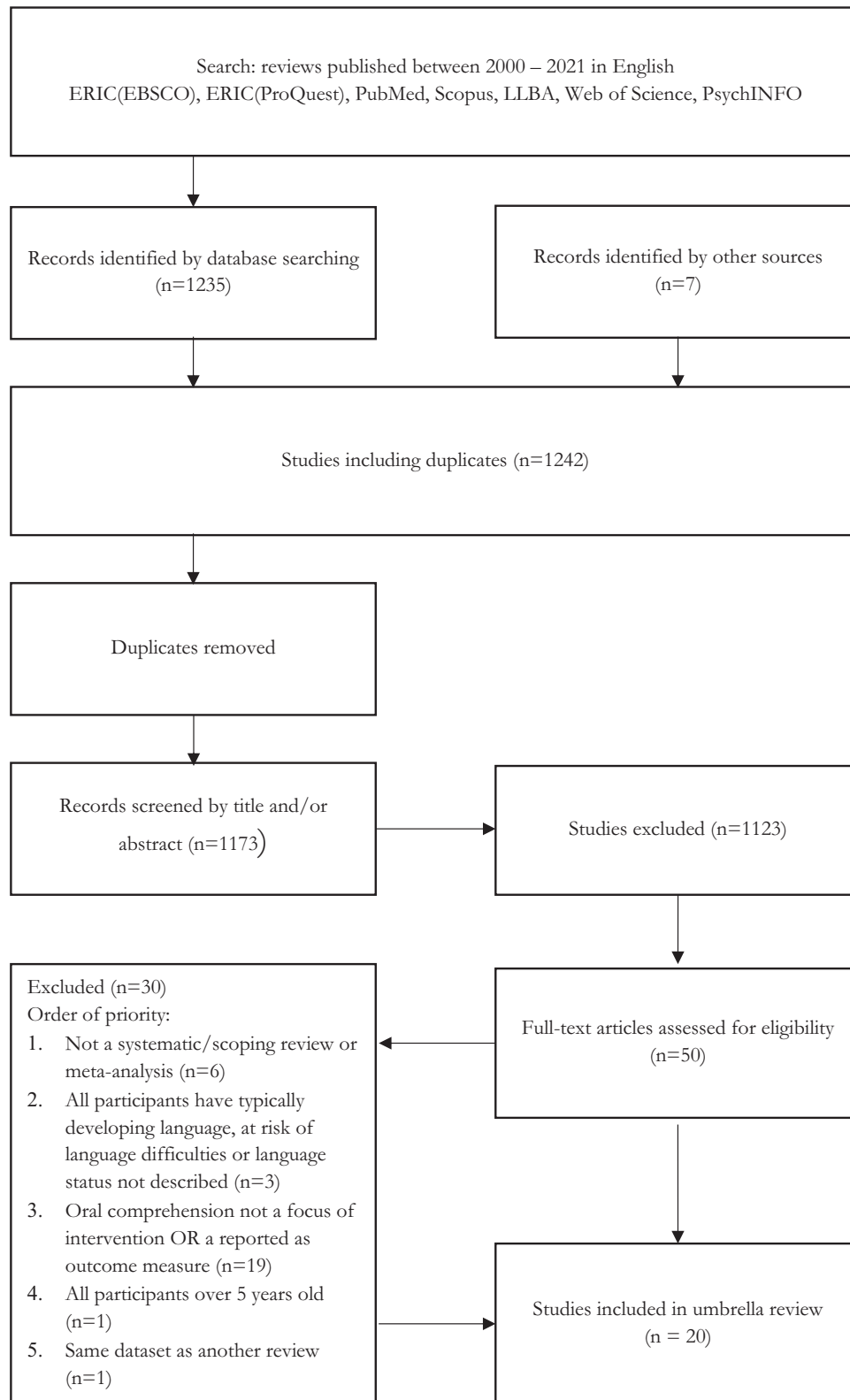


FIGURE 1 Review selection process.
Abbreviation: LLBA, Linguistics & Language Behavior Abstracts.



TABLE 3 Characteristics of eligible studies.

Reference (see Table 5)	Authors (Date)	Participant diagnosis/description	Age in years; months (mean)	Participants (n)	Area of investigation	TIDier elements reported (/12)
1	Barratt et al. (1992)	Language delay	3;1–3;7 (3;5)	42	Intensive vs. weekly therapy	8
2	Breit-Smith et al. (2017)	LI	3;1–4;8 (4;0)	6	Effect of interactive book reading on understanding of expository text structure and content	10
3	Camarata et al. (2009)	SLI	(2;10)	27	Treatment for expressive language on receptive language	9
4	Cole and Dale (1986)	Language delay	3;2–5;9 (4;6)	44	Direct instruction vs. interactive instruction	11
5	Colmar (2011)	Language delay	3;0–5;7 (NR)	14	Book reading intervention delivered by mothers	10
6	Colmar (2014)	Language delay or difficulties	4;3 - 5;7 (5;0)	36	Book reading intervention delivered by parents to disadvantaged children with LI	10
7	Gallagher and Chiat (2009)	SLI	3;7–4;2 (3;10)	24	Effect of intensive and nursery-based intervention	11
8	Gibbard (1994)	Language delay	2;3 - 3;3 (2;10)	36	Parent-based intervention	9
9	Gibbard et al (2004)	Language delay/speech and language delay	1;1–2;8 (2;0)	22	Parent-based intervention and its cost effectiveness	8
10	Glogowska et al. (2000)	Speech and/or language delay	1;6–3;6 (2;10)	159	Community-based speech and language therapy	7
11	Hancock, Kaiser and Delaney (2002)	Language delay and “emergent behaviour problems”	3;2–3;10 (NR)	5	Training parents from low SES backgrounds; supporting language and behaviour via implementation of parent/child interaction strategies	11

(Continues)

TABLE 3 (Continued)

Reference (see Table 5)	Authors (Date)	Participant diagnosis/description	Age in years; months (mean)	Participants (<i>n</i>)	Area of investigation	TIDieR elements reported (/12)
12	Lowenthal (1981)	Language delay	3;3–5;0 (NR)	40	Small vs. large group intervention	7
13	Restrepo et al (2013)	LI and DLL	3;7–5;8 (4;6)	256	Bilingual vs. English only vocabulary intervention on dual language learners with LI	10
14	Roberts and Kaiser (2015)	Language delay	2;0–3;6 (2;6)	97	Caregiver-implemented intervention	11
15	Thordardottir, Cloutier, Ménard, Pelland-Blais and Rvachew (2015)	Primary LI in children speaking a minority language	3;9–5;8 (5;0)	29	Bilingual and monolingual intervention on language acquisition. Intervention was focused stimulation.	11
16	van Kleeck et al. (2006)	LI	3;10 - 5;0 (4;2)	30	Effect of book sharing on literal and nonliteral language development	10
17	Wilcox et al. (2020)	Developmental speech and/or language impairment	3;10–5;3 (4;5)	289	The Teaching Early Literacy and Language (TELL) curriculum	11

Abbreviations: DLL, dual language learners; LI, language impairment; NR, not reported; SES, socioeconomic status; SLI, specific language impairment; TIDieR, Template for Intervention Description and Replication.

TABLE 4 Quality appraisal of studies included in TIDieR analysis.

	Barratt et al (1992)	Breit-Smith et al (2017)	Camarata et al (2009)	Cole & Dale (1986)	Colmar (2011)	Colmar (2014)	Gallagher & Chiat (2009)	Gibbard (1994)	Gibbard et al (2004)	Glogowska et al (2000)	Hancock et al (2002)	Lowenthal (1981)	Restrepo (2013)	Roberts and Kaiser (2015)	Thordardottir et al (2015)	van Kleeck et al (2006)	Wilcox et al (2020)
Comparison control group	✓	-	-	-	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓
Random assignment	✓	-	✓	✓	✓	-	✓	✓	-	✓	NA	-	✓	✓	✓	✓	✓
Initial group similarity	✓	-	✓	✓	-	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓
Fidelity	-	✓	-	✓	-	-	-	-	-	-	-	-	✓	✓	✓	-	✓
Blinding	-	-	-	✓	-	-	✓	-	-	✓	-	-	-	-	✓	-	✓
Intervention description	-	✓	✓	✓	✓	✓	✓	✓	✓	-	✓	-	✓	✓	✓	✓	✓
Measures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Statistical significance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓	✓	✓
Practical significance	-	✓	✓	✓	✓	✓	✓	✓	✓	-	NA	-	✓	✓	✓	✓	✓
Score	5	5	6	8	6	6	8	7	6	6	NC	4	8	8	9	7	9

Abbreviations: NA, not applicable; NC, not calculable (following Cirrin and Gillam (2008) on single subject studies); TIDieR, Template for Intervention Description and Replication.

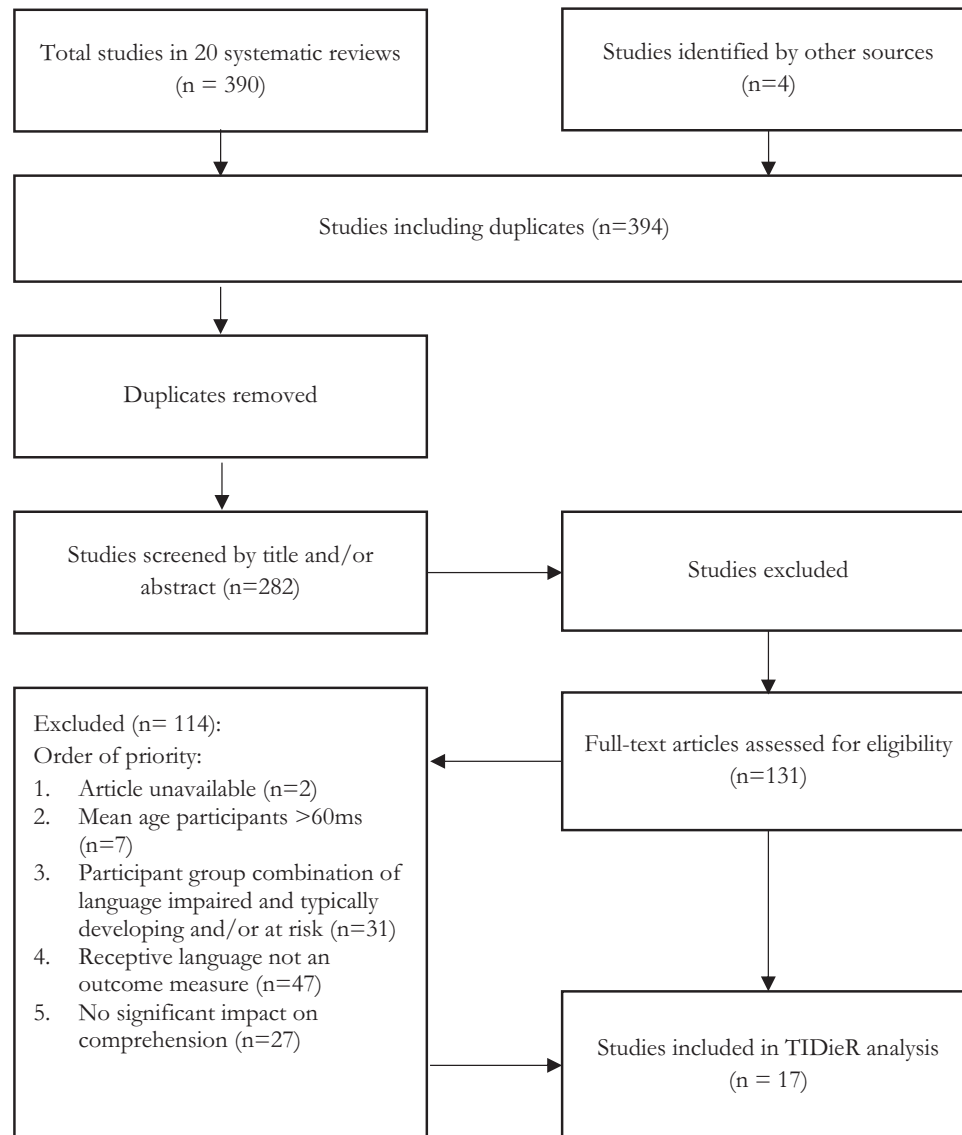


FIGURE 2 Study selection process.
Abbreviation: TIDieR, Template for Intervention Description and Replication.

Teaching (Roberts and Kaiser, 2015) and *focused stimulation* (Thordardottir et al., 2015). Other studies described their intervention in terms of linguistic targets, for example *vocabulary intervention* or *intervention for expressive grammar*. In some descriptions, targets were combined with the approach being used (*scripted book-sharing discussions to improve literal and non-literal comprehension*) or a combination of the method of delivery and the target (*teaching parents of children strategies to support language and behaviour*). Two studies referenced named intervention approaches: *Teaching Early Literacy and Language (TELL) curriculum* (Wilcox et al., 2020) and *direct language instruction using the DISTAR language programme* (Cole and Dale, 1986). One study (Glogowska et al., 2000) described the intervention in non-specific terms (*routine*

community-based speech and language therapy), omitting information relating to target, approach or details of delivery.

Why

Rationale, theory or goal of the elements essential to the intervention

Rationale was derived from theories of language development or impairment or the findings of previous research studies. This is captured within the themes described in later sections. An additional theme, *therapeutic techniques*, was identified from items extracted under this heading but



is described as part of heading 'What: procedures', due to the overlap in components.

Theories of language development and impairment

Intervention drew on the context of various theories of language development: that language develops through play, within the context of naturally occurring interactions with a carer, through the child's active participation in their linguistic environment, by the abstraction of linguistic rules and in association with other areas of cognition such as selective attention. The relationship between language development and external factors was a feature of studies describing the importance of high-quality parent/child interaction, maternal language and socioeconomic status. Intervention investigating the effectiveness of bilingual interventions specifically drew upon theories of bilingual language acquisition, whilst studies emphasising an individualised approach to intervention made reference to the fact that language difficulties are frequently accompanied by underlying and associated needs.

The nature of the linguistic input was highlighted by researchers describing the importance of rich vocabulary and syntax for communication, reading and learning. Research showing that parents of children with language impairment infrequently ask inferential comprehension questions was one rationale, together with the importance of prediction, explanation and hypothesising in typical language development. The overall relationship between language ability and reading, vocabulary and reading, and oral inferential comprehension with reading comprehension were theoretical factors underpinning several intervention studies.

Everyday communication as the context for language development was the rationale for studies implementing language learning strategies into everyday life by parents, and the embedding of language learning opportunities into school routines and activities by their teachers. The benefit of opportunities for frequent practice and the importance of carry-over or generalisation of language learning to everyday environments also justified elements of these studies.

Models of delivery

The effectiveness of small group intervention was used to justify interventions delivered in this format. Bilingual interventions drew on findings of previous studies demonstrating its effectiveness and professional guidelines.

Working with others was justified on the basis of the effectiveness of therapy delivered by parents/carers or teachers and as above, the subsequent opportunities afforded for practice, reinforcement and generalisation. Featured within this was a description of the importance of the parent/professional relationship and specific elements such as training, supervision and joint working.

Individualisation

Some studies involved participants following the same programme of goals and activities, whereas others justified individualisation of the programme by the heterogeneity of language profiles, the presence of additional needs and children's preferences and interests.

What: Materials

Any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery of in training of intervention providers

Materials covered those used by the child within the intervention and those supplied to others to support its delivery.

Used by the child

Materials used in therapy comprised of pictures, toys and books, which included picture and story books and expository texts, with the requirements that they were interesting and attractive to children, use photographs and drawings and feature limited amounts of written text. Some interventions using books as a key therapeutic technique had accompanying scripted questions, while others taught parents the use of general techniques (such as pausing, asking open questions) within book reading sessions. Bilingual interventions featured books in both English and other languages: either bilingual books featuring text in each language side by side or the same book in both languages. Pictures and picture series were used to elicit language, and toys described were those readily available in child-care or educational settings and motivating to young children with a range of interests. They included miniatures, puppets, art supplies, dolls, stuffed toys, modelling clay, games including card games and props for dramatic play.

Supporting intervention delivery

Materials supporting intervention delivery were therapy plans and guidelines, some of which were in the format of a manualised intervention protocol, lists of target words and structures, examples of scripts and prompts and the resources necessary to deliver the activities. Some interventions required specific additional materials such as cue cards used for whole class teaching activities. Materials used on an ongoing basis were record books, handouts and videos describing techniques and strategies, written instructions, feedback from the trainer and contact details of the researcher. Four studies (Barratt et al., 1992; Gibbard et al., 2004; Glogowska et al., 2000; Lowenthal, 1981) did not describe the materials used.

TABLE 5 Language facilitation strategies and techniques (What: procedures).

Language facilitation strategies and techniques	Intervention study ^a
Modelling	3, 4, 7, 10, 13, 17
Expanding/extending utterances	2, 13, 14, 16
Asking questions. Includes: contingent open questions; supporting child to identify expository structure in books; mixture of literal and inferential comprehension questions (70:30%)	2, 5, 6, 16
Responding to child's turns	4, 14, 16
Conversation as context for prompts to extend language	4, 5, 6
Recasting/conversational recast	3, 7, 17
Imitation: direct, elicited and imitation + modelling	3, 4, 7
Eliciting targets through prompts and imitation in play	3, 4, 7
Pausing and time delays, including using specific nonverbal prompting hierarchy	5, 6, 14
Prompting including using specific verbal prompting hierarchy	14, 16
Increasing/creating opportunities for child-initiated language	4, 5
Supporting children to respond to questions	2
Following the child's lead	3
Scaffolding child-led conversations	13
Providing definitions	13
Scaffolding instructions	13
Creating matched turns	14
Using words to describe environment and relationship among items	17
Demonstrating concepts with appropriate vocabulary and props	17
SEER (See, Example, Explain, Repeat) methods for vocabulary teaching	17
Linguistic mapping strategies (describing child's activity in a sentence using key vocabulary)	17
Reviewing	13

^aSee Table 3.

What: Procedures

Each of the procedures, activities and/or processes used in the intervention including any enabling or support activities

Approaches to intervention were of two broad types: (i) direct engagement with the child/children and (ii) training parents or others to support the child/children's language development. Three categories describe the activities, procedures and processes within these areas: language facilitation strategies and techniques, activities and training.

Language facilitation strategies and techniques

Table 5 lists language strategies and techniques and the studies in which they were used, the majority being 'milieu' techniques involving manipulating or arranging stimuli in the child's environment to create a setting that encourages the use of a targeted behaviour. The two

most commonly used techniques, modelling and expanding/extending utterances, are those typically associated with expressive language development. Other strategies were specific to the purpose of the intervention, such as asking inferential questions involving a specific ratio of question types.

A study embedding language and literacy instruction into teaching (Wilcox et al., 2020) separately listed the general support practices of reducing pace of speech, using visuals, rephrasing and simplifying, engaging the child prior to giving instruction, allowing additional time for the child to respond and offering choices.

Activities

Activities were described according to whether they supported language development within everyday occurrences, either at home or the classroom, or within time dedicated to language learning tasks. Activities within specific instruction time were retelling and acting out stories, vocabulary tasks including making vocabulary



books, using pictures including building and discussing picture sequences, following instruction games and activities from the Derbyshire Language Scheme. Interactive or dialogic reading was carried out in both dedicated language learning time and within everyday book sharing opportunities. Everyday contexts for language learning included conversations, play and snack times and games.

Training

Training included structured teaching using explanation and demonstration, and coaching and feedback as parents tried out strategies for themselves. Some studies encouraged parents to think creatively and flexibly about how to support their child by working in a group to design language activities or involved sessions on how to identify suitable materials and activities for their child.

Who provided

For each category of intervention provider (e.g., psychologist, nursing assistant) describe their expertise, background and any specific training given

Providers of intervention comprised of those delivering intervention to the child and those delivering training to parents. Delivering intervention to the child were parents ($n = 6$), SLTs alone ($n = 5$) and working in tandem with education staff ($n = 2$), researchers ($n = 3$) and teachers ($n = 1$). Those delivering training to parents were SLTs, researchers and 'specialists': early child specialists or a 'trained interventionist'. Where parents delivered the intervention to their children, studies provided background information about the parents such as age, socioeconomic status, income and/or educational attainment.

Where described, SLTs, teachers and researchers had from 6 to 31 years' experience. Expertise was described in various forms including nonspecific descriptions (e.g., '*certified and experienced*'), reports of the quality of their work ('*superior evaluations by their supervisors*') and details of their educational qualifications and their past experience.

Of the studies quantifying training, there was a large range (1 to 40 h). Training in several studies involved the teaching and practise of techniques central to the intervention, in one case (Roberts and Kaiser, 2015) covering 30 h over a 6-month period prior to the commencement of the intervention. Wilcox et al. (2020) combined group and individual training both prior to and during the intervention, where preschool teachers were trained via a 6-h group session and ten 2-h group sessions followed by indi-

vidualised in-class coaching on a weekly basis for one term, then biweekly for the second term. In contrast, Gallagher and Chiat (2009) reported that training had been offered to nursery teachers co-delivering the intervention with SLTs, but had not been taken up.

How

Models of delivery (e.g., face to face or by some other mechanism, such as internet or telephone) or the intervention and whether it was provided individually or in a group

All interventions were conducted face to face. Both direct intervention and parent training were delivered individually and in groups. Language intervention for children in groups mostly involved between two to five children, one study (Gallagher and Chiat, 2009) had a group of eight children and the largest, 10–16, was a class group (Wilcox et al., 2020). In the two studies where parent training was delivered in a group, one group featured a maximum of eight participants (Gibbard et al., 2004) and the other did not specify group size (Gibbard, 1994).

Where

The type(s) of location(s) where the intervention occurred, included and necessary infrastructure or relevant features

Intervention was delivered in a range of locations: educational settings such as nurseries, preschools, classrooms and Head Start centres (a programme in the United States providing services to low-income families), healthcare settings such as child development centres, health centres, clinics and a SLT centre. The child's home was the location for intervention between the parent and child, with one study (Gibbard et al., 2004) using the clinic as the training location and the home for intervention with the child.

When and how much

The number of times the intervention was delivered and over what period of time including the number of sessions, their schedule and the duration, intensity or dose

A breakdown of information related to when and how much by study is provided in Appendix 2. Where specified,

the overall number of sessions ranged from 11 to 140 (mean = 31.38; median = 24; SD = 32.80). Intervention took place from once a fortnight, for parent training sessions, to each day per week, for both intervention between a teacher and a child/children and parent-implemented interventions in the home.

The overall duration of intervention ranged from 8 to 34 weeks, with total time spanning the very wide range of four to 320 h (mean = 43.59; median = 18.75, SD = 76.63). The two studies describing the largest intensity and duration were programmes embedding strategies and specific learning activities into classroom activities. Here, hours related to the total amount of time the children spent in the educational setting and were therefore exposed to strategies at various points, but not the total time specifically engaged in language learning tasks.

One study only stated the overall duration of the study (6 months), but not the number of sessions or frequency. Others provided partial information, such as the frequency and duration of training phase with parents, but not the equivalent information for the intervention delivered by parents to their children at home.

Tailoring

If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when and how

Adaptation and personalisation included both the child and the parent. For the child, interventions around naturally occurring interactions meant that it was automatically adapted to their interests and routines. Using conversations around the child's interest as a vehicle for techniques such as asking open questions was an example of taking an individualised approach.

Some studies involving direct intervention from an SLT, teacher or researcher described using programmes individually devised for each child, using baseline skills or the child's language profile to set individual targets. However, studies did not always describe how individualisation was achieved.

Tailoring to parents' needs included adapting take-home information to their literacy levels. Studies described the need to be 'flexible', which in one study that trained parents (Roberts and Kaiser, 2015) involved the programme following an individual trajectory as new strategies were introduced following mastery of the one preceding.

Information about tailoring was absent from three studies (Breit-Smith et al., 2017; Lowenthal, 1981; Restrepo et al., 2013).

Modifications

If the intervention was modified during the course of study, describe the changes (what, why, when and how)

No studies described modifications to the intervention or whether modifications had been necessary.

How well

Planned: if intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them

Strategies to support adherence or fidelity included home visits during the training phase, telephone calls to parents halfway through the intervention period and record books for parents to note activities undertaken with their child. Adherence was also assessed through interviews or questionnaires to parents and SLTs. There was an overlap with the materials provided to those delivering the intervention; one study (van Kleeck et al., 2006) requiring teachers to ask a specific number and type of questions provided books with scripted questions.

Tools measuring fidelity included interviews with interventionists (parents or SLTs) and observations of intervention, either live or from a recording, using checklists of the components of the intervention. Measurements included parent ratings, inter-rater reliability and counts of specific features by researchers blind to the experimental condition.

For interventions involving training parents, fidelity measures included those taken to ensure fidelity of the trainers as well as the delivery of the strategies by parents. The one exception was the study by Roberts and Kaiser (2015), who measured the fidelity of the trainer only.

Six studies (Barratt et al., 1992; Camarata et al., 2009; Gibbard, 1994; Gibbard et al., 2004; Glogowska et al., 2000; Lowenthal, 1981) did not provide a description of any planned measures of adherence or fidelity.

How well

Actual: if intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned

Results of fidelity measures showed that in nearly all cases, intervention was delivered as planned. In one study

(Colmar, 2011), four out of 14 mothers minimally implemented the intervention, three of these due to child 'non-cooperation'. In another (Gallagher and Chiat, 2009), difficulties delivering the intervention as planned and for the duration intended were due to the lack of availability of nursery staff or the same member of staff, and difficulties securing a protected space.

DISCUSSION

This research took a systematic and detailed approach to identifying evidence for oral comprehension interventions in preschool children with language difficulties and described the components of these interventions. It revealed a total of 20 reviews and a further 17 studies describing interventions for a total of 1156 children. Given the large number of studies contained within the reviews, surprisingly few, 17, met the inclusion criteria designed to reflect typical caseloads of UK SLTs working with children with language difficulties in EY settings. This adds weight to claims (for example Rinaldi et al., 2021) that oral comprehension interventions for children with language difficulties would benefit from further direct investigation. Mapping the components of the eligible studies to the TIDieR checklist revealed a wealth of relevant information for practice and research. Discussion below focuses on how these results can guide clinical decision making for work with children with oral comprehension difficulties.

For a typical UK EY clinical population, intervention for oral comprehension can be effective. However, this research is not easily accessible to clinicians. It has taken this review and secondary data analysis to reveal the individual studies providing the evidence. One reason for this lack of visibility is the finding that oral comprehension has rarely been investigated for its own sake. It has far more frequently been employed as an additional outcome measure in studies whose primary aims were to examine other areas of language or intervention. Another reason is the discovery that the majority of intervention techniques are associated with expressive language development. Studies (notably Camarata et al., 2009) showed that developing expressive language had a 'knock-on' effect on comprehension. Interventions taking a 'milieu' approach (frequently parent-implemented interventions) mainly employed strategies and techniques focusing upon the child's output, yet produced a change in their understanding.

Research to practice implications are two-fold. Firstly, clinicians may need to look widely and think creatively about how to search for evidence for oral comprehension intervention. Secondly, it is a prompt for clinicians and

researchers to consider the ways in which comprehension and expression are conceptualised and targeted. Studies in this review provide evidence of interconnected, rather than separate, linguistic systems, furthering the argument that skills across language modalities are supportive of each other during development (Rogde et al., 2019). Oral comprehension should not, therefore, be addressed in isolation from other aspects of language.

A factor influencing the implementation of research into practice is the extent to which research reflects clinical reality. Despite deliberately not excluding children with additional conditions or diagnoses in the systematic search, none of the 17 studies eligible for analysis included participants with autism, learning disability or sensory impairments, and only two focused on bilingual interventions. This does not reflect the clinically and linguistically diverse caseloads of many SLTs, highlighting an important research-practice gap.

Consideration of intervention components reveals areas where typical clinical practice appears to be out of step. The frequently invoked rationale that language develops within everyday interactions suggests that intervention should be situated within naturally occurring environments. When asked about the intervention they delivered to support comprehension in preschool children with primary speech and language impairments, Morgan et al. (2019) found that SLTs "...predominantly focused on children following structured, play based, directions and varying the amount and variety of words that carry meaning in a sentence..." (p. 959). Such tasks tend to be delivered in structured clinician-led activities, rather than naturally occurring environments. This finding is a prompt for clinicians to consider how day-to-day interactions play a part in their intervention.

Components extracted within the TIDieR heading *Why?* can inform potential targets for oral comprehension intervention. Theories of language and literacy development were frequently evoked as rationale for particular targets. In addition to the interconnected nature of language mentioned earlier, studies addressing vocabulary emphasised the importance of rich vocabulary for learning, and work on inferential comprehension was justified on the basis of benefits to language and reading. Richness of vocabulary and inferential comprehension in children with language difficulties may not be commonly addressed. In a survey of the intervention practices of UK SLTs working with preschool children, 67% of respondents 'always or sometimes' focused on "basic/key vocabulary", whilst none described more complex or less frequent vocabulary, or inferential comprehension (Roulstone et al, 2015).

The TIDieR analysis revealed that effective interventions for oral comprehension can be delivered individually,

in groups, small classes, and in a range of settings. A prevalent model of delivery involved working closely with parents, training them to use particular techniques at home. In addition to specifying effective intervention techniques and strategies, analysis of components highlights other core aspects of this model, such as coaching, review, feedback, support via home visits and the provision of additional materials. It is important therefore, for SLTs to consider how they train and support parents, as well as the content of the intervention programme.

For a clinician looking for evidence regarding session duration or number, the range reported within the studies poses a challenge. Whilst some studies provided a smaller, arguably clinically realistic number, others delivered an intensity of intervention or pre-intervention training highly unlikely to be replicable in clinical practice. It is perhaps unsurprising that significant effects were found in studies where children had engaged in language learning tasks over 140 sessions spread over the course of a morning or afternoon for 5 days a week. Even the studies using fewer sessions (minimum 11, over a 6-month period) are in contrast to practice commonly reported in the UK where sessions are generally delivered once a week and/or over much shorter durations.

The diversity of ways in which researchers have described treatment duration and intensity demonstrates the need to go beyond conceptualising dosage in terms of number and length of treatment sessions. Recent research by Frizelle et al. (2021b, 2021a) has emphasised the importance of specific descriptions of both quantitative and qualitative aspects of dosage. There is evidence that these elements are often lacking in intervention reporting. For example, whilst children might have been in a classroom or therapy session for a 3-h period, the dosage or intensity, measured in learning opportunities, is unknown. This research therefore supports the call to improve intervention reporting with reference to these elements (Frizelle et al., 2022), which will improve how clinicians can apply the findings from research to practice.

The numerous and diverse techniques effective for oral comprehension highlight the difficulty in providing a simple description of any particular intervention. Furthermore, the variety of techniques employed within any single study emphasises the complexity of language intervention. In practice, an intervention programme is often a combination of techniques individualised for the child and their parents/carers (Morgan et al., 2019). Whilst the studies described here reflect the diversity of practice, the process of individualisation was often missing from the intervention description. The TIDieR therefore highlights the necessity of describing the intervention individualisation to support the replication of research to practice.

The TIDieR also draws attention to the importance of fidelity and adherence. Support and measurement of fidelity and adherence were missing from some aspects of intervention programmes, particularly in specifying the parent role in parent-based interventions. Describing fidelity and adherence also sheds light on the practical challenges of intervention delivery, information that may be crucial to the successful delivery of therapy in clinicians' working environments. For example, the nursery condition in the study by Gallagher and Chiat (2009) reported difficulties working with the same staff member, time spent negotiating room space and difficulties ensuring that work carried over between sessions, which may have an impact upon the effectiveness of the intervention.

LIMITATIONS

The strict exclusion and inclusion criteria employed in this study resulted in many studies not being analysed. Restricting the age limit and specifying that all participants met the criteria for language difficulties were particular reasons why studies became ineligible. However, the criteria were informed by a deliberate choice to isolate studies that could inform practice for preschool children in the United Kingdom. Similarly, studies were excluded due to the decision to consider only those that resulted in a statistically significant effect or at least a moderate effect size. However, doing so provided a quality control for studies that went on to have intervention components extracted.

Whilst the TIDieR was an effective tool to describe intervention components in this study, researchers have questioned its ability to fully capture the complexities of language intervention, particularly due to the lack of detail within each heading (O'Rourke et al., 2018). Work proposed by Frizelle et al. (2022) to develop guidance and consensus on key elements of the TIDieR headings for children with DLD constitutes an important step forward.

Overall conclusions and implications

This research aimed to identify intervention studies effective for oral comprehension in preschool children with language difficulties and to describe the components of these interventions. Contrary to reports of a lack of evidence, there is research showing that oral comprehension can be improved in preschool children with language difficulties who are typical of a UK EY caseload. This study is the first to use the TIDieR framework to identify

components in developmental speech and language therapy interventions and doing so has revealed a variety of rationales, techniques, procedures, settings and intensities associated with effective intervention.

Whilst the variety may pose a challenge for synthesising findings from research into overall conclusions and recommendations for practice, some pointers emerge for clinicians to consider when delivering interventions to develop oral comprehension in preschool children with language difficulties. Everyday situations and interactions are an important context for language development and there is value in targeting the development of rich vocabulary and inferential comprehension. When working with parents/carers, programmes should include how parents are supported to deliver and adhere to the intervention in their home environment. The benefit of expressive language facilitation techniques within interventions developing oral comprehension is a prompt for clinicians to reflect on the way that receptive and expressive language are targeted if these are currently addressed in isolation.

The TIDieR framework has a clear place in developmental intervention research. Gaps in reporting revealed by scrutinising studies against this checklist have highlighted the need to fully describe all aspects of intervention in research in order to support their replication and implementation in practice.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

PERMISSION TO REPRODUCE MATERIAL FROM OTHER SOURCES IF ANY

None.

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SUPPORTING INFORMATION

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

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APPENDIX

APPENDIX 1

Quality indicators of treatment comparison studies (indicators used by Durán et al. (2016), adapted from Cirrin & Gillam (2008)).

Parameter	Criterion
Comparison control group	Did the study include a control group and one or more treatment groups?
Random assignment	Were the participants randomly assigned into the treatment and control groups?
Initial group similarity	Did statistical analysis demonstrate that the groups were the same in all important ways except for the treatment under investigation?
Fidelity	Was the fidelity of implementation of the intervention adequately reported and were acceptable levels (>80%) achieved?
Blinding	Was blinding used to ensure that the individuals who conducted the assessments and analysed the data did not know which groups (treatment, comparison or control) the participants were assigned to?
Intervention description	Is the intervention described in sufficient detail to support replication?
Measures	Were the formal and informal measures used to assess the treatment outcomes valid and reliable?
Statistical significance	Did the authors report <i>p</i> values for all dependent variables?
Practical significance	Did the authors report eta-squared values or standardised <i>d</i> values for all dependent variables? If not, could they be calculated from the data that were provided?

APPENDIX 2

Number of sessions, intensity and duration per study

Study	Number of sessions	Intensity and duration	Total hours*
Barratt et al. (1992)	24	1x per week, 6 months	16
Breit-Smith et al. (2017)	24	3x per week, 8 weeks	Approx. 8.8
Camarata et al. (2009)	24	2x per week, 12 weeks	24
Cole and Dale (1986)	NS	5x per week, 32 weeks	320
Colmar (2011)	NS	Daily and when opportunities arise, 4 and 8 months	NS
Colmar (2014)	NS	Daily and when opportunities arise, 4 months	10.17–30.5**
Gallagher and Chiat (2009): Intensive condition	24	1x per week, 24 weeks	90 - 96
Gallagher and Chiat (2009): Nursery condition	12	1x per week, 12 weeks	8–11 (estimated)
Gibbard (2004)	11	1x per fortnight, 6 months	11–13.75
Gibbard, Cogan & MacDonald (2004)	11	1x per fortnight, duration of programme NS	Approx. 16.5
Glogowska et al. (2000)	NS	NS	NS
Hancock et al. (2002)	30 (max.)	2x per week, duration of programme NS	15–22.5
Lowenthal (1981)	NS	5x per week, 6 months	Approx. 31.25
Restrepo et al. (2013)	48	4x per week, 12 weeks	36
Roberts and Kaiser (2015)	28	2x per week, 3 months	28
Thordardottir et al. (2015)	16	1x per week, 16 weeks	13.33
Van Kleeck et al. (2006)	16	2x per week, 8 weeks	4
Wilcox et al. (2020)	140	Daily, 34 weeks	NS

Abbreviation: NS, not specified.

*Calculated by data provided in minutes.

**Estimated on the basis of daily sessions for 4 months, sessions 5–15 min long.