'Better Conversations with Developmental Language Disorder': feasibility and findings from an initial evaluation of a novel intervention.

Lucy Hughes[1,2], Caroline Newton[3], Juliette Corrin [3] and Wendy Best[3]

[1] Moor House Research and Training Institute, Moor House School & College, Oxted, UK
[2] School of Psychology and Clinical Language Sciences, University of Reading, UK
[3] Division of Psychology and Language Sciences, University College London, UK

Correspondence to: Lucy Hughes, Moor House Research and Training Institute, Moor House School & College, Mill Lane, Hurst Green, Oxted, Surrey, RH8 9HN, UK.
hughesl@moorhouseschool.co.uk Tel: 00 44 1883 712271

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Abstract

Purpose

Developmental Language Disorder (DLD) affects around 7.5 per cent of children and can impact education and social well-being. Thus far, interventions for school-aged children with DLD have been targeted at single-word or sentence level. This paper evaluates 'Better Conversations with Developmental Language Disorder' (BCDLD), a co-produced, conversation-focused intervention grounded in Communication Partner Training and Parent Child Interaction Therapy, both evidence-based approaches used globally across populations with communication difficulty.

Method

Six children with DLD (6;06 - 8;02 years) participated in BCDLD with their mothers. Each completed three baseline assessments and six conversation-focused therapy sessions. Video feedback was used to highlight facilitative and barrier strategies within their talk and to agree targets for change. Post-therapy and follow-up measures evaluated progress in response to intervention. The study employed conversation-based outcome measures, which were novel for this client group. Feasibility of the approach was explored with regard to recruitment, retention and acceptability. The practicality of using conversation-based outcome measures was evaluated.

Results

There was significant change in targeted conversation behaviours, the primary outcome measure, for five dyads after intervention. Secondary, indicative, outcomes demonstrate a significant increase in children's average utterance length for the group. Numerical change in child-to-adult ratio of speech was achieved, in line with

intervention targets, and for five children there was a numerical change in functional communication on the CCC-2 (Children's Communication Checklist). Feasibility results demonstrate good retention and acceptability, including time taken to transcribe and analyse conversation-based measures.

Discussion

The results suggest that school-aged children with DLD can benefit from direct intervention to improve their everyday conversation, and the approach can produce change on targeted communication behaviours and conversation measures. Feasibility findings provide support for the further development of BCDLD. Further co-produced research is necessary to refine the intervention, explore active ingredients and consider issues of candidacy and implementation within clinical services.

Keywords: *Case studies, Children 6-8 years, Developmental Language Disorders, Language Acquisition and Development*

1. Introduction

Conversation is the primary and most natural context for child language acquisition (Clark, 2016). Through their everyday interactions, primarily with parents and carers, children learn and hone the multiple skills required to communicate through language, including phonology, syntax, vocabulary and pragmatics. For children with developmental language disorder (DLD), learning to converse well with others can present significant challenges, due to difficulties understanding and responding 'online' in the quick back-and-forth of natural conversation. This, in turn, can limit children's access to essential rich language-learning opportunities, which gradually build linguistic and conversational competence for their typically-developing (TD) peers.

1.1 Typical language development

The provision of rich and engaging adult input, or 'language nutrition' (Head Zauche et al., 2017) has been shown to promote children's linguistic growth by feeding the child's maturing brain in a manner similar to the effects of a healthy diet on physical development. Multiple robust studies have established a link between the number of words spoken to a child in their first three years of life and their later language and literacy outcomes (e.g., Dickinson & Porche, 2011; Hoff, 2013; Weisleder & Fernald, 2013). Additionally, recent emergentist theories (MacWhinney et al., 2022) highlight the child's own role in shaping their language learning trajectory by drawing upon their rich pre-linguistic communicative and cognitive abilities, together with their experience and uptake of environmental input through everyday social interactions. Several studies have underlined the importance of this two-way exchange between caregivers and children by identifying a mechanistic link between the number of back-and-forth conversational turns within adult-child interactions and early

neurolinguistic development (Romeo et al., 2018a, b). In this research, greater participation in conversation with parents and carers is associated with stronger connections between language regions of the developing brain.

Romeo et al.'s (2018a) neuroscientific findings align with behavioural data, which examines the effects of early talk-in-interaction. For example, Gilkerson et al. (2018) found that the number of adult-child conversational turns at age 18-24 months was strongly correlated with child receptive and expressive language scores at school age (between 9 and 13 years old). However, it is difficult to discern what factors may have contributed to the initial variation in adult-child turns. For example, Leech & Rowe (2021) suggest that toddlers with more advanced communication skills are more likely to be able to establish and maintain conversation with their mothers than those with delayed or disordered language.

1.2 Atypical language acquisition: developmental language disorder

Whereas the majority of children acquire language quickly and apparently effortlessly in the first 10 years of life (Hartshorne et al., 2018), some children have severe and persistent difficulties in learning and using their native language, which affect their day-to-day functioning and can impact on their social and educational outcomes (Bishop et al., 2017). For around 2.34% of children, these language difficulties are associated with an underlying bio-medical condition, such as autism spectrum disorder (ASD). However, a further 7.58%, or two pupils in every class of 30, start school with developmental language disorder (DLD; Norbury et al., 2016). This has been defined as: 'a lifelong condition characterised by difficulties with understanding and/or using spoken language,' for which there is no single known cause (Royal College of Speech and Language Therapists; RCSLT, 2018, p. 1).

The nature and severity of DLD vary for each child and may change across the lifespan. Common features include difficulties with word-finding in isolation or in discourse (Best et al., 2021); phonology, including articulation and awareness of and ability to manipulate rhyme, syllables and blends of speech sounds (Ramus et al., 2013), morphology and syntax (Calder et al., 2021) and pragmatics (Andrés-Roqueta & Katsos, 2020; Norbury, 2014). However, individual children may also show strengths in any of these areas.

Depending on their individual language and communication profile, DLD can impact on a child's ability to participate in conversations with family, teachers and peers (Bishop et al., 2017; Croteau et al., 2015). It can also have wider consequences for children's academic attainment, employment prospects and social well-being (Chow & Jacobs, 2016; Conti-Ramsden et al., 2018; Mok et al., 2014). Taken together, the prevalence and enduring effects of DLD highlight the need for the development of effective, theoretically based interventions to support children and families.

1.3 Intervention for DLD

Given the impact of language disorder on children's everyday interactions and the key role carers play in supporting their child's development, many SLP approaches for pre-school children focus on training adults to interact with their language-impaired children in ways that are known to facilitate communication and progress with spoken language. For a review of parent-mediated interventions, see Roberts et al. (2011, 2019). Among the most widely employed therapy packages in Canada and the US is the Hanen 'It Takes Two to Talk' programme (Pepper et al., 2004). This comprises a mixture of group training sessions and individual home visits for parents to develop knowledge and understanding of language development and supportive communication strategies. During these visits, parents are videotaped while

practising strategies to support their child. These videos are reviewed by the parent and SLP to identify what is most helpful for the child's language development, as well as to monitor progress and set ongoing therapy goals.

A related intervention approach, which is commonly used with the parents of pre-school children with language difficulties in the UK, is parent-child interaction therapy (PCIT; Falkus et al., 2016). Like Hanen, PCIT employs video recordings of play sessions between adults and their children to highlight key communication strategies and support parents to reflect on their own interaction style. However, PCIT typically takes place in clinic and is condensed into four to six individual sessions, with no additional group training. The focus of intervention is to encourage parental communication behaviours, which have been found to be positively related to TD language development (Pickstone et al., 2009), in order to scaffold and support child language acquisition.

A summary of the most common PCIT targets and components of intervention (some of which overlap with Hanen and other related programmes) is provided in Appendix A. Detailed consideration of these features informed the development of the 'Better Conversations with Developmental Language Disorder' (BCDLD) intervention, investigated in this paper.

Whereas PCIT is the most widely-used intervention for pre-school children with speech, language and communication needs in the UK, it is rarely employed once children reach school age (Roulstone et al., 2012). Instead, interventions for primary pupils tend to focus on structural language skills and are typically delivered by teaching assistants, or other educational staff (Ebbels et al., 2019). One exception to this is a study by Allen & Marshall (2010), which investigated the effectiveness of PCIT for children aged 8-10 years with expressive language disorder. Sixteen

children with DLD and their parents participated and were randomly assigned to either an intervention or delayed treatment (control) group. Outcomes were assessed through video analysis, focusing on the following measures: child verbal initiations, verbal and non-verbal responses, mean length of utterance (MLU) and proportion of child-to-parent utterances.

The results showed children in the treated group improved on three out of the five target parameters: verbal initiation, MLU and proportion of child-to-adult speech. These outcomes appear promising. However, the study did not include any baseline period, making it difficult to determine whether change was achieved, over and above progress which would be expected from natural maturation. Furthermore, children continued to receive other language intervention during the project, including one-to-one and direct therapy, which complicates interpretation of the findings.

Despite children in the Allen & Marshall (2010) study being in Key Stage 2 (UK school years 3-6), the authors followed the example of early years PCIT in focusing on play-based situations, which may not reflect participants' day-to-day encounters with family, peers and adults outside the home (Croteau et al., 2015). In addition, the intervention focused solely on the role of parents and carers in tailoring their input in order to promote language development; pupils were not offered strategies to support their own expressive or receptive language, or to modify their turns in conversation.

1.4 Conversation-based therapy for adults with communication disorders

In contrast to the lack of conversation-based intervention for children with DLD, conversation therapy is a well-established method, which is used to address communication difficulties for adults with acquired language disorders, e.g., stroke-

related aphasia (Simmons-Mackie et al., 2016), cognitive communication disorder (Togher et al., 2013) and language-led dementia (Volkmer et al., 2023). These adult-focused programmes fall under the umbrella term 'communication partner training' (CPT) and are defined as 'planned intervention that is explicitly designed to enhance conversational abilities' (Simmons-Mackie, 2008, p. 253).

Among the most widely adopted CPT approaches is 'Better Conversations with Aphasia' (BCA; Beeke et al., 2014; Best et al., 2016), a manualised intervention programme, which can be accessed online at: https://extend.ucl.ac.uk. BCA was originally conceived for clients with conversational difficulties arising from agrammatism but has since been adapted for wider use with other forms of aphasia. The programme is informed by the principles of Conversation Analysis (CA), a qualitative research method, which focuses on examining video or audio-recorded data to identify patterns within naturally-occurring talk. CA is an inductive approach, which addresses how conversational turns are designed and ordered, as well as how participants understand and respond to each other within their everyday interactions (Sacks, 2010; Schegloff, 2007). Importantly, turns are seen in context, with each conversational act being conditional on its predecessor and influencing successively how the next speaker responds.

Therapy involves working directly with people with aphasia (PWA) as well as their communication partners (CPs). Prior to intervention, the dyad is asked to record themselves conversing as they would typically at home. The delivering SLP then views the videos in preparation for each session, identifying potential barriers, or trouble in the talk, as well as behaviours which appear to facilitate conversation, e.g., times when the participants resolve any difficulties and/or appear to be enjoying the interaction. These instances are highlighted and discussed within therapy, using

video clips to aid reflection and understanding. The PWA and CP are then supported to set goals collaboratively with the therapist, based on what the clients themselves identify as important or problematic within their talk.

A summary of example barrier and facilitator strategies, which have been identified and targeted during BCA intervention is provided in Appendix B. As for the core components of PCIT, these key conversation behaviours informed the design and delivery of the novel intervention which is evaluated in the current study. See Hughes (2024), Chapter 3, for a detailed description of how BCDLD was co-designed with key stakeholders and was informed by theory and interventions used successfully with other clinical populations. The programme aimed to address an unmet need for a conversation-based intervention, tailored for school-aged children with DLD, in the context of lack of change in language measures reported for many existing interventions for this population (Ebbels et al., 2019).

1.5 Study aims, outcomes and research questions:

Having identified a gap in the literature and current SLP practice for conversation-based therapy involving school-age children and their carers, this study aimed to develop, evaluate and explore the feasibility of a new intervention (BCDLD), targeted at children with DLD aged 6-8 years, which incorporates principles and techniques from both PCIT and CPT. The primary outcome was targeted conversation behaviours because these were expected to change as result of the intervention. These behaviours differed across dyads and thus are necessarily analysed at the individual level. Secondary outcomes, additional variables monitored to help interpret the results of the primary outcome, were child mean length in words and ratio of child-to-adult speech - both conversation variables not targeted directly by BCDLD, which have been used to measure change in previous

PCIT studies (e.g. Falkus et al., 2016) - and a measure of children's functional communication, the Children's Communication Checklist (CCC-2; Bishop, 2003). Secondary outcomes are more exploratory in nature, or variables for which effects may be too small to detect from the sample, but which are still of interest and valuable to assess. They can be used to inform hypotheses or theories, or aid in interpretations of findings and in this study are investigated at the group level to provide an indication of potential for change. The following research questions will be addressed in relation to six mother-child dyads who participated in the case series study:

Primary Outcome – change on targeted behaviours in conversation

1) Does the number of targeted facilitators used by children and parents in conversation increase after intervention?
2) Does the use of targeted communication barriers used by children and parents in conversation decrease following the intervention?

Secondary Outcomes – change in wider measures of conversation and language

3) Does children's mean length of utterance in words (MLUw) increase following the intervention?
4) Does the ratio of child-to-adult speech change after intervention?
5) Do children's CCC-2 scores increase following the intervention?

In addition, the study will evaluate the feasibility of BCDLD with respect to recruitment and retention, acceptability, and suitability of chosen outcome measures.

2. Method

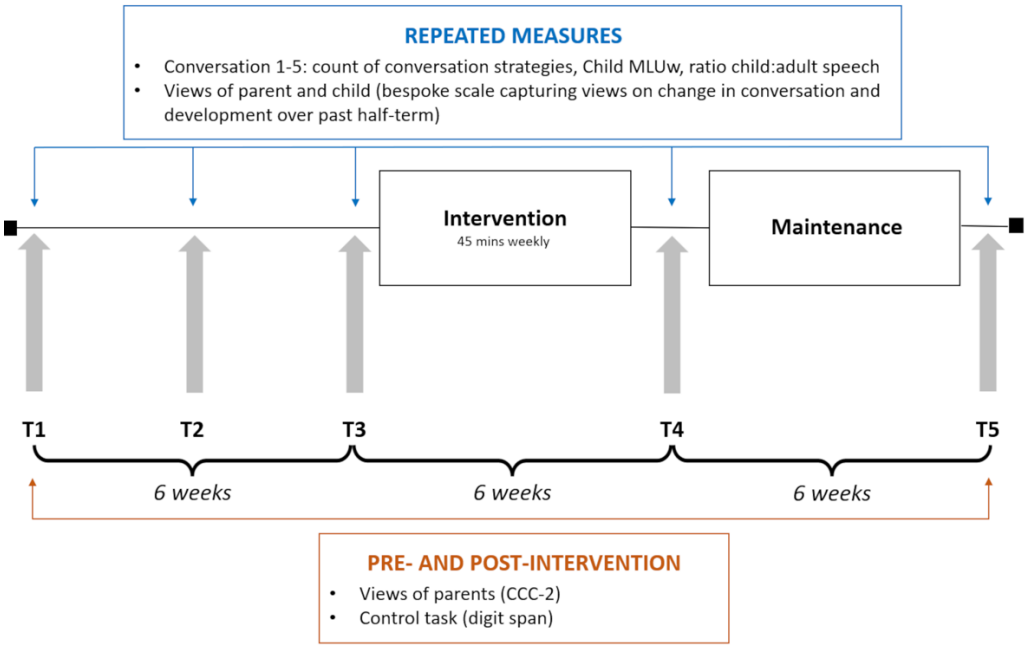
2.1 Ethics

This study was granted ethical approval by the University College London Research Ethics Committee (approval number 2981/003). Parents and children were each provided with an information sheet, detailing the purpose and structure of the research and gave their informed written consent to participate in the study (see Supplementary Materials).

2.2 Design and feasibility of outcome measures

The study incorporated several features of single case experimental design with replication across a series of dyads. Repeated measures were taken at several timepoints throughout the study - three recorded conversations were collected for each dyad prior to therapy, one immediately post-intervention and another at follow-up six weeks later. See Figure 1 for phases of the study and assessment details.

Figure 1: Study design



Screening entailed a video of conversation, recorded by the dyad, and discussion with the parent about their child's language and conversation strengths and needs. Core sections of the Clinical Evaluation of Language Fundamentals (CELF 5; Wiig et al., 2017) were administered to confirm a clinical language difficulty and a non-verbal task (Pattern Construction from the British Ability Scales; Elliott & Smith, 2012) was used to ensure children referred with DLD did not have significant learning difficulties beyond language, which could affect their ability to participate in the BCDLD intervention.

Parents were also asked to complete the CCC-2 as a secondary outcome measure of functional communication, which is appropriate for administration with this age group and could reflect changes beyond conversation.

The repeated measures design enabled us to look for patterns at an individual level across phases of the study and to help account for the inherent variability in conversation data (Perkins et al., 1999). Contact time with the SLP was matched during the pre-intervention, intervention and post-intervention phases to control for any Hawthorn, or 'charm' effects, which may have resulted due to participants' awareness of being seen by a professional over the course of the study. Children were not receiving any other direct language intervention during their involvement in BCDLD. The intervention lasted a pre-specified number of sessions (Howard et al., 2015).

A control task (digit span) was carried out before and after intervention. Children with DLD consistently perform poorly on verbal working memory tasks (Arslan et al., 2020). Therefore, this is a skill that has room for improvement in many children with

DLD. The evidence suggests that therapy aimed at everyday conversation would not be expected to impact on digit span scaled scores (Best et al., 2016).

Whilst five conversations were recorded and analysed for each dyad across phases of the study, this is fewer than recommended by the Single-Case Reporting Guideline in BEhavioural Interventions (SCRIBE; Tate et al., 2016) and the What Works Clearing House Single Case Experimental Design quality standards (WWC SCED; Kratochwill et al., 2013). For findings from multiple baseline designs to be meet WWC standards without reservations, the first baseline phase must have at least six data points. There should also be a staggered introduction of the independent variable across different points in time. All subsequent phases must have five or more data points per phase. For this study, it was not feasible or appropriate to collect this amount of conversation data due to the additional time commitment required by families, which may have limited the acceptability of the intervention to participants, and the limits on resources in terms of transcribing and scoring large amounts of complex conversational data.

Therefore, a hybrid design was adopted whereby individual counts for conversation behaviours (our primary outcome measure) were analysed statistically to detect whether any changes significantly differed from chance in order to be confident that the results reflect change greater than random variation (e.g. Nickels et al., 2015). The individual level analysis afforded by this design was necessary because, given the variability in children's DLD and in their conversations, different dyads chose to focus on different behaviours in conversation.

For our secondary outcome measures, within group comparisons were made between pre- and post-therapy to give an indication of effect sizes, and to explore

the potential of BCDLD to produce change in conversation measures beyond individual behaviours and in functional communication.

2.2.1 Inter-rater reliability and feasibility of conversation outcome measures

Since the use of the above conversation-based outcome measures was novel for this research context and population, an investigation of both inter-rater reliability and feasibility was carried out within this study to determine whether behaviour counts, MLUw and ratio of child-to-adult speech are appropriate instruments for evaluating the effectiveness of the BCDLD intervention. Inter-rater reliability (IRR) reflects whether independent raters are able to employ these measures in the same way, and achieve similar results, indexing the objectivity of research findings (Hallgren, 2012). Feasibility includes aspects such as time taken to collect and analyse conversation data, A summary of methodological details and results of these investigations can be found below. Full details are available at: https://osf.io/pwv6f/

2.2.2 Inter-rater reliability for conversation measures

In order to determine whether counts of conversation behaviours and child MLUw in conversation are appropriate measures for evaluating the effectiveness of BCC intervention, IRR was calculated using percentage agreement between the scores from two raters. In all cases, Rater 1 is the first author and the second rater is either an MSc or BSc student, who received detailed training in coding conversation behaviours. Random labels were assigned to each video recording so that students were blind to the point of data collection when scoring the conversation samples. Barrier and facilitator behaviours were counted independently by Rater 1 and Rater 2 for all conversations recorded by Dyads C and D. This represented 33% of the total BCDLD data set. In a separate analysis, inter-rater reliability for child MLUw was calculated using point by point percentage agreement. This was achieved by

comparing the coded utterances between two raters across six conversations for 20% of the full data set.

Finally, Wilcoxon signed rank tests were employed to evaluate the similarity of timings for child and adult utterances, recorded in seconds, by the two independent rater for the same conversations as for MLUw. This paired difference test was chosen for ratio comparisons, rather than percentage agreement, since time is an interval and not a categorical variable.

Whilst 80% agreement is typically used as the gold standard for establishing IRR in naturally-occurring data (e.g., Oelschlaeger & Thorne, 1999), the cut-off point of 70% has been proposed as acceptable for new instruments involving observational coding from videos (Haidet et al., 2009). Therefore, this level of agreement was chosen to evaluate IRR for BCDLD, reflecting the natural variability of targeted behaviours across conversation samples and dyads and the previously reported difficulty with establishing strong agreement for conversation measures (Best et al., 2016).

2.3 Participants

Six children with DLD (four boys and two girls), aged 6;06 - 8;02 years, and their main carers were recruited to the study. All children attended mainstream primary schools in the geographical areas of Greater London and Surrey in England, UK. Referrals were made by school Special Educational Needs Co-ordinators (SENCos), following initial contact with the schools by the first author via email or telephone calls. Criteria for inclusion were:

- Child aged between six and eight years (persisting language difficulties at this age are suggestive of poor prognosis).

- Identification as having a clinical language difficulty (to include at least two scaled scores of 7 or below on CELF-5 core language subtests).
- Having English as a main language (i.e., exposed to English at home and in an English-speaking nursery since the age of three).
- No other significant developmental diagnosis, which may affect their ability to participate in BCDLD (e.g., autism, emotional or behavioural difficulties).
- Non-verbal skills task at or above the low average range (as indexed by a percentile score ≥ 8 on the Pattern Construction task from the British Ability Scales; BAS, Elliott & Smith, 2012). This was to maximise children's ability to participate in the meta-cognitive aspects of BCDLD.
- Difficulty with conversation as reported by parents and captured in assessment of a videoed conversation (examples of difficulty include frequent conversation misunderstandings, or frequent child word-finding difficulties).

All dyads were monolingual English speaking, with the exception of Dyad D, where the child's main language was English and the mother spoke both English and Jamaican Creole. Table 1 summarises children's characteristics, background language profiles and BAS scores, with CELF-5 subtests below the clinical cut-off highlighted in bold.

Table 1: *Child participant characteristics*

			CELF-5 pre-therapy scores						BAS pattern construction scores	
Dyad	Child gender	Child age	Sentence Comp*	Word Structure*	Formulated Sentences*	Recalling Sentences*	Core Language SS†	Percentile	T score §	Percentile
A	M	7;06	**5**	10	9	**7**	86	18	53	62
B	M	6;08	9	8	**5**	**7**	84	14	60	84
C	M	6;06	**6**	8	**6**	9	84	14	44	27
D	F	7;03	**6**	9	**6**	**7**	82	12	49	46
E	M	6;10	**5**	**6**	**7**	**7**	79	8	54	66
F	F	8;02	**4**	**6**	**4**	**4**	70	2	44	27

*Scaled score, where ≤ 7 indicates below average performance (-1SD and under)
†Standard score, where ≤ 85 indicates below average performance
§ T score, where < 40 indicates below average performance.
CELF-5 Clinical Evaluation of Language Fundamentals (Wiig et al., 2017, sentence comp* is sentence comprehension) BAS British Ability Scales (Elliott & Smith, 2012)

2.4 Outcome Measures

Conversation sampling. Multiple video recordings were collected (three pre- and two post-therapy). During their recorded interactions, parents were asked to talk with their child at home as they would typically, for example at the end of a school day. They were invited to make use of games or toys if they wished. This unstructured natural conversation was designed to be as ecologically valid as possible: there was no observer present and no topic constraint. Parents were asked to record up to 10 minutes of talk. The central five minutes of each conversation was used for analysis. Conversations were transcribed by pre-registration SLP students, blind to the point of data collection, who were trained over 15 supervision sessions and scored for the following quantitative features:

- Counts of targeted barrier and facilitator behaviours for both child and parent (see Section 2.5, below, for details of how these targets were identified).
- Child mean length of utterance in words, calculated following guidelines from the Expression, Reception, and Recall of Narrative Instrument (Bishop, 2004).
- Ratio of child-to-adult speech, timed in seconds and calculated as: number of seconds the child spoke, divided by number of seconds the adult spoke, following Falkus et al. (2016).

The CCC-2 and digit span were collected and scored at two timepoints - once before and once after the six-week intervention period.

2.5 Intervention

Therapy sessions took place at the participants' home or in a quiet room at the child's school once a week for 6 weeks, each lasting around 45 minutes. Intervention for all dyads was carried out by the first author, who is a Highly Specialist SLP with over 15 years' experience working with children with DLD and expertise in PCIT.

Both the child and parent were present for all sessions, during which they viewed short clips from their pre-therapy conversations to increase insight into key positive or negative features of their interactions. The therapist facilitated the selection (from a set of suggestions) of up to three strategies each for the parent and child to work on - either to increase facilitators or reduce barriers. Multiple opportunities were provided for the dyad to reflect on and practise strategies during therapy and home tasks. Child-friendly handouts were used to aid comprehension and engagement. Table 2 summarises the theme and content each session. The full intervention protocol is presented in Appendix C, described using the Template for Intervention Description and Replication (TiDier) framework (Hoffmann et al., 2014).

Table 2: *Summary of intervention sessions*

Session	Theme	Tasks
1	Introduction to Conversation and Language Development	Identify parent facilitator; set up 'Talk time' for home practice
2	Turns, sequences and actions	Identify a child facilitator to practise at home
3	Trouble and repair	Identify a parent barrier / agree an alternative strategy for them to use
4	Child-led topics of conversation	Use family photos / favourite books as topic starters; practise strategies and identify a barrier behaviour for the child.
5	Consolidation of child strategies	Focus on child strategies, including playing conversation-based games
6	Reviewing and moving forward	Create a poster for teachers, family and friends to share 'top tips' from therapy.

2.6 Identification of targeted conversation behaviours

Prior to intervention the first and fourth authors met to view baseline videos recorded by each dyad to identify key barriers and facilitators to conversation. These determined the choice of video clips that were prepared for therapy, which formed the basis of participants' self-reflection and discussion. While the project team guided a dyad's reflection in this way, the child and carer made the final decision on which strategies to practise or reduce.

A set of individualised barriers and facilitators were identified by each dyad as targets for change, A summary of the conversation behaviours chosen by participants is presented in Table 3. The most common therapy target was adults' use of test questions. This was identified as a barrier to conversation by four dyads. Meanwhile, three mothers chose recasting or repeating back as a facilitative behaviour. Similarly, three children identified 'using gestures or acting out' as a supportive strategy, while 'giving up when stuck on a word' was chosen as a barrier by the same number of children. Adult minimal turns, aimed at encouraging children to take more and longer turns in conversation, were identified as facilitative for half of the dyads. However, Mother A identified the same strategy as a barrier to her conversations with her son, since she felt this tended to result in him 'wandering off track' or forgetting what he was saying.

433 **Table 3:** *Conversation behaviours targeted by each individual dyad*

Behaviour type	Dyad A	Dyad B	Dyad C	Dyad D	Dyad E	Dyad F
Child Facilitator	A uses strategy to support his memory and understanding	B uses gestures or acting out to support his WFD	C 'says it another way' when stuck on a name	D asks for help, clarification, or repetition	E uses gesture or acting out to help communicate meaning	F uses gestures or acting out to help communicate meaning. F uses 'FANBOYS' words to help extend her utterances†
Adult Facilitator	M gives clear explanation of a word or concept	M uses: a) minimal turn b) contingent commenting c) recasts or repeats*	M gives clear explanation of a word or concept	M 'holds back' by using: a) minimal turns b) pausing for 3 or more seconds	M repeats back or recasts what E has said	M uses contingent comments
	M repeats back or recasts what A has said	M responds to A's non-verbal communication				M uses minimal turns M uses extended pauses (at least 2 seconds duration)

434 *Strategies identified as an alternative to questioning.
435 †Co-ordinating conjunctions, e.g., *for, and, nor, but, or, yet and so.*
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Behaviour type	Dyad A	Dyad B	Dyad C	Dyad D	Dyad E	Dyad F
Child Barrier	A gives up when stuck on a word A seeks to end the conversation or switch to new activity	B gives up, e.g. by saying 'It doesn't matter'	C makes something up that isn't true	n/a	E uses minimal turns E uses single word turns	F gives up when stuck on a word
Adult barrier	M uses three or more consecutive passing turns	M uses: a) test question b) forced choice question	M 'lets things run on' when C says something that may not be true, or when there appears to be a misunderstanding M explicitly criticises or corrects C, e.g. 'You got that wrong' or 'No, it's_'	M uses a test question	M uses test question	M uses test questions M 'jumps in' before F can start or complete a turn.

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2.7 Data analysis

All data for the study were collected and analysed by the first author. For our primary outcome measure (the number of targeted conversation behaviours pre and post-therapy), a weighted Poisson trend test for frequencies (Barnes & Nickels, 2017; Beeke et al., 2015; Boswell, 1966) was applied to raw counts of the total number of turns containing barriers and facilitators for each individual dyad. This is a non-parametric test, suitable for analysing the rate of occurrence of events within a specified time period, which detects any significant change in the instances of a behaviour post-therapy, compared with pre-therapy. Weightings were applied to the raw data to identify them as pre- or post-therapy counts, respectively (the sum of weightings was zero). One-tailed tests were used to test hypotheses regarding change for facilitator items, which were predicted to increase, and barrier items, which were predicted to decrease. Significance was set at $p < .05$.

For our secondary measures - child MLUw and ratio of child to adult speech, and the CCC-2, the measure of functional communication, descriptive statistics were produced and within-group analyses were carried out to assess the potential of BCDLD to effect change for each different measure. Wilcoxon signed rank tests were employed to compare average pre- and post-intervention scores for the group as a whole. One-tailed tests were used for MLUw and the CCC-2, where children's scores were predicted to increase. Two-tailed tests were applied for child-to-adult ratio of speech, where the direction of change was predicted to vary according to individual therapy targets. In addition, performance on the digit span control task was summarised and compared pre and post intervention. The significance level for all comparisons was set at $p < .05$. Effect sizes were calculated according to Pallant

(2007, p. 225) by dividing the z value (standardised test statistic) by the square root of the number of observations.

3. Results

3.1 Conversation behaviours and measures

3.1.1 Primary outcome measures

RQ1) Does the number of targeted facilitators used by participants in conversation increase after intervention?

Table 4 (below) summarises pre- and post-therapy counts of facilitators for each individual dyad, along with Poisson trend results to assess whether any change that occurred was statistically significant. This shows that two dyads produced a statistically significant increase in identified conversation facilitators following BCDLD. In both cases, this change was led by mothers increasing their use of targeted facilitators following the intervention, while children's use of facilitators remained fell marginally across pre- and post-therapy timepoints. For a full breakdown of child and adult counts for each targeted conversation behaviour, please see: https://osf.io/pwv6f/.

Table 4 *Summary of pre- and post-therapy facilitator counts*

	Pre-therapy				Post-therapy			Poisson trend test	
Dyad	T1	T2	T3	**Average pre**	T4	T5	**Average post**	*z*	*p*
A	3	7	4.64†	**4.88†**	11	9	**10**	2.13	0.017*
B	32	22.54†	16.52†	**23.69†**	29	18	**23.5**	-0.04	0.483
C	0	6	4	**3.33**	5	4	**4.5**	0.66	0.256
D	13	10	6	**9.67**	13	19	**16**	1.99	0.02*
E	17	7	12	**12**	11	11	**11**	-0.32	0.37
F	30	22	26	**26**	24	26	**25**	-0.22	0.41

*†Scores corrected to account for recorded conversations less than 5 minutes duration, all of which occurred prior to BCDLD. *Statistically significant.*

Table 5 *Summary of pre- and post-therapy barrier counts*

	Pre-therapy				Post-therapy			Poisson trend test	
Dyad	T1	T2	T3	**Average pre**	T4	T5	**Average post**	*z*	*p*
A	5	2	4.64†	**3.88†**	2	0	**1**	1.91	0.028*
B	10	37.44†	17.70†	**21.71†**	6	9	**7.5**	-3.89	<0.001*
C	15.79†	4	1	**6.93†**	0	4	**2**	-2.43	0.008*
D	15	1	1	**5.67**	0	1	**0.5**	-4.10	<0.001*
E	11	10	46	**22.33**	13	14	**13.5**	-2.23	0.01*
F	5	5	20	**10**	5	7	**6**	-1.51	0.07

*†Scores corrected to account for recorded conversations less than 5 minutes duration, all of which occurred prior to BCDLD. *Statistically significant.*

Table 6: *Comparison of group MLUw and ratio scores at Time 1 and Time 3 (both conversations were recorded prior to BCDLD intervention)*

Conversation variable	**Pre-therapy 1**			**Pre-therapy 3**			***z***	***p***	***r***
	M	***Mdn***	***SD***	***M***	***Mdn***	***SD***			
Child MLUw	3.97	3.86	0.66	4.18	3.57	1.44	0.105	0.917	0.043
Child-to-adult ratio of speech	1.29	0.95	0.96	1.02	0.88	0.75	0.943	0.345	0.385

RQ2) Does the use of targeted communication barriers decrease following the intervention?

Table 5 (above) summarises pre- and post-therapy counts of barrier behaviours for each individual dyad, along with Poisson trend results to assess whether any change that occurred was statistically significant. This shows that five dyads produced a statistically significant decrease in identified conversation barriers following BCDLD. For the final dyad, barrier counts reduced numerically from 10 to 6, but this did not reach statistical significance (p = .07).

Notably, test questioning was the individual behaviour which showed the greatest change across the four mothers who were aiming to reduce this strategy. Test questions solicit specific names or knowledge that is 'obviously already known to the questioner' (Grosse & Tomasello, 2012). A detailed consideration of this adult turn type, using conversation analysis to explore the interactions of Dyads B and E, is presented in Hughes et al. (2022).

3.1.2 Secondary outcomes measures

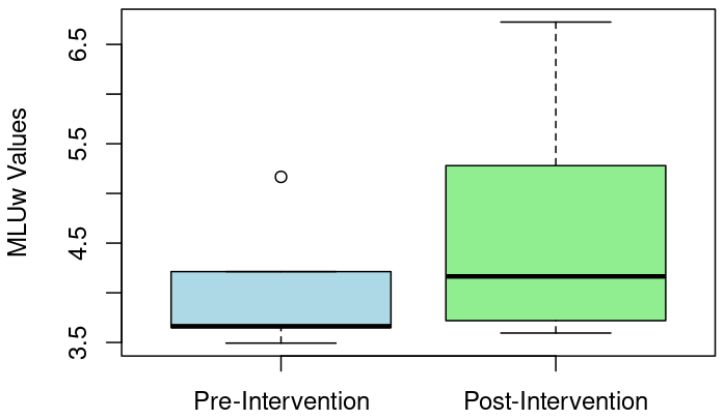
Secondary conversation measures were stable for the group across a six-week period prior to intervention. This was measured by comparing group scores for MLUw and ratio of child-to-adult speech between their first and third recorded pre-therapy conversations (see Table 6, above.)

RQ3) Does children's MLUw increase following the intervention?

With regard to more formal conversation measures, there was a significant change in average MLUw, with a large effect size, for the group as a whole (pre-therapy *Mdn* = 3.67, post-therapy *Mdn* = 4.17; z = 1.992, p = .023, r = .813, 1-tailed). The median increase of 0.50 compares to an average six-monthly gain of .095 in MLUw for children with DLD aged between six and eight years, reported by Rice et al. (2010).

Group MLUw scores pre- and post-therapy are summarised in Figure 2. The error bars highlight variation between dyads, with Child A appearing as an outlier with relatively high MLUw scores pre-therapy. There was also considerable variation across conversations at individual level. See: https://osf.io/pwv6f/ for details of individual scores for MLUw and our other secondary outcome measures. Five children with DLD achieved a numerical increase in their mean length of utterance in words when average pre- and post-therapy scores are compared. Child F was the only participant whose MLUw did not improve following BCDLD therapy and also formed part of the single dyad who did not show a statistically significant change in either facilitators or barrier behaviours following the intervention.

Figure 2: Summary of Child MLUw scores pre- and post-therapy.

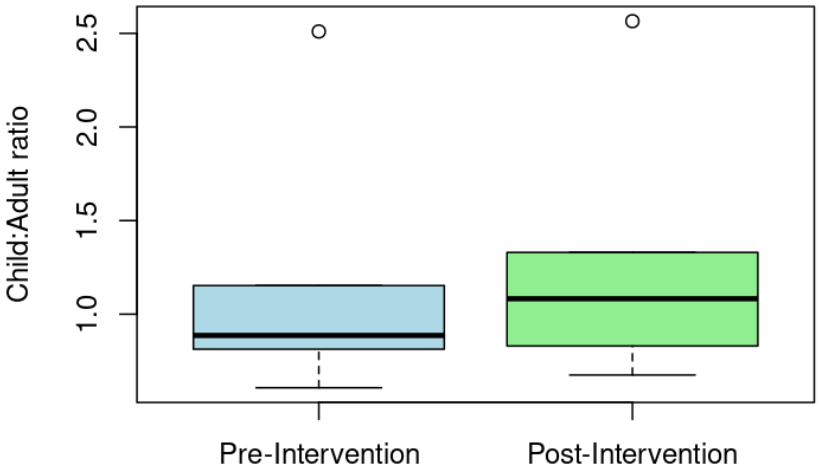


RQ4) Does the ratio of child-to-adult speech change after intervention?

Group results for ratio of child-to-adult speech were more equivocal. For the group as a whole, there was a non-significant increase in average ratio scores, with a small effect size, following the intervention: pre-therapy *Mdn* = .89; post-therapy *Mdn* =

1.08 (z = .314, p = .753, r = .128, 2-tailed). Group ratio scores for pre- and post-therapy are summarised in Figure 3.

Figure 3: Summary of ratio of child-to-adult speech scores pre- and post-therapy.



Individual scores highlight Children B, D and E speaking consistently more after the intervention, while Children A and F spoke less, and Child C showed considerable variation across pre- and post- therapy conversations. For Dyad A, the intervention aim was not to increase child MLUw or ratio of child:adult speech, as the child's main difficulties were with receptive language. Meanwhile, for Dyad F, the Mother was aiming to leave more pauses for her child to process language and plan her responses, as well as to increase contingent commenting, neither of which would be likely to increase child:adult speech ratio. If only dyads where there was a clear intervention aim of increasing child-to-adult speech are included in the pre-post analysis (Dyads B - E), there was a significant increase in this measure: pre-therapy *Mdn* = 0.84; post-therapy *Mdn* = 1.26 (z = 1.826, p = .034, r = .913, 1-tailed).

Table 7: *Summary of children's raw scores pre- and post-therapy for standardised language measures*

Child	A		B		C		D		E		F		Pre-post change		
Raw score	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	*z*	*p*	*r*
CCC-2 general comm †	105	99	65	54	51	32	72	46	45	59	55	48	-1.363	0.086	-0.556
social interact †	25	27	18	20	8	7	25	15	21	17	10	10	-0.677	0.249	-0.276
Digit span	5	6	5	6	10	10	8	11	9	7	5	5	0.736	0.231	0.300

† For the CCC-2, a decrease in raw scores indicates an increase in communicative functioning and vice versa.

3.2 Functional communication measure: CCC-2

Group scores for the parent-reported CCC-2 were unchanged following BCDLD (see Table 7, above), reflecting continuing challenges within children's everyday communication. At an individual level, there was a reduction in numerical score on the General Communication Composite, reflecting better functional communication for five children.

The digit span control task also remained stable for the group, although there were three individual children for whom standard scores rose post-therapy, one whose scores fell and two whose stayed the same.

3.3 Inter-rater reliability

Overall IRR for targeted conversation behaviours reached 71.43%; which is an 'acceptable' level according to Haidet et al. (2009). There was a high level of inter-observer agreement for adult minimal turns (91%), as well as for instances where a mother explicitly criticised or corrected her child (83%) and a different mother's use of extended pauses (80%).

For Child MLUw, the overall percentage agreement also reached an acceptable level of 77.27%. Meanwhile, for ratio of child-to-adult speech, scores from Raters 1 and 2 did not differ significantly in the timed duration of child or adult speech (Wilcoxon signed-ranks test, 2-tailed, Rater 1 *Mdn* = 119, *S.D.* = 34.91, Rater 2 *Mdn* = 114, *S.D.* = 34.57, z = -1.69, p = .091, r = -.49). See: https://osf.io/pwv6f/ for full details of the IRR investigation..

In summary, the reliability of measuring the conversations was adequate for the primary outcome of targeted behaviours and the secondary conversation measures MLUw and ratio.

3.4 Feasibility of outcome measures

An aim of this project was to explore the relative value and feasibility of different outcome measures, including time taken to collect and analyse conversation data. The three core measures employed within this project were: frequency of targeted facilitator and barrier behaviours; mean length of utterance in words (for the child) and the ratio of child-to-adult speech. Each of these measures was calculated from five minutes of natural conversation, transcribed orthographically from recordings made by dyads on three occasions prior to therapy and twice afterwards. Time taken to transcribe and score data for Dyads C-F was recorded systematically by pre-registration SLPs, who carried out this work as part of their Masters projects.

The average time spent on transcription and analysis of all conversation measures was just over two hours per recording (120.76 minutes). This compares favourably to related qualitative methodology, with researchers commonly reporting taking a day of work to structure and code an hour-long interview or interaction (Campbell et al., 2013; Miles et al., 2020). Whilst the conversations recorded by parents and children were relatively short, at around 5 minutes in duration, they required close, specialist analysis to account for children's disordered language, while multiple measures were used to analyse and quantify different aspects of the dyadic interactions. Several automated transcription services were trialled initially, but the high number of errors meant that it was quicker to transcribe each conversation manually.

3.5 Feasibility of BCDLD

The next section will report the wider feasibility of BCDLD, focusing on a) recruitment and retention and b) acceptability.

3.5.1 Recruitment and retention

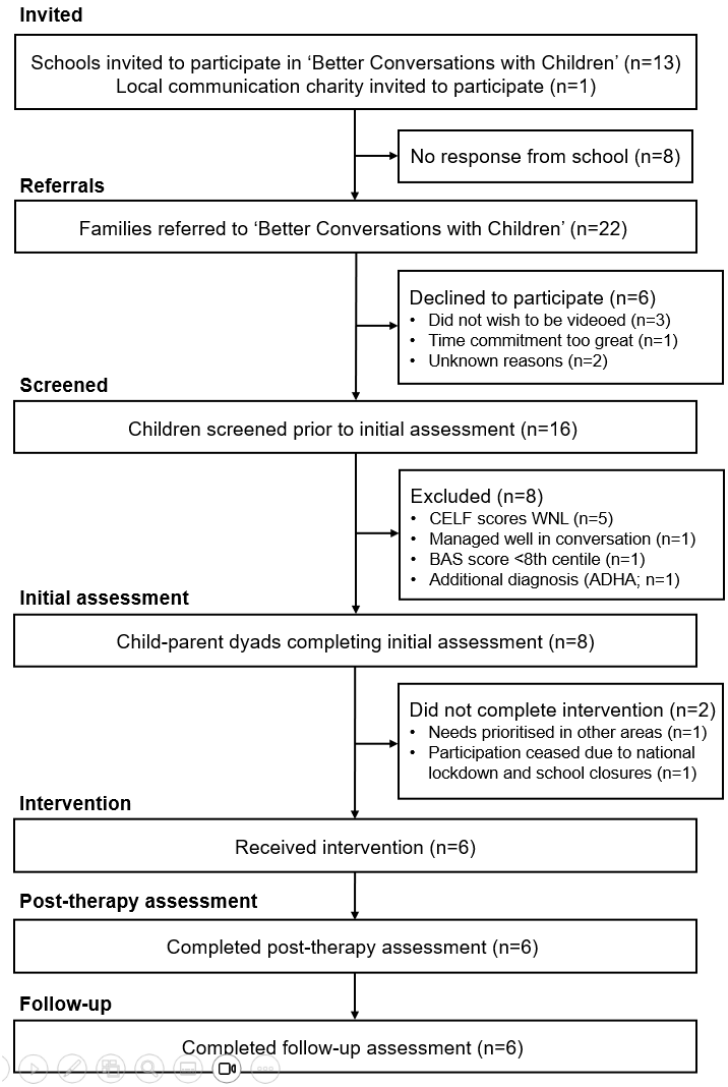
Children and parents were recruited via their school Special Educational Needs Co-ordinators (SENCos) or Inclusion Managers. A total of 13 primary schools were contacted, based in South London and Surrey, England. Figure 4 illustrates the numbers of participants who were approached and/or assessed for eligibility, received intended treatment and whose results were analysed in the study. SENCo's were telephoned or emailed to invite them to put forward children for the 'Better Conversations' project. In addition, the first author met with parent representatives from a local communication charity, who agreed to pass the project recruitment materials to members of their weekly youth groups for children with speech, language and communication needs.

As a result of this process, one child from the charity was referred for screening but scored within normal limits on the CELF core language subtests. A further 21 children were referred by their school SENCo's or Inclusion Managers, however when the first author contacted their carers to explain the project, six declined to participate. Of those who gave a reason for this, three said that they did not wish themselves, or their child, to be videoed, with one mother commenting: 'That is a red line for me'. One parent stated that the time commitment to attend six sessions was too great for her, while the remaining two carers did not give a reason for not wanting to participate.

Following parental consent, a total of 16 children were screened for inclusion in the study. Of these, five did not meet our inclusion criteria as they scored within normal limits on the CELF. One child scored below the 8th centile on the BAS pattern construction subtest and thus did not meet inclusion criteria, while another had an additional diagnosis of ADHD, which became apparent after screening. Finally, one

child was excluded from the study because he managed well in conversation, despite his identified language difficulties.

Figure 4: *Flow diagram of process through phases of the project (adapted from Eldridge et al., 2016).*



In total, eight children completed the full six-week initial assessment period between May 2018 and February 2020. However, one withdrew from the project without commencing intervention in order to prioritise his needs in other areas. Six dyads went on to participate with their carers in the BCDLD intervention and follow-up

assessment. A seventh dyad had completed one therapy session just prior to the Covid-19 pandemic, which resulted in a UK nationwide closure of schools and stay-at-home order in March 2020. While a follow-up session was offered remotely, via Zoom, to offer advice and strategies to the parent, it was not possible to resume face-to-face delivery of BCDLD within the time frame available.

3.5.2 Acceptability of the intervention

Acceptability has been defined as:

'A multi-faceted construct that reflects the extent to which people delivering or receiving a healthcare intervention consider it to be appropriate, based on anticipated or experienced cognitive and emotional responses to the intervention' (Sekhon et al., 2017, p.4).

Sekhon and colleagues (2017) put forward a theoretical framework, which captures different aspects of acceptability. It was beyond the scope of the current study to provide a comprehensive evaluation of acceptability and implementation. Within BCDLD, acceptability was primarily assessed by documenting the proportion of dyads who completed the full therapy programme. Following Justice et al. (2011), this was seen as the most definitive way of establishing whether parents and children could feasibly participate in the intervention through to completion.

No consenting participants withdrew from the project citing reasons of non-acceptability, although, as outlined above, concerns about the use of video and time commitment were reported to have deterred several families from signing up to the project at the outset. This highlights a distinction between 'prospective' (i.e., anticipated) and 'retrospective' (i.e., experienced) acceptability from the perspective of intervention participants (Sekhon et al., 2017).

Following therapy, both parents and children were asked to comment on their overall experience of therapy, including 'What worked well?' and 'What could have been better?' The response from parents indicated a high level of satisfaction with the content and delivery of BCDLD. For example, Mother A gave the following feedback: “I have found this amazing and have learnt so many skills... [My child] can talk and explain so much more”.

Mother B stated:

“I think it’s a brilliant little therapy. It’s given me the tools to be able to help [my son] ... It was so frustrating to have a conversation with him. I didn’t know if he was being silly or didn’t want to talk. But now I’ve realised I just need to give him more time”.

Mother F reflected:

"More time dedicated to conversation definitely supports language development. There are lots of strategies to help, but time, space and awareness are probably the best... [My daughter] loves 'Talk Time'; we always talk, but it's our special time".

No suggestions for change or negative comments were made by parents or children who experienced the BCDLD programme. This indicates that the intervention was well matched with the needs and priorities of those who participated and suggests the principles behind development of BCDLD are sound.

4. Discussion

This study investigated a new intervention for children with developmental language disorder, BCDLD, grounded in interactionist theories of child language development. The programme extended the use of PCIT strategies from pre-schoolers to school-aged children with DLD, drawing upon insights from behaviour change theory, as

well as principles and methods from conversation-based therapy used widely for adults with acquired communication disorders and their conversation partners (CPs).

4.1 Intervention study findings in relation to research questions

RQ1 and 2: Does the number of targeted facilitators used by participants in conversation increase and the use of targeted barriers decrease after intervention?

The primary goal of the BCDLD intervention was to effect change in targeted conversation behaviours, chosen by each individual dyad. Two out of the six dyads showed a significant increase in targeted facilitators following BCDLD while five out of six dyads evidenced a significant decrease in targeted barrier behaviours following the intervention. The overall contrast in results for facilitators and barriers indicates that the mechanisms of change may be different for increasing the frequency of targeted facilitators, compared to reducing undesirable behaviours. This aligns with previous findings for conversation-based therapy for adults with aphasia and their CPs (Johnson et al., 2017, 2021). Dyads within this study worked on both adult and child-led behaviours. Close inspection of the data reveals that numerically adult facilitators rose on average for all six dyads following therapy whilst facilitators for all but one child fell. This could indicate that it was less necessary for children to employ self-help strategies once parents had adopted a more supportive communication style, though working on these strategies could still prove beneficial for their interactions with other, less familiar CPs.

Across the six dyads, test questions emerged as the behaviour most selected and most amenable to change. For the four mothers who were aiming to reduce instances of this behaviour, their average use during a 5-minute conversation fell

from 8.84 pre-intervention to 2.25, almost a quarter as many, post intervention. This would have major implications if scaled up for the approximate 28 minutes per day that UK mothers spend on interactive childcare and 19 minutes for fathers (Wishart et al., 2019).

It could be argued that test questions showed the most potential for change (reduction) due to their high average counts pre-intervention, although a high count of a behaviour could equally show it to be endemic and, therefore, more difficult to reverse. In contrast, for certain facilitators, such as giving clear explanations of words and concepts, it may not be feasible or advisable to employ this behaviour with high frequency during natural conversations. Therefore, a more modest adjustment, which may reflect clinically meaningful change, but not reach statistical significance, could be seen as appropriate within a short, recorded interaction, This study highlights the individualised nature of conversation and the need to tailor goals carefully for each dyad. While minimal turns were identified as a facilitative strategy for three participating mothers, this same behaviour was chosen as a barrier for Dyad A. This was due to the nature of Child A's difficulties, primarily with receptive language and auditory memory, and his tendency to lose focus and wander off topic without regular recasts, repetitions and explanations from his Mother.

RQ3: Does children's mean length of utterance in words (MLUw) increase following the intervention?

Alongside the observed modifications to the dyads' conversation behaviours, the study's secondary outcomes revealed changes to children's MLUw, which is seen as a robust measure of children's language development. Children in this study (with the exception of Child F) showed improvement in this area which is over and above the gradual increase with age that has been reported by Rice et al. (2010) and

Potratz et al. (2022). It appears that change in conversation behaviours, such as adults' reduction of test questions, may encourage children to use longer and more complex turns. More detailed analysis with a wider range of dyads is required to identify which barriers or facilitators have the strongest influence on children's utterance length.

The single child whose MLUw did not improve following BCDLD therapy was the eldest in the cohort and showed the most severe receptive and expressive difficulties, based on her CELF scores prior to the intervention. In addition, Dyad F was the only dyad who did not show a significant change in either facilitators or barrier behaviours following the intervention. This may have been due to the dyad choosing a relatively large number of strategies to work on (eight, compared to a mean of five, *SD*=1.22, for the rest of the dyads). Alternatively, Child F may have benefited from a longer period of intervention in order to practise and consolidate therapy targets.

RQ4: Does the ratio of child-to-adult speech change after intervention?

The mixed findings for ratio of child-to-adult speech were likely to be related to individual therapy targets, with Mother A being encouraged to offer more verbal input in order to support her son's comprehension and help keep the conversation on track, whilst other parents were aiming to leave more time and space for their child to speak. In the case of Dyad F, the selection of multiple targets may have led to confusion for the participants, since the mother was seeking to employ more minimal turns and extended pauses, whilst simultaneously increasing her use of contingent commenting - an aim which runs counter to the first two strategies.

RQ5: Do children's CCC-2 scores increase following the intervention?

For the CCC-2, which is a measure of children's functional communication, there was a numerical decrease in raw scores for the General Communicative Composite (indicating an increase in communicative functioning) for all but one participant, but this did not reach statistical significance when analysed for the group.

It could be that allowing longer between CCC-2 assessments would result in significant change in this secondary outcome measure, particularly if ‘Better Conversations’ between children with DLD and their parents continue to build conversation and language skills beyond the intervention. This would need exploration in a fully study with longer term follow up. Alternatively, it may be that a different secondary measure is more appropriate, for example a measure of structural language. While care needs to be taken in employing multiple outcome measures, future research might use a composite study endpoint (e.g., Vetter & Mascha, 2017), although this needs to be clearly justifiable in relation to the aim of the intervention.

Informal feedback via bespoke child and parent questionnaires provided a positive view of perceived improvements following therapy. However, these findings must be interpreted with care since these measures were designed and administered by the clinician-researcher, which may have biased participant responses in favour of the intervention (Choi & Pak, 2005; Sedgwick, 2013). In future work, it would be important to engage an independent investigator to seek comments and criticism from project participants during and following the intervention.

There was no overall change in the control task digit span for the group following BCDLD. This gives some confidence that changes reported above are due to the intervention. However, caution is required when interpreting these scores, since

three out of the six children showed a numerical increase in digit span after the intervention.

Since BCDLD was a novel intervention for this target population, a range of measures were employed to help capture change in language and conversation targets. These included conversation behaviour counts, MLUw and ratio of child-to-adult speech, alongside a standardised control task and parental questionnaire. The core conversation measures, which were novel for this clinical group, proved sensitive to change following the intervention while no significant change was shown on either the CCC-2 or digit span control task. This aligns with previous research highlighting that standardised measures may not be appropriate for capturing change with repeated administration over a short time frame (Ebbels et al., 2019; McCauley & Swisher, 1984).

Future consideration of outcome measures will need to establish which represent the most meaningful areas of change for participants and whether pre- and post-therapy assessment schedules can be streamlined to avoid over-testing of children. The latter is crucial and supported by Patient and Public Involvement activities prior to the development of the BCDLD intervention, For example, one young person in our advisory group, who had grown up with DLD and repeated testing by SLPs, reflected on how hard it was to be faced with language tasks at which she was aware of failing. Reducing the number of assessments would also lessen the time taken to transcribe and analyse conversation data. While the time dedicated to transcription and scoring (two hours per recorded interaction) was not unusual for a research project, this would not be feasible without support should the intervention be implemented clinically. Instead, it will be necessary to develop transcription-less processes for identifying and counting key conversation behaviours (Herbert et al.,

2013). Over time, future BCDLD research findings will converge around key conversation strategies for primary school children with DLD, making dyad-specific transcription and scoring less of a clinical imperative.

These preliminary results indicate that progress in conversation is achievable for this client group within a clinically realistic time frame but may perhaps be harder to achieve for children with more severe language difficulties. For reliable comparisons across participants a larger sample size is necessary. Nevertheless, this small-scale study provides initial data on effect sizes to inform future power calculations and enables a clear picture of response to intervention for all participants relative to repeated baseline testing

4.2 Feasibility findings

Turning to the feasibility and acceptability of the BCDLD intervention, there were initial challenges at the start of the recruitment process related to: a) the lack of children with identified language disorder within mainstream settings and b) the reluctance of some parents to be videoed as part of the intervention. The first issue is related to the persisting pressure on SLP resources, including workforce shortages in the UK (House of Commons Health and Social Care Committee, 2022). School-based SLPs typically manage caseloads for several mainstream schools, with allocations ranging from half a day to two days per week, during which time they must prioritise children with Education and Health Care Plans[1], as well as offering whole school (universal) and targeted support for at risk pupils. Whilst a widely-cited prevalence study (Norbury et al., 2016) estimated that there are an average of two

[1] An Education and Healthcare Plan is a legal document, setting out the additional support needed for young people with Special Educational Needs, which must be provided by local authorities and services (Department for Education, UK, 2023).

children with DLD in every UK classroom, the experience of the first author in approaching schools between March 2018 and December 2019 was that staff were rarely aware of the term DLD and very few children had this existing diagnosis. None of the children who participated in the study were receiving direct input from an SLP - a strength of the study because there was no confound with other intervention - though most had previously been referred to the Early Years or school-aged service. Since recruitment for BCDLD was completed, there have been several international awareness campaigns (e.g., https://radld.org/), aimed at raising the profile of DLD among parents and professionals. It is anticipated that this increased recognition would make it easier to identify children who meet the current BCDLD inclusion criteria in a future larger-scale project. If effective with a wider range of children, offering a parent-mediated intervention (BCDLD) for school-aged pupils with DLD may help ease the pressure on over-stretched SLP services and could provide a cost-effective addition or alternative to clinician or teacher-led interventions.

The second factor, which affected early uptake for the project was the concern of some parents over being videoed and/or the time commitment required for them to attend sessions with their children. These initial contacts with parents were made between 2018 and 2019, prior to the Covid-19 pandemic and the subsequent upsurge in families and services using video-conferencing platforms to communicate and hold professional meetings and appointments. The RCSLT (2022), state that telehealth has now been widely adopted across healthcare settings, with 'digital first' consultations routinely used across SLP and other services. This shift in everyday practice is likely to have resulted in parents and children feeling more comfortable and familiar with seeing themselves on screen via online video and messaging platforms.

This recent societal change also provides scope to offer sessions remotely, rather than face-to-face, which may make the therapy more accessible to time-poor parents, who are managing work and other childcare alongside supporting their child with DLD. However, it is important to bear in mind the possible inequalities which may exist between different social groups in terms of access to technology, as well as the skills and confidence to use these tools. Further consultation with parent groups from a range of different areas and backgrounds will be necessary to determine parameters for in person vs telehealth delivery.

4.3 Limitations of the project

The project was limited by the relatively small number of conversation samples collected prior to and following the intervention period. Including at least six datapoints during the initial baseline and intervention phases would be necessary to meet quality guidelines for single case experimental designs, according to the What Works Clearinghouse (2022). A further shortcoming of the study was that randomisation and staggering of baselines were not included as part of the design, as recommended by Tate et al. (2016). Inclusion of these SCED features would strengthen the design of a future larger-scale evaluation of BCDLD. This would need to be balanced against the feasibility and acceptability of asking children and parents to record themselves more frequently in conversation, as well as the increased time required for researchers to transcribe and score multiple conversation samples.

4.4 Clinical implications

This study has provided initial data, which could inform the management of DLD for school-aged children and their carers. Findings have highlighted a set of key

conversational variables, which can facilitate or hinder children's language and communication development. Within the intervention study, both therapy and outcome measurement were targeted at the children's everyday communication, an area which is often overlooked (Croteau et al., 2015), but which has the potential to impact on both structural language skills and children's ability to participate in everyday conversations and activities at home and at school. Differing results for the six dyads highlight the need for SLPs to tailor their intervention to individual strengths and needs,

Given the enduring impact of poor spoken communication skills on educational attainment, continued research on evidence-based interventions for school-aged children with language disorder is a high priority for both health and education. This is particularly the case in a climate of increasing levels of need and limitations on resources. The potential for training parents to support their children's language and conversation development within a short, cost-effective block of therapy, could provide an important additional pathway for managing the needs of older children with DLD, in addition to existing programmes to support vocabulary, narrative and grammar (e.g., Calder et al., 2021; Spencer & Peterson, 2020; Wright & Ebbels, 2018). Future work could consider integrating more targeted interventions alongside, or within, the BCDLD programme, in order to maximise children's progress and generalisation of newly learnt language and communication skills.

4.5 Future directions

The project has conceived and provided an initial evaluation of the BCDLD programme, based on established approaches used with other populations. Future consultation with key stakeholders, researchers and specialist clinicians will be

necessary to refine the therapy protocol further before it is piloted with more participants. The UK Standards for Public Involvement (National Institute for Health Research, 2021) could help guide this work, by of maximising service user involvement. This could include co-production of a manualised therapy resource to be used in the training of SLPs, who would then trial the delivery of BCDLD within National Health Service (NHS) and education settings. A larger-scale case series study could then be undertaken, following SCRIBE and WWC guidelines, possibly with the long-term aim of progressing to a full-scale RCT. However, there are also some benefits to pursuing a single case design, as control is built into the within-participant structure by measuring change across phases of the study. Differences between participants (e.g., language level and conversation style) are therefore not of concern in answering the question of whether change follows intervention.

In future work, we could increase experimental control by measuring treated and untreated behaviours for all dyads. We would predict a change in treated behaviours and, in theory, there should be no change on behaviours untreated for that dyad. However, evidence from Conversation Analysis (e.g. Hughes et al., 2022) suggests that one turn type may influence another and thus, the prediction for untreated behaviours is not straightforward and future CA studies related to BCDLD may explore this issue further. While more conversation behaviours to target will emerge from working with a wider range of dyads, there is increasing evidence and agreement on common barriers and facilitators in the field of outcome measurement for conversation intervention (e.g. Azios et al., 2022).

Trialling BCDLD with a larger range of children and parents would allow statistical analysis of key variables, such as age and clinical severity, to determine whether these have an impact on the outcomes of therapy. It will also be important to

consider aspects of delivery such as timing and dosage to establish their influence on intervention effectiveness (Frizelle et al., 2021a; Justice et al., 2017).

4.6 Conclusion

This study was the first to explore the use of a conversation-based intervention, BCDLD, with school-aged children and their main carers. Initial findings add to the emerging evidence for conversation-based therapy, which up to now has been focused on adults with acquired language disorder. Meanwhile, feasibility results strongly support the further development of the programme, which has the potential to be rolled out clinically by training mainstream SLP providers. The project has extended the use of principles and methods from parent-child interaction therapy to older children, involving them actively in therapy alongside their parents. Positive changes in 5/6 dyads' conversations were achieved within a clinically realistic time frame and provided a detailed view of how language disorder, and targeted use of communication strategies, can impact on everyday interactions. Conversation is the primary context for language use and the main medium through which we learn, express ourselves and participate socially. By supporting children and carers to have 'Better Conversations', this programme has the potential to improve language outcomes and to increase children's access to friendships, education and future life chances.

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Data availability statement

The data that support the findings of this study are available on the Open Science Framework at https://osf.io/pwv6f/. Further information can be found within the first author's PhD thesis, which is openly available within the following repository: https://discovery.ucl.ac.uk/id/eprint/10187117/

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Appendix C: Template for Intervention Description and Replication (TIDieR) Checklist for ‘Better Conversations with Developmental Language Disorder’ (BCDLD)

Supplementary materials:

Parent and Child Information Sheet and Consent Forms

Summary of Inter-rater Reliability Investigation

Individual Behaviour Counts Targeted by Each Dyad

Individual Data for Secondary Outcome Measures