

*Acceptability of a word encoding
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qualitative exploration through the
theoretical framework of acceptability*

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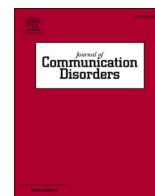
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Acceptability of a word encoding intervention for children with Developmental Language Disorder: A qualitative exploration through the theoretical framework of acceptability

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ABSTRACT

Intervention studies for children with developmental language disorder (DLD) often focus on effectiveness without considering the impact on the target population. When acceptability is addressed, parents' perspectives are prioritized due to methodological challenges in interviewing children. This study investigates the acceptability of a word-encoding intervention, previously evaluated using a single-case experimental design (SCED), by integrating views of children, parents, and teachers.

Five children, four parents, and one teacher who participated in the SCED study completed semi-structured interviews. Acceptability was assessed using the domains of the Theoretical Framework of Acceptability. Parents' and the teacher's responses were analysed using qualitative framework analysis. Multi-modal responses from the children were synthesised and described.

Overall, participants viewed the intervention positively. All participants considered the intervention ethical. Parents reported a range of benefits, including gains in untargeted domains, while children had limited awareness of their progress or the intervention's purpose. For parents, perceived burden and cost were influenced by the setting (school vs. clinic). Children found sessions enjoyable but those in school caused some disruption. Parents' understanding of the intervention was influenced by whether they attended sessions; similarly, the teacher, who did not attend, had limited understanding.

Insights from multiple stakeholders highlighted key considerations for researchers designing and clinicians selecting interventions. Dosage should be sustainable for children; school-based delivery may improve accessibility and reduce parental costs but can disrupt participation. Clear communication between researchers and stakeholders is essential to ensure shared understanding of goals and outcomes.

1. Introduction

Developmental Language Disorder (DLD) is a neurodevelopmental condition characterized by persistent difficulties in understanding and/or using spoken language, in the absence of a known biomedical cause (Bishop et al., 2017). These challenges typically persist across the lifespan and can significantly affect an individual's quality of life (Eadie et al., 2018; Wilmot et al., 2024). DLD is highly prevalent, it is estimated that around 7% of children in primary school meet criteria for DLD (Norbury et al., 2016). For these

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reasons, early intervention tailored to a child's unique profile of strengths and needs is essential to reduce the risk of negative long-term outcomes (Curtis et al., 2017; Sansavini et al., 2021).

Word learning is one of the language difficulties often associated with DLD (Kan & Windsor, 2010) with a direct impact on children's social development and academic achievements (Bleses et al., 2016; Rantalainen et al., 2021; Westrupp et al., 2020). Research indicates that children with DLD often experience challenges with the initial encoding of new words (Calabrese et al. 2025). Word encoding is the process by which a memory trace linking the phonological form of the word to its meaning is formed after first exposure (Craik et al., 2007). Encoding depends on both existing lexical knowledge and verbal working memory. Crucially, DLD can be associated with both limited lexical knowledge (McGregor et al., 2013) and low verbal working memory capacity (Archibald & Gathercole, 2006), both of which can hinder successful encoding of new words.

Based on this understanding, we recently proposed that an intervention targeting word encoding in children with DLD should focus on both lexical knowledge and memory processes. To investigate this hypothesis, we conducted a single-case experimental design (SCED) study to examine whether the sequential delivery of a verbal working memory intervention which integrated a phonemic awareness training (VWMPA) and a lexical strategy intervention would enhance the ability to encode new words in real time in seven children with DLD. Quantitative analysis revealed that, following both intervention phases, participants showed improvements in all word encoding outcomes (Calabrese et al., 2025 preprint; under review).

While quantitative data documenting gains in targeted linguistic and cognitive skills contributes valuable evidence regarding intervention outcomes in research contexts, it is also important to establish the acceptability of the intervention. In this regard, qualitative methodologies are particularly useful for gathering stakeholders' perspectives to determine whether an intervention was perceived as appropriate and meaningful for the target population, and to inform implementation of interventions in real-world settings (Skivington et al., 2021). Therefore, the acceptability of an intervention as perceived by stakeholders is crucial for bridging the gap between evidence-based interventions-which do not fully consider the needs of intervention recipients and their contextual realities-and person-centred care. Closing this gap is essential to support adherence to the intervention and to maximise the benefits of programmes developed and evaluated in research settings. Nevertheless, the acceptability of speech and language therapy interventions is rarely considered and examined directly (Olszewski et al., 2021).

Based on this premise, this further study reports on an investigation of the acceptability of the VWMPA and lexical strategy intervention that was conducted in parallel with the SCED study (Calabrese et al., 2025 preprint; under review).

1.1. The intervention

The experimental protocol consisted of sixteen 45-minute sessions of lexical intervention, delivered twice weekly over eight weeks, and sixteen 45-minute sessions of VWMPA intervention delivered with the same frequency.

The lexical intervention selected for this study was Lexicon Pirate (Motsch & Ulrich, 2012) a strategy-based programme shown to be effective in enhancing word learning in both German-speaking (Motsch & Marks, 2015) and Spanish-speaking children with DLD (Acosta Rodríguez et al., 2020). The Lexicon Pirate teaches children how to independently explore semantic and phonological information associated with new words, along with techniques for effective storage and retrieval, using a puppet character (Tom the pirate) who models the strategies.

The VWMPA sessions consisted of two components: (1) eleven trials of a listening recall task (Henry et al., 2022), and (2) 20 minutes of phonemic awareness training adapted from Park et al. (2013). The listening recall task was included because it requires simultaneous processing and storage of verbal information. Such tasks, referred to as executive loaded tasks as they activate the central executive component of Baddeley's model of working memory (Baddeley & Logie, 1999), have been shown to improve both verbal working memory and short-term memory (Rowe et al., 2019). In addition, phonemic awareness training was incorporated because it shares underlying mechanisms with word encoding: both involve the identification and manipulation of sound sequences to build a phonological representation. Previous research emphasized that for working memory intervention to produce transfer effects to verbal skills, the tasks must involve overlapping cognitive processes (Stanford et al., 2019). Therefore, the phonemic awareness component was integrated into the verbal working memory intervention to enhance its potential impact on word encoding.

Each participant received both interventions, but the order was counterbalanced across participants. Comprehensive assessments of language and working memory were conducted before and after each intervention block. These assessments included a word encoding task, which served as the primary outcome measure. Adapted from Jackson et al., (2021), the task enabled us to observe changes in the children's ability to encode new words in real time across different phases of the study. The number of assessment sessions depended on their individual testing pace. In total, across all timepoints, the number of assessment sessions ranged from nine to fifteen sessions.

Settings where the intervention took place varied, with five children receiving all sessions in school (with optional clinic sessions during holidays), one child attending one session per week in school and one in clinic, and another completing all sessions in the clinic. Sessions delivered in schools were conducted one-to-one between the researcher and the child, without involvement of teaching staff, except for one child (R3) who received full-time one-to-one support at school; in this case the learning support assistant attended all the sessions. All clinic-based sessions were attended by one parent.

The results of the SCED showed that each block of intervention had an effect on the targeted domains (lexical knowledge and verbal working memory) and that children improved across multiple word encoding outcomes following the sequential delivery of the two blocks. More details on the intervention and results can be found on the preprint of the paper currently submitted for peer review via (Calabrese et al., 2025 preprint; under review).

1.2. Acceptability of intervention: A theoretical framework

According to the hierarchy of scientific evidence, the SCED study provides Level 2 evidence for the effectiveness of the VWMPA and lexical intervention to enhance word encoding in children with DLD (Gillam & Gillam, 2006). However, quantitative evidence produced by intervention studies alone is not sufficient to justify implementation of the intervention in clinical practice. The UK Medical Research Council recommends that researchers also investigate the acceptability of interventions (Moore et al., 2015; Skivington et al., 2021) as this provides insight into how they are perceived by intended users and whether they align with the needs and preferences of the target population. To meaningfully inform the provision of speech and language therapy, research should integrate evidence on the effectiveness of interventions with data on their acceptability (Ayala & Elder, 2011; Douglas et al., 2022). Understanding individuals' lived experiences of interventions is critical to determine whether it can be successfully implemented in real-world settings.

Although the importance of evaluating the acceptability of interventions is widely acknowledged, this aspect is rarely explored in research on speech, language, and communication needs. When acceptability is addressed, it is often done without reference to a guiding theoretical framework (Douglas et al., 2022). To address this gap, Sekhon and colleagues (2017) proposed a framework providing a definition and theoretical conceptualization of the acceptability of healthcare interventions, known as the Theoretical Framework of Acceptability (TFA). Drawing on a review of existing studies examining acceptability in healthcare, they identified seven key domains that define how acceptable an intervention is perceived to be by its users. These domains are: a) Affective attitude - how individuals feel about the intervention, b) Burden - the perceived effort required to participate, c) Ethicality - the extent to which the intervention aligns with the individual's personal values, d) Intervention coherence - how well participants understand the intervention and how it works, e) Opportunity costs - what individuals perceive they must give up to engage in the intervention, f) Perceived effectiveness - the extent to which the intervention is perceived to achieve its intended purpose, g) Self-efficacy - the individual's confidence in their ability to participate in and carry out the behaviours required by the intervention.

The TFA has been widely used in healthcare research to evaluate how acceptable an intervention is to its target audience. This includes studies assessing the acceptability of interventions for individuals with speech, language, and communication needs. For example, Frizelle and colleagues (2024) incorporated an evaluation of intervention acceptability into a feasibility study of an online vocabulary language intervention for children with Down syndrome. Using the TFA to analyse parental responses to a post-intervention questionnaire, the researchers identified areas of improvement to support future implementation. For example, they found that reducing the duration of the videos children were required to watch, could reduce the burden of the intervention for children and families.

Alighieri et al. (2023) used the TFA to compare the acceptability of high-intensity versus low-intensity speech and language therapy for children with cleft palate, as reported by their parents. Through qualitative interviews, they found that although attending speech and language therapy was burdensome regardless of intensity, both interventions were generally perceived positively. However, parents reported lower self-efficacy when engaging with the high-intensity intervention. This study illustrates how qualitative research using the TFA can provide essential insights that complement quantitative findings. While quantitative studies often focus on determining the optimal intervention intensity for effectiveness, Alighieri et al. highlighted the importance of preparing and counselling parents to support their engagement, particularly when higher intensity treatments are being considered.

Mouton and colleagues (2025) emphasized that gaining a comprehensive understanding of an intervention's acceptability requires more than just parental perspectives. They recommended extending the investigation to include the views of speech and language therapists and children themselves.

1.3. Eliciting the perspectives of children with language difficulties

Acceptability studies in the field of speech and language therapy interventions often focus primarily on the views of parents, while the perspectives of children are frequently overlooked (Roulstone et al., 2015). This tendency is largely due to the methodological challenges involved in collecting qualitative data from children with language difficulties. For instance, children with DLD may struggle to reflect on past events (Gabaj et al., 2025) or to understand and use abstract language required to express feelings and opinions (Ponari et al., 2018), which can affect the reliability of their responses. Additionally, children with DLD often present with varied cognitive profiles that may include difficulties with sustained attention and working memory (Janssen et al., 2024), potentially limiting their engagement during interviews.

Despite these challenges, it is essential to include children's perspectives when exploring the acceptability of speech and language interventions, as they are the primary recipients of these services and can offer unique and meaningful insights into their experiences. When researchers intend to conduct interviews with children who have language difficulties, individualised adaptations must be made to the format and phrasing of questions to ensure comprehension (Bedoin & Scelles, 2015).

Owen and colleagues (2004) successfully conducted semi-structured interviews with children with communication difficulties, exploring their experiences with speech and language therapy and obtaining valuable data. The authors emphasised the importance of using visual cues, such as pictures and objects, to enhance participants' understanding and support expression. They noted that children with stronger expressive skills were observed to go beyond the visual prompts, offering more elaborate responses. The study also highlighted the impact of the interview approach: allowing sufficient time for children to formulate answers and avoiding overly closed questions were key to eliciting meaningful responses. However, the authors acknowledged that some portions of the interviews did not yield informative data, confirming that while it is possible to gather the perspectives of children with language difficulties through semi-structured interviews, doing so remains methodologically challenging.

1.4. The present study

The present study aims to assess the acceptability of a word encoding intervention from the perspectives of children who received the intervention, their parents/carers and educational staff (teachers and learning support assistant) of the schools involved in the study. The intervention, delivered through a combination of school-based and clinic-based sessions, required substantial time and commitment from children, families, and schools. Therefore, it is crucial to understand how the intervention protocol was received by all stakeholders to inform its future implementation in research, clinical, and educational contexts.

Semi-structured interviews, underpinned by the TFA, were used to explore participants' experiences and perceptions on all dimensions of acceptability, addressing the following research aims:

- To explore the perceived acceptability of the intervention across the TFA's domains
- To identify potential strengths of the intervention, such as perceived improvements in daily functioning or other meaningful changes not reflected in the SCED outcome measures
- To highlight limitations of the protocol, such as any aspects of the intervention that may have been experienced as overly burdensome.

The findings will offer critical insights for integrating effectiveness data with practical considerations needed to support adherence, engagement, and future research on the intervention.

2. Methods

2.1. Design

Semi-structured interviews were conducted using a topic guide informed by the TFA. Open-ended questions explored the acceptability of each intervention as well as the overall protocol, targeting all the dimensions identified by the TFA: attitude, perceived burden, ethicality, perceived effectiveness, intervention coherence, self-efficacy, and opportunity costs. Table 3 describes how each dimension was defined in the present study. Three different topic guides were developed to explore each domain of acceptability with parents, teachers, and children during the interviews (Appendix A). Open-ended questions allow researchers to obtain rich and detailed responses while encouraging participants to reflect and elaborate on their answers (Karatsareas, 2022, p. 99). Children' interviews consisted of a combination of open-ended and closed-ended questions.

2.2. Participants

All seven children who received the word encoding intervention, along with their parents, were invited to participate in the study. Of these, five children (four males) and four parents (one father, three mothers) agreed to take part. Two parents (P2, P3) were parents of the same participating child (R22). In one of the four schools involved in the project the class teachers of two participating children and the learning support assistant who attended the sessions for one child were invited; however, only one class teacher accepted. All participating children met the criteria for DLD, as defined by Bishop et al. (2017): a standard score ranging between 70 and 100 on the Raven's Coloured Progressive Matrices (Raven et al., 2008), and standard scores below 7 (-1 SD) on a minimum of two subtests of the Clinical Evaluation of Language Fundamentals - Fifth Edition (CELF-5; Wiig et al., 2013). One child, (R3), had standard scores lower than 7 only in one subtest of CELF-5; nevertheless, this child was included based on consistent concerns about language development expressed by both parents and teachers. Children presented with diverse linguistic, cognitive and psychological profiles. While most exhibited more pronounced difficulties with expressive language, R24 showed significant challenges with language comprehension. Additionally, R3 and R22 presented with a limited ability to sustain attention, while R11, R22 and R24 had difficulties with verbal working memory. Children's scores on standardized language assessments conducted prior to the intervention are reported in the Appendix B.

Three of the children who participated in the interviews completed all their sessions at school, except for occasional clinic visits during school holidays. Two parents attended all their child's intervention sessions, as these were delivered in the clinic (P2, P3). One parent (P4) attended one session per week in the clinic throughout the project (the child's other sessions were delivered in school). T1 was the class teacher for a child who received all of their intervention sessions in school. T1 did not attend the sessions in person but received feedback from a learning support assistant who was present at all pupil's sessions. T1 also received an overview of the

Table 1
Participants (adults).

ID	Participant	Attendance
P1	Parent R3	Two sessions only
P2	Parent R22	All sessions
P3	Parent R22	All sessions
P4	Parent R24	One session per week
T1	Class teacher R3	None

intervention from the researcher prior to the interview. Information on participants is summarised in [Table 1](#) for adults, and in [Table 2](#) for children.

2.3. Data collection

Three children were interviewed three weeks after the end of the intervention sessions (R3, R11 and R26) while two (R22, R24) were interviewed after 10 weeks. Parents were interviewed within eight weeks of the project's completion, while the teacher interview was conducted six months after the project ended.

All parents and the teacher completed an electronic consent form via Research Electronic Data Capture (REDCap) consenting to theirs and their child's interviews. Children also completed a paper copy of a child-friendly assent form (see Appendix C). All parent and the teacher interviews were conducted online via Microsoft Teams.

Children's interviews were conducted face-to-face in a quiet room within the same setting where the children had completed their intervention sessions, either at school or at the Speech and Language Therapy Clinic of the University of Reading. One of the school-based interviews was supported by a learning support assistant who had previously attended the intervention sessions (R3). A parent was present for the two children who were interviewed in the clinic (R22 And R24)

The parents' and the teacher's interviews began with warmup questions asking about the child's communication difficulties and the role they played within the intervention project. Topic guides were then followed. Children's interviews were also supported using visual cues (Appendix D). These included images depicting activities from the intervention, which were consistent with those used in the visual agenda used during the intervention sessions. This consistency ensured that children understood the activities the interviewer was referring to during the interview. The visual cues also included emotion charts with faces and colours representing different feelings, which helped children express their emotional state. Furthermore, colourful rating scales supported them in describing the effort required and their overall perceptions. This approach provided children the opportunity to reflect and express their perspectives flexibly, while accommodating their receptive and expressive language needs.

Microsoft Teams software was used to audio-record and automatically transcribe each parent and teacher interview. Children's interviews were video recorded via a Microsoft Teams meeting set up on a laptop. Only the children's hands were shown in the frame to capture their gestures as they pointed to the visual cues during the interviews. One child indicated on the consent form that their preference for their interview to be audio recorded only. A member of the research team then listened to the recordings and manually verified and corrected the transcripts.

2.4. Data Analysis

2.4.1. Parents and teacher

Interviews with parents and the teacher were analysed using the framework method (Gale et al., 2013). This approach was chosen for its suitability to qualitative studies that apply a theoretical framework, aligning well with the current study, which was guided by the TFA. Framework analysis offers a well-structured and transparent approach, guiding researchers through the systematic analysis of qualitative data via seven distinct stages: transcription, familiarization, coding, developing the analytical framework, applying the analytical framework, charting data into a matrix, interpreting the data.

Once finalised, each interview transcript was inserted into a three-column table in a Microsoft Word document: the central column held the transcript, the right-hand column was for annotations, and the left-hand column for coding. During familiarization, the researcher read each transcript multiple times, recording initial observations and reflections in the right-hand column. Line-by-line coding then followed, with individual utterances assigned codes using a combined inductive and deductive approach: the codes were generated inductively from the data, then categorized deductively into the predefined domains of acceptability outlined by the TFA. Coding was done manually, with relevant transcript sections colour-coded and corresponding code labels recorded in the left-hand column using matching colours.

Two members of the research team independently coded two of the ten interviews. Based on this initial coding, an analytical framework was developed by comparing codes, discussing interpretations, and resolving discrepancies. This process led to agreement on a set of labels and their categorization under the domains of acceptability. The analytical framework was created manually using Excel. Each code label was categorised and entered under the column corresponding to a specific domain of acceptability (e.g., affective attitude). Once the framework was finalized, one researcher proceeded to code the remaining transcripts by applying the set of codes and updating it when required. Examples of codes for each category, along with the corresponding interview excerpts, are

Table 2
Participants (children).

ID	Age ^a	Attendance	Support
R3	7;1	In school	LSA
R11	7;11	In school	-
R22	6;10	In clinic	Parent
R24	7;6	Clinic and school	Parent
R26	7;1	In school	-

LSA = learning support assistant, ^a = age at the time of the interview.

provided in Table 3. After coding, the data was charted into a matrix. The matrix consisted of one column for each category aligned with the domains of acceptability from the TFA, and one row for each participant. As such, all codes related to a particular category were summarized within a single cell for each participant. The matrix was then used to interpret the data and identify patterns across participants.

2.4.2. Child interviews

Children's responses to the adapted questions, particularly when supported by visual cues, were noticeably simpler and shorter than those of the adults who participated in the interviews. As a result, the children's responses did not yield data that was sufficiently rich for inductive coding. Data were collated for each domain of acceptability. Narrative summaries were developed for each domain for each child separately. These were then synthesised into narrative summaries.

3. Findings

The findings are reported for each domain of the TFA to explore the acceptability of the intervention systematically across participants. Table 3 provides the definitions used for each domain in this study, along with corresponding examples of coding drawn from relevant participant quotations. The final matrix summarising the codes for parents and the teacher, as well as the narrative table describing children's responses, are reported in Appendix E.

3.1. Affective attitudes

All parents expressed a positive attitude towards participating in the project. They appreciated the anticipated benefits and viewed the project as an opportunity for support. No concerns were raised about potential risks associated with participation.

"It was an opportunity that I didn't feel I wanted him to miss out on because I could see that the benefits would have outweighed anything that I presume to be, you know, negative or putting pressure on [X] to do. But actually, my overall view has been so positive" [P1].

Parents also valued the opportunity to contribute to a research project, recognizing its potential to support other children in the future. They expressed concerns about their children's performance during the project, particularly whether their child's individual profile of strengths and needs, such as attentional difficulties, might have impacted their ability to fully engage in the project assessment sessions or intervention activities. In addition, parents reported that their children generally had positive experiences with the project, they enjoyed the sessions and were motivated to participate.

"But overall I think it was good for her because she enjoyed coming. And she waited for these days when she had the project" [P3].

During the interviews, all four children confirmed these positive perceptions, expressing enjoyment of the sessions either verbally or pointing to the emotion chart.

"Made me laugh" [R26].

One child reported feeling frustrated, both verbally and crossing the angry face on emotion chart, as result of his difficulties in completing the tasks.

"Angry... (crosses angry face) ...because every time I always I always get it wrong" [R3].

No concerns or perceived risks were reported from the teacher, who instead showed appreciation for the structure and support that the project provided within the school setting.

3.2. Burden

Parents reported variable levels of burden associated with participation in the project. P1 and P4 both described the intervention as placing minimal burden on themselves and their families. Specifically, P1 highlighted that school-based delivery significantly reduced both time and financial demands.

"The fact that he was having it at school with you guys was brilliant. And I didn't feel under any pressure to do it at home...Financially, it didn't cost me anything" [P1].

Similarly, P4 found attending one clinic session per week to be manageable, due to the flexible scheduling of sessions. However, both P1 and P4 acknowledged that attending twice weekly sessions at the clinic would have been more demanding for the child and potentially challenging logistically. *"Coming once a week wasn't a problem for me... In terms of (child's name), I think once a week was probably the limit"* [P4].

P2 and P3 were parents of the same child who attended all sessions in the clinic, requiring them to bring their child on site twice a week. While P2 found this commitment manageable (*"I think overall it's been at least neutral or it may be in a way it was even positive"* [P2]), P3 showed willingness to accept the demands but identified a significant time burden and noted its impact on family life (*"We struggled because, it's a lot of time, but we were happy to use it"* [P3]).

Overall, session delivery setting emerged as a key factor influencing perceived burden. Families whose children participated in school-based sessions during regular hours reported lower levels of burden than those attending after-school sessions in the clinic.

The teacher reported minimal burden on teaching staff, noting that the only challenges related to logistical arrangements, such as coordinating time slots with the researcher and identifying a quiet space within the school for the sessions. The project was considered a good fit for the school setting, with no burden placed on staff regarding session activities.

"From my point of view, there was no effort involved at all" [T1].

In terms of the burden posed by the project on children, both teachers and parents noted that sessions scheduled in the afternoon

Table 3
Domains of TFA.

TFA domain	Definition	Code examples	Quote
Affective Attitude	How parents, children and teachers felt during the intervention	Positive attitude toward research No risks perceived	"I was more than happy for X to take part" [P1] "It's not something that can harm her. It can only be positive for her" [P2]
Burden	The perceived amount of effort that was required by parents, children and teachers to participate (during each individual session and throughout the project)	Work disruption After-school sessions tiring for child	"We also need to leave work earlier because you needed to get there" [P3] "So, I think that wasn't so bad. I think after school it was, he felt it was quite an effort, I think" [P4]
Ethicality	The extent to which the intervention fit with the family's values and teacher's professional values. The extent to which the intervention was respectful towards the child and their family	One to one intervention fits with professional values Child's needs and preferences were respected	"I think anything that anything that lets a child have that amount of attention and focused help. It's got to be a good thing" [T1] "If he wanted a little break and you were respectful for that, and that you allowed him to have that movement break if he needed" [P1]
Perceived effectiveness	The degree to which parents, children and teachers perceived the intervention as successfully achieving its intended aims.	Described improvements in WM Independent use of LP strategies (stretch word)	"She doesn't struggle like remembering and processing information that she got now, words Yeah" [P3] "He started actually stretching the word himself. He was himself trying to use the strategies that you used" [P4]
Intervention coherence	The extent to which parents, teachers and children understood the purposes of the intervention and how it worked	Progressive parental understanding of project purposes Consistent description of LP activities	"As we started it and as we've kind of moved towards the middle, I kind of started to understand better what's happening" [P2] "My understanding that it's to ask questions and also implement strategies how to remember the word. Like stretching or using magic to repeat the word couple of times" [P3]
Self-efficacy	The extent to which parents, teachers, and children felt confident in engaging with the intervention-whether this involved parents and teachers participating at home, in school, or during sessions, or children understanding what to do during the intervention activities.	Parent happy with involvement during project sessions	"I was happy to participate sometimes and get involved in the game" [P4]
Opportunity costs	The extent to which parents or children felt they had to give up valued benefits, activities, or routines in order to participate in the intervention, and teachers' perceptions of how the intervention affected children's opportunities within the school setting.	Progressive increase in child's confidence The child did not miss social opportunities No other activities were suspended	"So I could actually see her being becoming more.. confident. I guess with what she was doing" [P2] "We made sure he wasn't missing out on his play times for his social play" [T1] "No, nothing. No, we don't tend to do sort of, you know clubs, or anything after school. They happen at weekends" [P4]

were more challenging. Children appeared to have limited cognitive and emotional resources later in the day, whereas morning sessions supported better engagement. Furthermore, one parent (P2) pointed out that sessions including assessment probes felt too long for their child.

Children's responses regarding the perceived burden were more difficult to interpret as two children showed clear difficulties understanding the questions and gave inconsistent responses. However, one child (R3) reported verbally that the number of sessions was perceived as very high (described as "*one hundred*" [R3]), though the length of individual sessions did not feel too long. In contrast, three children (R11, R24, R26) indicated that the sessions were too long and more breaks were needed. Notably, R26, who occasionally completed three sessions per week to make up for recurring absences, explicitly stated that this frequency felt burdensome.

In general, sessions involving the Lexicon Pirate activities were perceived as less effortful, while the Listening Recall task from the VWMPA sessions was consistently described as more challenging. However, these findings should be interpreted with caution, as several children experienced difficulty understanding questions, particularly those that required reflection on specific components of the intervention. It is likely that some of the questions, asked retrospectively after the intervention had ended, felt too abstract or lacked sufficient context for accurate recall.

3.3. Ethicality

All parents and the teacher consistently reported that the intervention aligned well with their values and was delivered respectfully. Children's individual needs, such as the need for breaks, were consistently recognized and accommodated. Parents appreciated that

children were not pressured or pushed beyond their limits.

“Definitely, yeah, absolutely. He was never forced to do anything he didn’t want to do. And we could have breaks if he needed them. So yeah, it was totally respected” [P4].

The Lexicon Pirate protocol was described as particularly appropriate and engaging by both the teacher and one parent, who noted it helped maintain the child’s motivation and interest.

When asked, four out of five children answered “yes” when they were asked if they felt supported and that they were given opportunities to make choices during the intervention (see Appendix E for a summary of responses). However, one child (R24) expressed dissatisfaction with the requests made during sessions. In a follow-up question, the child clarified that these requests sometimes felt excessive and made him feel angry.

3.4. Perceived effectiveness

Parents perceived different levels of effectiveness of the intervention and in different domains. Some of them reported significant improvements, while one of them described more modest or uncertain changes. P1 described clear and meaningful gains in their child’s language, including independent use of questioning strategies, richer expressive language, improved vocabulary access, and longer attention span:

“Now he asks so many questions all the time. He’s exploring things all the time and gaining knowledge all the time. His concentration levels have shot right up, that was reported by the school as well” [P1].

P2 and P3 also observed positive changes. Both highlighted improvements in their child’s speech intelligibility and self-monitoring during phoneme production, although the intervention did not target speech sounds directly. In addition, P3 reported increased independence in word learning and improved ability to process and retain linguistic information:

“I think she got independent in this term also. Because now when she doesn’t know something, she asks, ‘What is this for?’ or ‘What is this object?’ So we could explain to her”... “She doesn’t struggle with remembering and processing information now...word” [P3].

In contrast, P4 did not notice significant changes in word learning following the intervention as difficulties persisted. Similarly, while the teacher observed a range of positive developments in the pupil, including improved sustained attention, expressive language, and vocabulary, they could not definitively attribute these changes to the intervention itself.

Children’s ability to describe perceived improvements was variable. Two children (R11 and R22) provided consistent responses and provided examples of specific words they had learned during Lexicon Pirate sessions. R11 also mentioned that the phonemic awareness activities had helped with phonics. The other children showed difficulties in understanding the question and provided inconsistent responses. Nevertheless, after some prompting, R24 reported: *“Tom taught me to ask what things are”*. Through follow-up question the child also stated that the memory sessions helped with learning words and that throughout the project he *“got better”* at the tasks of phonemic awareness.

3.5. Intervention coherence

Participants demonstrated varying levels of understanding regarding the purpose and content of each block of the intervention.

Parents showed a strong understanding of the Lexicon Pirate. All four parents accurately described its rationale, objectives, and associated activities, indicating a robust grasp of how the intervention worked. In contrast, comprehension of the VWMPA intervention was overall limited. Only two parents (P3 and P4) articulated a clear understanding of this component, and notably, these were the parents who attended sessions consistently throughout the project. The other two parents, who attended less regularly, provided only general responses: they were aware that the intervention targeted memory somehow, but they lacked insight into which specific aspects were being addressed or how this was achieved.

The teacher showed limited understanding of both interventions. They attributed this to insufficient communication from the research team regarding the interventions’ rationale and feedback on outcomes.

“I didn’t really know much of what went on at all. I only know how you’ve described it to me” [T1].

Children also demonstrated variable understanding. With regard to the Lexicon Pirate intervention, three children (R3, R24, and R26) described Tom as someone who helped them learn to describe and ask about unknown words, suggesting some awareness of the intervention’s aim. The remaining children were unable to articulate how the intervention worked.

In relation to the VWMPA sessions, only R11 and R22 provided partial explanations. R11 stated the sessions were meant to help with memory and phonics. R22 gave a general answer (*“they help me learn”*) but elaborated that the purpose of the phonological awareness task was to improve her phonics and that the listening recall task was to determine whether a sentence was true or false. This suggests that she understood the structure of the tasks but not the broader aims of the intervention. All other children were unable to articulate the purpose of the VWMPA sessions.

Overall, the Lexicon Pirate intervention was more readily understood by both parents and children compared to the VWMPA intervention.

3.6. Self-efficacy

All parents reported feeling comfortable when involved in the intervention sessions and expressed confidence in applying the strategies learned during those sessions at home. However, P2 and P3 noted the need for additional guidance to effectively implement the strategies independently and P1 highlighted challenges in conducting the activities at home due to their child’s limited cooperation

in the home environment. Interestingly, P3 expressed a desire for greater involvement in the sessions, contrasting with P4, who voiced concern that their presence might negatively impact their child's engagement.

The teacher viewed the Listening Recall and Lexicon Pirate activities as classroom-appropriate and expressed confidence in implementing them, provided sufficient training and support were available.

"I think they all sound like something I could do if I was shown how to do them" [T1].

Two parents observed limited understanding and confidence in their children initially, which improved progressively through the project. When interviewed children described the lexical strategies effectively and four of them reported high levels of confidence in applying the strategies independently, showing strong self-efficacy.

Regarding the VWMPA sessions, three children reported understanding the tasks and feeling confident while completing them. On the other hand, R11 and R24 provided inconsistent responses about their level of confidence, potentially resulting from difficulties in understanding the interview questions.

3.7. Opportunity/costs

P1 and P4, whose children attended the project at least partially at school, reported minimal costs of participation. The cost of occasional travel to the clinic was described as insignificant, and none of the parents had to take time off work or make special arrangements for siblings due to the flexible scheduling of clinic sessions.

P1, whose child attended sessions exclusively at school (except for the Easter holidays), emphasized that the sessions gave the child the opportunity of a constructive break from the main curriculum during the day. This viewpoint aligned with the teacher's perspective, who noted that the benefits of one-on-one sessions outweigh the curriculum disruption for a child with complex needs and low classroom engagement. The teacher also remarked that the impact of the sessions on the curriculum might be greater for a child with better classroom engagement.

In contrast, P2 and P3, whose children attended sessions exclusively at the university clinic, reported some associated costs. Both parents mentioned transportation expenses, such as train tickets and occasional taxi fares. They also noted the need to compensate for lost work hours in the evening after attending the sessions during the day. While P2 considered these costs manageable, reflecting a high degree of flexibility, P3 pointed out that the sessions had a noticeable impact on their family:

"We were home just about 6:00 o'clock in the evening, and after this, I still needed to make up the hours I should have been working... We were ready to sacrifice. But yes, it was time-consuming" [P3].

This suggests that perceived costs may vary based on the delivery setting but also on parents' ability and flexibility to absorb the costs.

The teacher also confirmed that participation in the project did not prevent the children from engaging in social or recreational activities at school. This was made possible through effective communication and the flexible rescheduling of intervention sessions. However, some children still felt they missed out. In particular, R3 expressed frustration, preferring to play football instead of attending sessions, R11 was disappointed about being placed in a different group for PE, and R26 reported missing some phonics lessons and time with friends.

4. Discussion

The present study explored the acceptability of a word encoding intervention for children with DLD. Acceptability was assessed through semi-structured interviews, guided by the seven domains of acceptability described in the TFA. Interviews were conducted with five of the seven children with DLD who had participated in a previous study evaluating the effectiveness of the intervention protocol, as well as with four parents and one classroom teacher.

Overall, all participants expressed positive attitudes toward both the intervention and the research project. Parental concerns primarily centred around their children's ability to maintain attention and perform well during the assessments. These findings suggest that additional reassurance and clearer communication may be needed to help parents understand the expectations placed on their children, as well as how the sessions will be tailored to align with each child's individual strengths and needs.

The perceived burden of participation for parents appeared to vary depending on the setting in which the intervention was delivered. Parents whose children attended sessions fully or partially at school reported a lower burden, while those required to bring their child to the clinic twice a week experienced a higher time burden. This suggests that high-frequency or intensive interventions may be better suited for delivery in school settings to minimize strain on families and support adherence, but due to the small number of participants, needs further exploration.

Additionally, most children reported that the sessions felt too long, a view echoed by one of the parents who noted that sessions involving probes were particularly lengthy. The use of probes was specific to the experimental design used to test the intervention's effectiveness. Therefore, future large-scale evaluations or clinical implementation of the intervention would not need to include the probe assessment tasks as part of the sessions. Nevertheless, these findings still highlight the need to balance evidence-based dosage with what is tolerable for the child (Calder et al., 2021).

Despite the burden placed on some families and the sustained effort required from children during sessions, the intervention was considered ethical overall. Both parents and the teacher noted that the activities aligned with their values and that the research team was respectful of the children's needs. Similarly, children reported feeling respected in their choices and individual needs.

While the effectiveness of the intervention had been examined in a previous study through quantitative analysis of improvements in word learning outcomes, the present research contributes additional insight by capturing the lived experiences of those involved. This

analysis helps identify potential improvements in the child's everyday functioning beyond the experimental setting, including domains not assessed in the formal testing battery. Parents consistently observed notable improvements in their children's ability to sustain attention. Although the intervention did not explicitly target attention, it is plausible that the working memory training, which engaged the central executive component of the working memory system (Baddeley & Logie, 1999), contributed to generalized improvements in attentional control (Al-Saad et al., 2021). Unexpected phonological improvements were also reported by two parents, indicating that the phonological awareness training may have enhanced the child's ability to reflect on sounds. This highlights the potential for broader cognitive and linguistic benefits associated with the intervention.

Three children reported some improvements; however, in general, it was challenging to elicit children's responses on their perception of the effectiveness of the intervention. This is consistent with Van Poucke et al. (2025), who found that children with DLD vary in their ability to articulate the benefits they experienced from speech and language therapy. This finding may reflect children's limited awareness of their own progress. For instance, during the SCED evaluating the intervention's effectiveness (Calabrese et al., 2025 preprint; under review) assessment results were shared with parents at each data point but not directly communicated to the children. Providing more explicit feedback on their own development could increase children's understanding of the achievements made during the intervention and, in turn, enhance their intrinsic motivation and engagement with therapy activities (Hattie & Timperley, 2007).

Parents who attended the intervention sessions demonstrated a better understanding of how the interventions worked, supporting evidence that experience-based learning through direct participation enhances adult learning (Burch et al., 2019). Although all parents were offered a webinar outlining the project's aims and structure, as well as one-on-one meetings at the end of each block to discuss results, these efforts did not ensure a consistent level of understanding across participants. Yet, parental understanding of the intervention's purpose and rationale is critical for effective collaboration, supporting adherence to therapy and improving children's language outcomes (Klatte et al., 2020). Therefore, providing accessible materials for independent review, such as written materials or videorecorded demonstrations of the intervention strategies, may be necessary, especially when parents are unable to attend the sessions in person (Schubbe et al., 2020).

Similarly, the teacher reported limited understanding due to insufficient communication about the project. This reflects previous findings that teachers often have limited access to training, knowledge sharing, and collaborative opportunities with speech and language therapists in school settings (Glover et al., 2015). Future school-based interventions should therefore prioritise teacher involvement by sharing both the project's framework and the outcomes achieved. This would enable teachers to reinforce intervention strategies, monitor progress more effectively, and contribute to a more holistic understanding of the child based on shared knowledge and perspectives. Quigley and Smith (2022) pointed out that this collaboration is dependent on dedicated time and space for the discussion, as well as relationships built on mutual respect where information exchange is balanced between theoretical knowledge and practical experience.

Children also showed limited understanding of the interventions, with none of them able to explain the purpose of the working memory component. Providing children with age-appropriate explanations about the wider objectives of the intervention and the aims of each task may help foster a deeper understanding of the intervention purposes. In turn, this can enhance self-determination, as children feel more directly involved in the process, thereby increasing their motivation and engagement with the intervention (Haerens et al., 2021). Overall, all participants demonstrated sufficient levels of self-efficacy. However, children's responses appeared to be influenced by their difficulty understanding the term "confident," which proved particularly challenging. This aligns with existing evidence that children with DLD often struggle with abstract vocabulary (Ponari et al., 2018). Therefore, while exploring self-efficacy was deemed essential given its key role in promoting adherence to interventions, the methodology used may not have been appropriate to yield reliable insights in this context.

The perceived costs of the intervention were closely linked to its delivery setting. Parents whose children received intervention at school reported minimal disruption to family routines, emphasizing the benefits of in-school delivery for both logistical ease and child engagement. The teacher's appreciation of sessions further supports their suitability for school based-delivery, especially for children with complex needs and low classroom engagement. In contrast, clinic-based delivery was associated with tangible costs, including travel expenses and lost work hours. Although families involved in this study demonstrated flexibility in managing these costs, such demands could become significant barriers to participation for those with lower incomes, less flexible work schedules, limited access to private transportation, or childcare requirements for siblings. These social determinants of health are likely to affect access to healthcare services (Bambra et al., 2010) like speech and language therapy, and should be carefully considered by clinicians and researchers when designing and selecting interventions. Strategies that mitigate these barriers are essential to promoting equitable access to care. This study highlights that delivering speech and language therapy in schools may be one such strategy to enhance accessibility and reduce inequalities.

While school-based sessions reduced the costs for families, some children reported missing out on school activities, highlighting the challenge of finding an optimal schedule that minimizes costs for parents while preserving meaningful opportunities for children.

In summary, this study found that the intervention was generally acceptable to participants, particularly in terms of affective attitude, ethicality, and perceived effectiveness from the parents' perspective. However, the acceptability of the burden, the intervention coherence, and the costs for both families and children represented areas for consideration for future research and implementation of the intervention.

5. Strengths and Limitations

To our knowledge, this is the first study to use semi-structured interviews based on the TFA to evaluate the acceptability of an

intervention for children with DLD from the perspective of multiple stakeholders.

A key strength of this research was the inclusion of multiple stakeholders' perspectives (children, parents, and one teacher) which provided a comprehensive understanding of the intervention's acceptability. However, the study was not without methodological limitations. In particular, despite the use of visual aids, it was challenging for children with DLD to provide detailed responses to open-ended questions. Many interview prompts were reflective and abstract in nature, which may have been difficult to understand for some children. This limitation could have affected the reliability of certain findings and may have led to the omission of important aspects of children's experience. Future research exploring the acceptability of interventions in this population should consider adopting a concurrent rather than retrospective design. Finally, the sample may have provided only a partial perspective on the intervention's acceptability, as it included just one class teacher, who did not directly observe the sessions, and only a subset of the participating children and their parents. A more comprehensive understanding would have required input from all children involved, their parents, and the learning support assistant who attended the sessions.

6. Conclusions

This research highlights the importance of integrating quantitative intervention studies with qualitative, theoretically informed explorations of acceptability. Such integration is crucial to ensure that evidence-based interventions are both effective and feasible for implementation in clinical practice. While the intervention was generally found to be acceptable by participants, the delivery setting had a significant impact on their experiences, leading to notably different perspectives.

By incorporating the views of children, parents, and a teacher, this study highlights important methodological considerations for clinicians aiming to apply the intervention and for researchers interested in exploring the protocol further. These include the need to balance participant burden with evidence-based decisions on dosage, to improve participants' understanding of the intervention, to support children in recognizing their progress, and to carefully weigh the costs for families against the opportunities provided to children.

Importantly, these considerations extend beyond the specific intervention examined here and can inform the design and implementation of future interventions for children with DLD.

Ethical Considerations

The study received ethical approval from the University Research Ethics Committee of the University of Reading with reference number 023-082-EP.

CRedit authorship contribution statement

Paola Calabrese: Writing – review & editing, Writing – original draft, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Vesna Stojanovik:** Writing – review & editing, Supervision, Methodology, Investigation, Conceptualization. **Emma Pagnamenta:** Writing – review & editing, Validation, Supervision, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

Topic guides for semi-structured interviews informed by the theoretical framework of acceptability

Parental perspectives

Introduction

The PhD researcher will explain the format of the interview and thank the parent/carer for attending. They will check that the parent/carer is still happy for the interview to be recorded. The researcher will provide reassurance that the interview is being recorded for research purposes only and will be transcribed anonymously.

The researcher who will conduct the interview will be the same person who delivered the intervention sessions which will be discussed during the interview. For this reason, the researcher will invite the participants to be honest in their answers without worrying about sharing possible negative opinions or thoughts about the intervention. The participants will be reassured that there will

be no consequences for their answers, but they will be valuable to improve the project and inform the literature.

Before the beginning of the interview the researcher will provide the parents with a brief overview of the intervention, explaining the aims, the structure the sessions and the tasks in each block of intervention with examples:

All children received two blocks of two different types of interventions. One block aimed to improve the child's ability to retain linguistic information in memory for a short time and manipulate mentally this information in real time. This ability is called working memory, and it is called this because it is the type of memory that allows to work on information while you keep it active in memory.

The sessions lasted around 30 minutes and included two types of tasks:

- The listening recall, which consists of asking the child to make a judgment on the meaning of a sentence and to recall the last word of the sentence. As the child's working memory improves the number of sentences presented at once progressively increases. Each time the child needs to complete 11 trials overall so 11 "attempts" and each attempt is rewarded with a desired game.
- The phonemic awareness training aims to improve the child's ability to reflect and manipulate sounds in words. The child is asked to break the words down into individual sounds or to guess a target word when presented with a sequence of sounds. Through the sessions the words become longer and more complex and when the child is confident with these two activities, they complete more complex activities such as replacing sounds in the words.

The other block of sessions is called the Lexicon Pirate. The aim of this block is to teach children to identify their own knowledge gap when they don't know a word and to become active explorers of new words by asking meaningful questions. The child is guided through the sessions by a puppet pirate called Tom and the activities are structured around the storytelling of a treasure hunt. Each time the child needs to look for treasure "which is words that they don't know" into a treasure bag. After the child finds three treasures, they need to actively explore the new objects first by asking questions and then using the object directly. The child also learns some tricks to remember new words and to retrieve them when they struggle to remember what something is called.

Warm-up question and background information

Opening question:

Can you tell me a bit about your child and their speech, language and communication?

Follow up questions (as appropriate):

- How do you feel about your child's speech, language and communication currently?
- How do you feel about your communication with your child?
- (if the family is from a non-English/ Multicultural Background) How do you feel about your communication with your child in each language?

Can you tell me about your involvement in the working memory and lexical intervention project of the University of Reading for word learning difficulties in children with Developmental Language Disorder?

Follow up questions (as appropriate):

- Can you talk about your role during the project
- Did you attend the sessions?
- If yes, did you attend them regularly or just one off? If it was only one off could you describe which type of session did you attend?
- Where did the sessions take place in your case?

TFA: Affective attitude

Opening question:

If parents attended at least one session, they will be asked the questions below. If they attended all the sessions all follow-up the questions below will be asked, otherwise only those that are applicable to the session they attended.

- How comfortable did you feel about having your child take part into a research project in general? How about this project in particular?

Follow up questions (as appropriate):

- Can you describe how you felt while your child completed the assessments
- Thinking now about the intervention sessions (rather than the assessments), can you describe how you felt while the child was completing the memory and phonemic awareness tasks (The researcher expands on those tasks to make sure that the parent understands which task they are referring to. For instance: "The memory tasks are those in which the child was asked to judge whether the sentence was true or false and remember the last word" or "The phonemic awareness tasks were those in which the child needed to think about the sounds in the words")
- Again, thinking about the intervention sessions (rather than the assessments), can you describe how you felt while the child was completing the treasure hunt with Tom.

If parents did not attend the sessions:

- How comfortable did you feel about having your child take part into a research project in general? How about this project in particular?
- Your child completed an extensive battery of assessment before the first block, at the end of the second block and at the end of the third block. These are tests of memory and language. Overall, the assessments last around 4 hours split in 4 sessions of 1 hour each. Can you describe how do you feel about the idea of your child completing a comprehensive battery of tests?
- Thinking now about the intervention sessions (rather than the assessments), can you describe how you feel about the memory tasks that I described at the beginning of the interview? E.g. “The memory tasks are those in which the child was asked to judge whether the sentence was true or false and remember the last word” “The phonemic awareness tasks were those in which the child needed to think about the sounds in the words”
- Again, thinking about the intervention sessions (rather than the assessments), can you describe how you feel about the idea of your child doing the treasure hunt with Tom?

*TFA Burden**Opening question:*

Thinking about the project as a whole, including the assessments and interventions sessions, what do you think about the effort that was required by you as parents and the whole family?

Follow up questions (as appropriate):

- How did it fit in with your family commitments and routines?
- Do you think the time and commitment that were required were sustainable for a family like yours?

For parents who did not take the child to clinic on a regular basis because the intervention was delivered mainly in school:

- Do you think the time and commitment that were required were sustainable for a family like yours?
- Would you have participated if it had not been possible for me to deliver the sessions in school? This would have meant that one parent would have had to take the child to the clinic twice a week for the length of the project (16 weeks plus assessments)

Again, thinking about the project as a whole including the assessments and interventions sessions What do you think about the effort that was required by your child?

Follow up questions (as appropriate):

- What do you think about their experience with these sessions and with the project overall?
- Were the activities appropriate? Did you notice any fatigue, stress, tiredness, negative feelings, or positive feelings about coming to the sessions?

For parents who did not take the child to clinic on a regular basis because the intervention was delivered mainly in school:

Again, thinking about the project as a whole including the assessments and interventions sessions What do you think about the effort that was required by your child

- Think about the number of assessments, the number of sessions, the length of each session.
- What do you think about their experience with these sessions and with the project overall?
- Do you think that the activities described were appropriate?
- Has your child shared with you any concerns about fatigue, stress, tiredness, negative feelings, or positive feelings about coming to the sessions?

*TFA: Ethicality**Opening question:*

How appropriate was the intervention for your child's needs?

Follow up questions (as appropriate):

- Thinking about your child's needs such as language difficulties, emotional difficulties, attention difficulties, personal preferences, do you think your child's needs were respected during the project? Do you think your child's choices were respected during the project?

Parents who did not take the child to clinic because the intervention was delivered mainly in school will be provided with some further details:

At the beginning of each session the child was presented with a visual agenda to let them know what tasks they needed to complete. They were then offered a choice of what to use to mark the tasks completed (e.g stamps, stickers). During the memory training the listening recall was associated with a rewarding activity such as inserting a star into a rocket for each attempt, a fishing game where they need to catch a fish after each attempt, the rock game where they need to balance some rocks one on top of the other. Each time

the child can select the rewarding activity preferred.

There were some elements that were not adjusted to the child's preference. For example, the phonemic awareness training needs to last 20 minutes and the listening recall needs to consist of 11 trials.

How appropriate was the intervention for your child's needs?

Follow up questions (as appropriate):

- Thinking about your child's needs such as language difficulties, emotional difficulties, attention difficulties, personal preferences, do you think your child's needs were respected during the project? Do you think your child's choices were respected during the project?

How well did the intervention fit with your family values?

TFA: Perceived effectiveness

Opening question:

Please describe any changes you have noticed in your child's language while they were receiving the intervention

Follow up questions (as appropriate)

- Has your child become more independent in exploring words? How?
- Is your child more aware of sounds in the words
- Is your child more accurate in processing linguistic information?
- Do you think that learning new words is easier?

Do you think that each block (lexicon pirate and memory training) has achieved its purpose?

Follow up questions (as appropriate):

- Do you think the strategies that Tom taught to the child were helpful?
- Do you think your child will put in place those strategies in the future?
- Do you think that the block of sessions that focused on memory help your child in learning new words more easily?

What do you think may have been particularly helpful for your child?

What do you think may not have been particularly helpful?

TFA: Intervention coherence

Opening question:

What is your understanding of the purpose of the interventions? (a brief description of each intervention will be given here as appropriate)

Follow up questions (as appropriate):

- What was your understanding of how the lexicon pirate worked?
- Only parents who attended the sessions: Do you think that activities were appropriate to teach the child the lexical strategies (questions, retrieval strategies, memorization tricks)?
- What was your understanding of how the working memory training worked?
- Only parents who attended the sessions: Do you think the activities were appropriate to enhance your child's memory of verbal information (sounds or words?)

TFA: Self efficacy

For parents who attended at least one session:

Opening question:

Can you describe how comfortable you felt when you were involved in the activities during the sessions?

Do you think you would be comfortable doing some of the intervention activities in the future with your child?

What would you need to feel confident to carry out these activities with your child at home (explore h instructions and resources here)

How confident was child in doing the activities during the sessions?

Follow up questions (as appropriate):

- Do you think your child understood what they were asked?
- Do you think your child knew what to do all of the time?
- Do you think your child felt confident in what they were doing
- What is your opinion on parents' involvement in SLT?
- Do you think that parents can make the difference?

- Should it be only the professional delivering the sessions or do you think that parents should be directly involved?

For parents who did not attend any sessions:

The researcher will talk through the task of each intervention block once again

Let's talk through the tasks again. 16 sessions aimed to improve your child strategies to learn new words independently. These sessions were structured as a treasure hunt that the child did with a friend: Tom the pirate, which is a puppet. Tom the pirate and your child took turns to look into the treasure bag to find a treasure until they each found 3 treasures. When they had three treasures each took turn again to explore one treasure at the time. For each treasure they needed to discover all the information that they did not know (e.g., the name, what it was used for). Tom provided the model for the questions.

Opening question:

Can you describe how confident would you feel in doing an activity like this with you child?

The other 16 sessions aimed to improve your child's working memory. In this case the tasks were the listening recall and a phonemic awareness training. In the listening recall the child needs to judge whether a sentence makes sense and recall the last word. As the child's memory improves, they are presented with a progressively higher number of sentences at a time and they need to judge each of them and then recall the last word of each of them in order. The other task is a phonemic awareness training where child needs to break increasingly long and complex words into individual sounds, or blend together a sequence of sounds provided to guess the target word.

Opening question:

Can you describe how confident would you feel in doing an activity like this with you child?

What is your opinion on parent's involvement in SLT?

Follow up questions (as appropriate)

- Do you think that parents can make the difference?
- Should it be only the professional delivering the sessions or do you think that parents should be directly involved?

TFA: Opportunity costs

Opening question:

What was the impact of participating in the project on your family such as family commitments, financially, on your other children?

Follow up questions (as appropriate):

- Was the cost of travelling sustainable?
- Was it sustainable for you in terms of time off work?
- Did you have to make any family adjustments to be able to ensure the child's attendance?
- Has participating in the project resulted in you making any sacrifices for you, your child, or the rest of the family

General acceptability

Opening question:

Can you share your thoughts on the intervention and how acceptable it was for your child?"

Children's perspectives

Introduction

The PhD researcher will explain the format of the interview and thank the child for attending and check the child is still happy for the interview to be recorded. The researcher will provide reassurance that the interview is being recorded for research purposes only and will be transcribed anonymously. The researcher will explain to the child that their help is needed to understand if the researcher did a good job during the sessions that they did together.

For this reason, the researcher will ask the child some questions about the sessions that they completed together. The researcher will emphasise that the child does not need to worry about sharing negative opinions and that there are no right or wrong answers. The researcher will make clear that there will not be any consequences for the child's answers and that their responses won't be shared.

The researcher will explain the child that they brought some pictures that could be helpful, but the child will be free to answer in their preferred way (e.g., just verbal answers or using the visual cues)

TFA: Affective attitude

Opening question:

Can you talk to me about the sessions that we did together -

How did you feel during the sessions that we did together? (use visual scale with emotions)

Follow up questions (as appropriate):

- Could you explain why?

*TFA Burden**Opening question:*

How easy or hard were the sessions and the activities that we did?

Follow up questions (as appropriate):

- Show visual representation of the treasure hunt with Tom: How easy or difficult was the treasure hunt with Tom?
- What was the hardest part and the easiest?
- Show visual representation of listening recall: Do you remember this task? This is the task in which you needed to tell me if a sentence made sense and tell me the last word of the sentence at the same time. How easy or difficult was to remember the last word of the sentences?
- Did you find this task difficult? Why?
- What was the hardest part and the easiest?
- Show visual representation of phonemic awareness tasks: Do you remember this task? In this case we had the blocks, and I asked you to tell me all the sounds that made a certain word, or I would tell you a sequence of sounds and you needed to guess the word. How easy or difficult was to find the sounds in the words using the blocks? What was the hardest part and the easiest?
- How hard was the work that we did together overall?

How did you feel how much time the sessions with me took??

Follow up questions (as appropriate):

- How many times a week did you do your sessions? Was it too much or did you manage it fine?
- How did you feel about how long the sessions with me took?

*TFA: Ethicality**Opening question:*

How did you feel during the sessions? How did you feel about what I was asking you to do?

Follow up questions (as appropriate):

- Do you think that you were offered choices and that your choices were important?
- Did I listen to you when you requested something or needed something?

*TFA: Perceived effectiveness**Opening question:*

How do you think our sessions have helped you? Has anything changed?

Follow up questions (as appropriate):

- Is there anything that you can do now that you couldn't before you started doing the sessions with me?
- Did Tom help you with anything? What did Tom help you with?
- Did the memory sessions help you with anything? What did they help you with?
- What is the most helpful thing that you learned?

*TFA: Intervention coherence**Opening question:*

Do you know why you had sessions with me? Could you explain why?

Why do you think you have done the sessions with Tom?

Follow up questions (as appropriate):

- What did Tom teach you?

Why do you think you have done the memory sessions? (Give examples of activities if needed to remind the child)

*TFA: Self efficacy**Opening question:*

Can you describe what would you do now when you come across a new word that you would like to learn?

Follow up questions (as appropriate):

- How confident are you that you know what to do when there is a word that you don't know?

How confident did you feel about doing the treasure hunt with Tom and why? (use visual scale here as appropriate)

Follow up questions (as appropriate):

- Did you always understand what were you asked to do?
- Do you know what to do all of the time?

How confident did you feel about doing those tasks (present visual referent for listening recall and phonemic awareness training) during the sessions? (use visual scale here as appropriate)

Follow up questions (as appropriate):

- Did you always understand what you were asked to do?
- Did you know what to do every time?

TFA: Opportunity costs

Opening question:

Do you think that doing those sessions with me was a good way of spending your time?

Do you feel you missed out because of the sessions with me?

Follow up questions (as appropriate):

- What did you miss out? Is there anything in particular?
- What would you have wanted to do instead?

General acceptability

What do you think of the sessions?

Would you recommend them to a friend?

Teaching staff's perspectives

Introduction

The PhD researcher will explain the format of the interview and thank the teaching staff for attending and check they are still happy for the interview to be recorded. The researcher will provide reassurance that the interview is being recorded for research purposes only and will be transcribed anonymously.

The researcher who will conduct the interview will be the same person who delivered the intervention sessions which will be discussed during the interview. For this reason, the researcher will invite the participants to be honest in their answers without worrying about sharing possible negative opinions or thoughts about the projects. The participants will be reassured that there will be no consequences for their answers, but they will be valuable to improve the project and inform the literature.

Warm-up question and background information

Opening question:

Can you tell me about your involvement in the working memory and lexical intervention project for word learning difficulties in children with Developmental Language Disorder of the University of Reading?

Follow up questions (as appropriate):

- Tell me about your role during the project: Did you attend the assessments? Did you attend the working memory sessions? Did you attend the lexicon Pirate sessions?
- Were you directly involved in the sessions? Explain how.
- Can you tell me a bit about how the child(ren) in your school who participated in the project are getting on in school something about your pupil?

Follow up questions (as appropriate):

- What kind of support does the pupil receive in school?
- What are the main areas of difficulty?
- Who is mainly in charge of the pupil's daily support?
- What do you think are the priorities for the pupil's wellbeing and success?

TFA: Affective attitude

Opening question:

How did you feel about the project?

Follow up questions (as appropriate):

- How comfortable did you feel in having your pupil taking part into a research project?
- Can you describe how you felt while your pupil completed the assessments

- Can you describe how you felt while the child was completing the memory and phonemic awareness tasks (The researcher expands on those tasks to make sure that the teaching staff understands which task they are referring to (e.g., “The memory tasks are those in which the child was asked to judge whether the sentence was true or false and remember the last word” “The phonemic awareness tasks were those in which the child needed to think about the sounds in the words”)
- Can you describe how you felt while the child was completing the treasure hunt with Tom

TFA Burden

Opening question:

What do you think about the effort required by this program from teachers and schools in general?

Follow up questions (as appropriate):

- What are your thoughts on the feasibility of conducting these sessions within the school setting? What do you think about how the sessions have been planned, times, setting, length
- How does it fit with the school timetable and routines?

Thinking about the project as a whole including the assessments and interventions sessions, what do you think about the effort required by this program from your pupil?

Follow up questions (as appropriate):

- What do you think about their experience with these sessions and with the project overall?
- Were the activities appropriate, have you noticed any fatigue, stress, tiredness, negative feelings, positive feelings about coming to the sessions?

TFA: Ethicality

Opening question:

How appropriate do you think the intervention was towards your pupil' needs? Please justify your answer

Follow up questions (as appropriate):

- Thinking about your pupil's needs such as language difficulties, emotional difficulties, attention difficulties, personal preferences, do you think your child's needs were respected during the project? Do you think your child's choices were respected during the project?

How appropriate do you think the intervention is in general to children with language difficulties? What about children with more complex needs? How respectful is the intervention towards children's additional needs?

How well did the intervention fit with your professional values?

TFA: Perceived effectiveness

Opening question:

Please describe any changes you have noticed in your pupil's language while they were receiving the intervention

Follow up questions (as appropriate):

- Has your pupil become more independent in exploring words? How?
- Is your pupil more aware of sounds in the words?
- Is your pupil more accurate in processing linguistic information?
- Do you think that overall learning new words is easier?
- Have you noticed any other changes with the other skills like reading or writing?

Do you think that each intervention (lexicon pirate and memory training) has achieved its purpose?

Follow up questions (as appropriate):

- Do you think the strategies that Tom taught to the child were helpful?
- Do you think your pupil will put in place those strategies in the future?
- Do you think that the block of sessions that focused on memory help your child in learning new words more easily?

What do you think may have been particularly helpful for your pupil?

What do you think may not have been particularly helpful?

TFA: Intervention coherence

Opening question:

What is your understanding of the purpose of the interventions?

Follow up questions (as appropriate):

- What was your understanding of how the lexicon pirate worked?
- Do you think that activities were appropriate to teach the child the lexical strategies (questions, retrieval strategies, memorization tricks)?
- What was your understanding of how the working memory intervention worked?
- Do you think the activities were appropriate to enhance the child's memory of verbal information (sounds or words?)

TFA: Self efficacy

Opening question:

Can you describe how comfortable you felt when you were involved in the activities during the sessions? (if applicable)

Do you think you would be comfortable in doing some of those activities with your pupil in the future if provided instructions?

How confident do you think your pupil was in during the activities during the sessions?

Follow up questions (as appropriate):

- Do you think they understood what they were asked?
- Do you think they knew what to do all the time?
- Do you think they felt confident in what they were doing?

TFA: Opportunity costs

Opening question:

What was the impact of participating in the project on pupil's educational priorities? What about other priorities like social engagement with peers?

Follow up questions (as appropriate):

- Did the child miss out on the curriculum?
- Was the number of sessions sustainable?
- Did the child miss on any school activities that would have benefitted the child?

General acceptability

Opening question:

Can you share your thoughts on the intervention and how acceptable it was for your pupil? And the school?

Appendix B

[Table 4](#), [Table 5](#), [Table 6](#)

Table 4

Language assessment scores of participating prior to the intervention.

Participant	Demographics		CELF-5				Vocabulary	
	Age ^a	Gender	SC ^b	WS ^b	FS ^b	RS ^b	BPVS ^c	EOWPVT ^c
R3	6;6	M	10	7	7	6	75	107
R11	7;5	M	15	9	6	5	100	116
R22	6;2	F	8	5	2	9	70	90
R24	6;11	M	5	2	4	5	70	85
R26	6;10	M	7	4	6	4	77	75

SC = Sentence comprehension, WS = Word structure, FS = Formulated sentences, RS = Recalling sentences, CPM = Raven's coloured progressive matrices

^a Age in years; months before the intervention

^b Scaled scores

^c Standard scores

Appendix C

Simplified consent form completed by children.



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University of Reading
Earley Gate
Reading, RG6 6AL
email: psols.c.l.s@psy.reading.ac.uk

Study Title: Acceptability of a Speech and language intervention to enhance word learning for children with language difficulties

I am here to ask you some questions about the sessions that we did together.

What will you be asked to do?

Listen to the questions.

Answer using your words or

pointing to some pictures



I will video record this

Or I can just audio record it if you prefer

If you don't like it, say "STOP"



Do you want to do this?



Your name

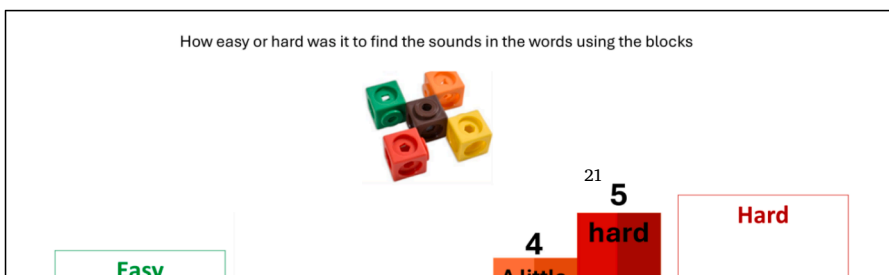
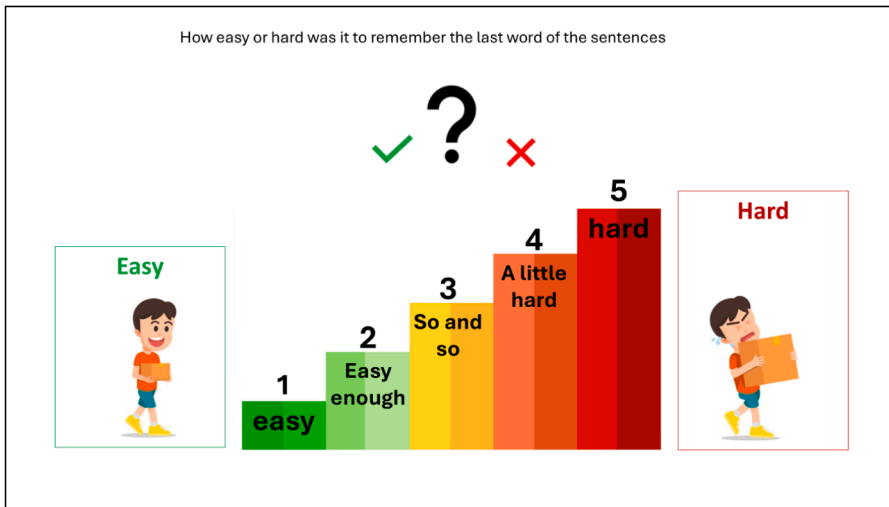
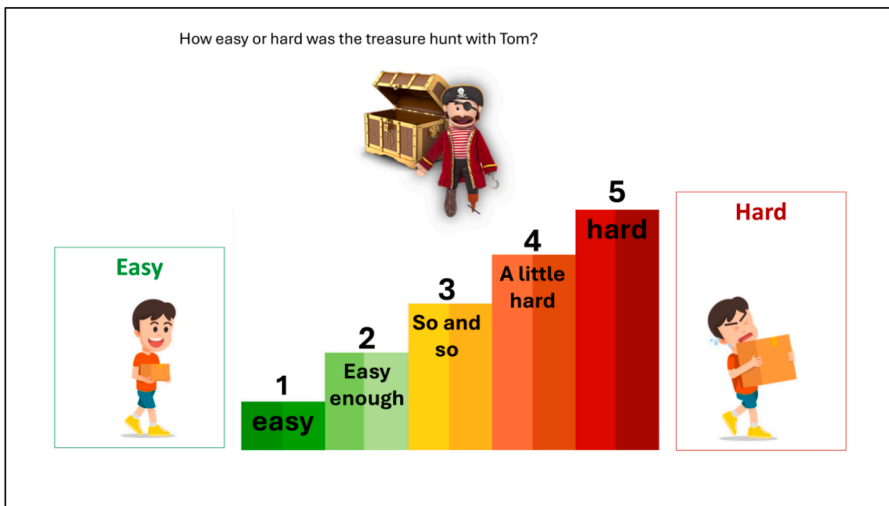
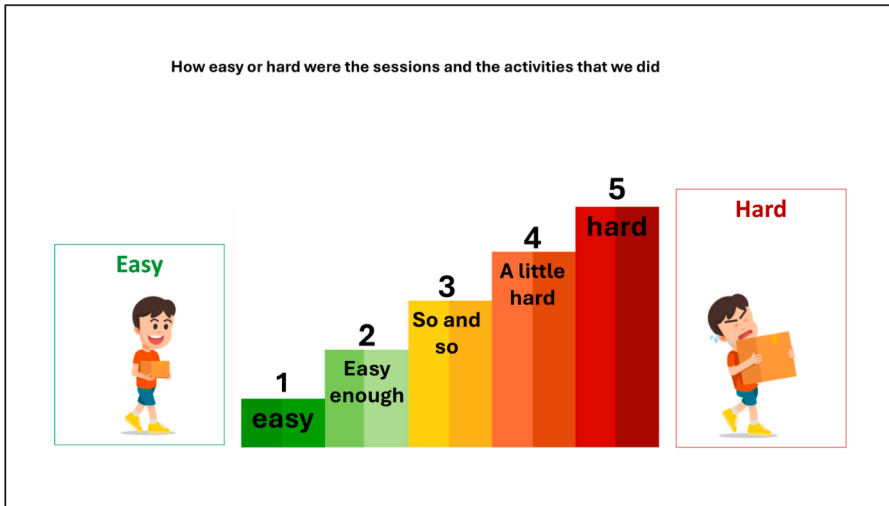
www.reading.ac.uk

Appendix D

Visual cues supporting children's interviews

1 How did you feel during the sessions with me and why?

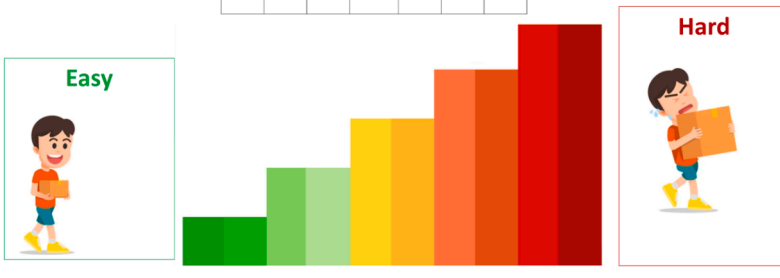
SAD	HURT	HAPPY	FOCUSED	SURPRISED	CONFUSED	ANGRY	RAGING
SICK	TIRED	CALM	EXCITED	WORRIED	SILLY	TERRIFIED	ANNOYED

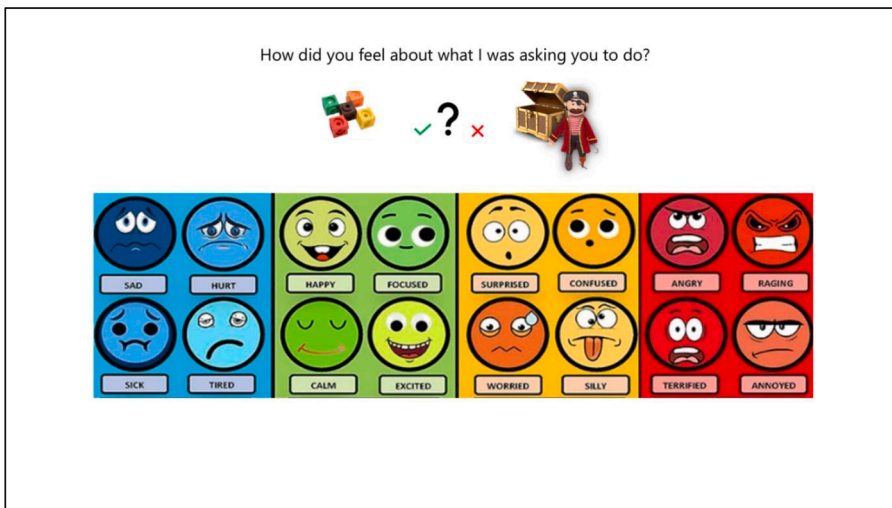
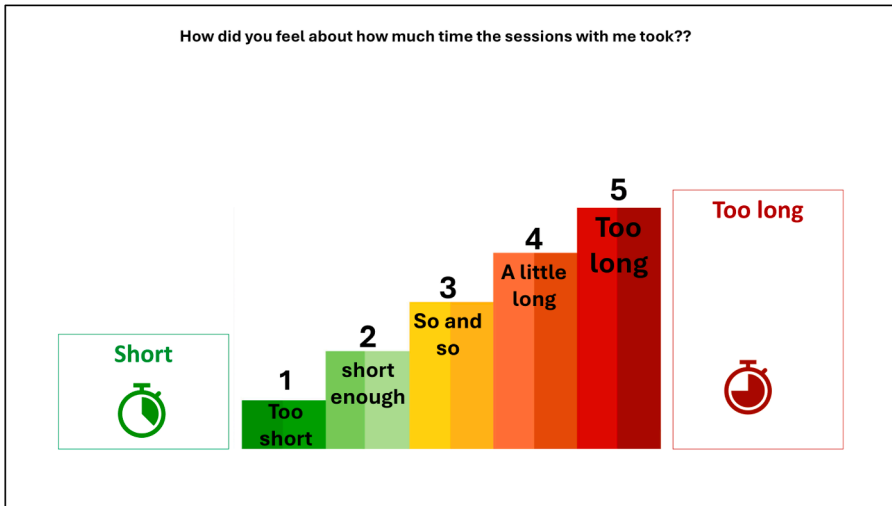


How did you feel how much time the sessions with me took??

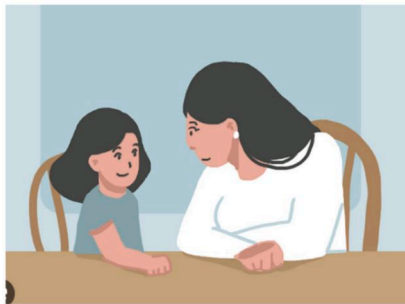
How many times a week did you do your sessions? Was it too much or did you manage it fine?

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY





- Do you think that you were offered choices and that your choices were important?
- Did I listen to you?



How do you think our sessions have helped you?

Is there anything that you can do now that you couldn't before you started doing the sessions with me?

Did Tom help you with anything? What did Tom help you with?



Did the memory sessions help you with anything? What did they help you with?



Why do you think you have done the sessions with Tom?
(Give examples of activities if needed to remind the child)

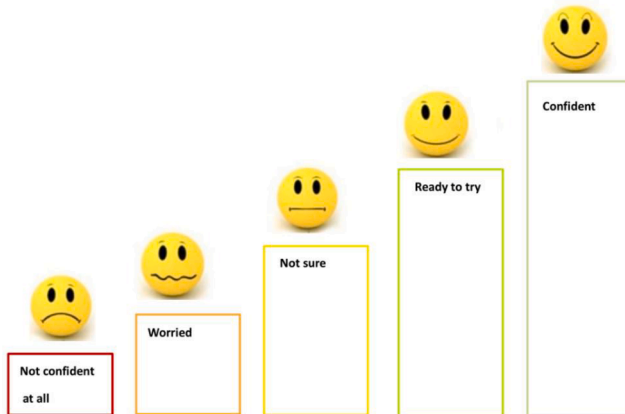


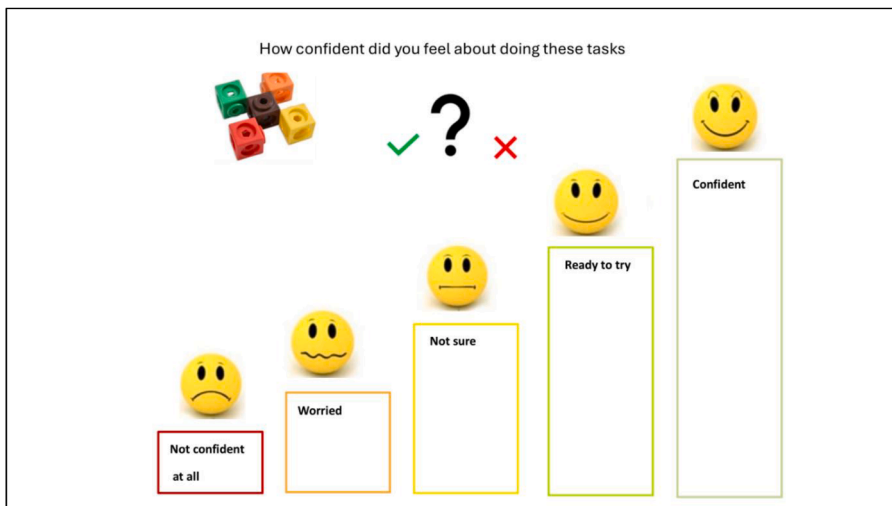
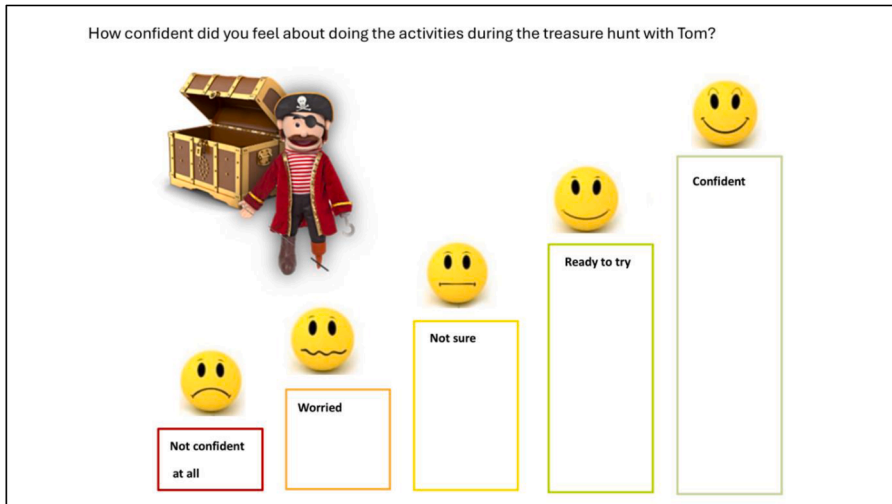
Why do you think you have done the memory sessions?
(Give examples of activities if needed to remind the child)



•Imagine you find a word you don't know but you want to learn this word.
•What would you do?

- If you don't know a word, what would you do?
- How confident are you about knowing what to do?





How confident did you feel about doing these tasks

Not confident at all

Worried

Not sure

Ready to try

Confident

- Do you think that doing those sessions with me was a good way of spending your time?
- Do you feel you missed out because of the sessions with me?

What do you think of the sessions?



Awful Not very good Okay Really good Fantastic

• Would you recommend them to a friend?

Appendix E

Matrix summarising parent and teacher codes generated through framework analysis and descriptions of children's responses

Table 5
Framework matrix for adult participants (parents and teacher).

Participant	Affective attitudes	Burden	Ethicality	Perceived effectiveness	Intervention coherence	Self efficacy	Opportunity costs
P1	Initial anxiety about the project's demands and child's ability to stay engaged, outweighed by anticipated benefits. They expressed a positive overall attitude toward the research, felt comfortable with the assessments, and were interested in the WM sessions. "It was an opportunity that I didn't feel I wanted him to miss out on because I could see that the benefits would have outweighed anything that I presume to be, you know, negative or putting pressure on X to do... my overall view has been so positive." The parent reported child's enthusiasm for school-based sessions, contrasting with reluctance toward home-based tasks.	Low level of burden reported. School-based sessions were particularly reduced pressure at home and gave the child a break from curriculum. Though the sessions were effortful, and the assessments exceeded the child's attentional capacity, breaks made participation possible. Home practice was viewed as optional, and neither the child nor the parent felt pressured to complete it. Practical factors like school delivery, proximity to the clinic, and easy transport supported feasibility. Travel burden was minimal and outweighed by benefits. However, clinic-only delivery during term time would have caused scheduling challenges.	The parent felt the intervention aligned with their values and was respectful and child centered. The child's needs, especially for breaks and emotional regulation, were accommodated, reinforcing trust. Rewards and breaks supported engagement and fit the family's parenting style. Learning support assistant feedback to parents confirmed the intervention's responsiveness and respectful approach.	Improvements in the child's language were observed: more questions, richer expression (including emotions), and better vocabulary access. Gains also included attention, memory, and curiosity for words. "Now he asks so many questions... His concentration levels have shot right up, and that was reported by the school as well." Changes were attributed to the project. "The benefits were for us immeasurable." Puppets were engaging and age-appropriate. Reading and phonemic difficulties persisted, prompting need for further training. Lexical strategies continued being used post-intervention.	The parent found the LP activities to be age-appropriate and described them consistently, suggesting a good understanding of the purpose of the intervention. However, they misinterpreted the Backward Digit Span, an assessment probe, as part of the working memory intervention. Overall, the parent did not demonstrate a clear understanding of the purpose of the working memory intervention, as they were unable to describe its aims or how it worked.	The parent reported limited involvement in the intervention. While they felt fully comfortable participating in the clinic-based sessions and were willing to carry out home-based activities, they acknowledged that success at home depended heavily on the child's cooperation. The parent assumed the child understood instructions and felt comfortable with the sessions, although this assumption was based on a lack of opposition rather than explicit feedback. They also noted that repetition might be needed to support comprehension, and that the child's compliance was likely driven more by motivation than understanding.	The school-based sessions were considered ideal, as they offered a structured and supportive environment which allowed children's engagement-unlike the home, which was viewed as unsuitable for learning. The family did not experience any significant costs, financially or in terms of time off work, as the sessions were completed predominantly in school. No concerns were raised about missed class time, as the sessions were considered constructive breaks from regular classroom activities.
P2	The parent expressed a positive attitude toward the project, seeing it as an opportunity for support. While no risks were perceived, they showed emotional	The burden of participation was considered acceptable. "I would say that the burden wasn't particularly bad ". Some adjustments were needed, such as reorganizing care for a sibling, but these changes	The intervention was perceived as respectful and aligned well with the family's values. The parent felt that the child was treated with respect, including sensitivity to	The range of positive effects observed included increased independence in exploring new vocabulary, independent use of questioning strategies, gains in phonological	Parent's initial generic understanding of the project improved over time, through participation. Overall, activities were described as appropriate, engaging, and	The parent actively supported their child's participation in the intervention, helping to maintain motivation through strategies like offering rewards	The parent reported that participation in the project was associated with limited costs. Occasional travel-related expenses (e.g., taxi fares) and the need to take time off work or

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Table 5 (continued)

Participant	Affective attitudes	Burden	Ethicality	Perceived effectiveness	Intervention coherence	Self efficacy	Opportunity costs
	investment in the assessment process, with some initial concern about the child's performance and attention. Particular worry was associated with child difficulties in tasks perceived as simple. "At the beginning, I remember I felt quite a lot of the time that I was concerned that she's not doing well. I mean, to me it seems like a reasonably easy task and I was kind of concerned that she's not doing it." The parent referred that the child also showed a positive attitude toward participation and appeared to enjoy the sessions.	led to a positive new routine. The intervention was perceived as manageable within the family's schedule. Although the child occasionally showed signs of tiredness after school, the level of effort required, and the requests were seen as appropriate. "I think she I think she was generally happy with the sessions. I mean, I don't recall her ever complaining about them other than maybe, oh, I'm a bit tired, but that wasn't a consistent thing. That was like a one off". To support motivation, the family found it helpful to reward the child's attendance with preferred foods.	their need for breaks. The researcher was described as having a supportive and considerate approach. " I think you've given her ample times to recover between the tasks. You've been very friendly, very nice with her". No conflicts were identified between the project's demands and the family's cultural or personal expectations.	abilities (awareness of difficulties and speech accuracy). Enhanced quality of life was noted across social and academic domains: better socialization, reduced gaps in communication and academic performance (phonics). The most significant change was in sustained attention. "At the beginning of the year, the feedback from school was: it's kind of difficult with her, whereas towards the middle of the school year/ the end the feedback became "OK she's trying. She doesn't necessarily get it the first time, but she will definitely try". "I definitely think her life in general became easier ". The parent noted that the working memory sessions supported word learning "Yes, I think they helped learning new words. I think they generally gave her some kind of new tools that she can apply "	motivating. The parent was able to clearly articulate the objectives of the Lexicon Pirate component, showing a detailed understanding of its goals and intended outcomes. In contrast, their understanding of the working memory component was more limited. While they identified the listening recall task as appropriate, their explanation of the purpose of this part of the intervention remained general. As the parent stated: "Well, I mean, as the name suggests, it's designed to kind of improve her memory, just remembering things, but that's as much as I understood at least." This suggests a lower level of coherence regarding the aims and mechanisms of the working memory sessions.	and engaging in sessions, which felt natural to them. They expressed a willingness to apply LP strategies beyond the clinical setting, though they noted that additional support would be needed. The parent noted that the child's confidence and understanding of the activities progressively increased throughout the project. They recognised the value of parental involvement in speech and language therapy and emphasised the importance of collaboration between parents and speech-language therapists.	recover hours in the evening were mentioned, but these were considered manageable. The ability to arrange transport independently (e.g., by car) and parent's flexible working hours helped minimise additional costs. Despite the objective financial and time costs involved, the parent's flexibility meant that participation in the project was not perceived as involving specific sacrifices.
P3	The parent expressed a positive emotional attitude toward the intervention, appreciating its benefits and the opportunity for their child to help others through research participation.	The parent noted a significant time burden and impact on family life. Flexible work enabled participation, though the burden felt heavy. They were willing to sustain the demands due to the clear benefits in their child's progress.	The parent felt that the intervention was respectful of both their child's needs and family values. They appreciated support such as visual agendas, movement breaks, and opportunities for the child to make choices, which	The parent observed a range of positive outcomes, including improved speech accuracy and intelligibility. Although not a direct focus of the intervention, the child's awareness of phonological difficulties	The parent demonstrated a clear understanding of both components of the intervention. They consistently described LP and working memory activities and viewed them as appropriate for their intended	The parent showed strong motivation to support their child and expressed a clear desire to stay involved, learn strategies, and continue practice at home is sufficient structured guidance was provided. The	The main cost of participation was time, due to travel and the need for both parents to occasionally work in the evenings. While there were some financial costs, mainly related to public transport, these were perceived as

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Table 5 (continued)

Participant	Affective attitudes	Burden	Ethicality	Perceived effectiveness	Intervention coherence	Self efficacy	Opportunity costs
	Some worry was reported about the child's ability to follow instructions, perform in assessments, and show expected progress. Despite this, the parent said the child enjoyed the sessions, looked forward to them, and took pride in sharing her achievements with her teachers. "Overall I think it was good for her because she enjoyed coming. And she waited for these days when she has project and she'll have to tell her teachers about this also. So yeah, I think it's still positive experience for her also"	Participation was described as somewhat tiring for the child, particularly because the sessions were scheduled in the late afternoon following a full school day during an already busy week for the child. Sessions involving probes were seen as especially demanding, and the parent felt that additional breaks would have made these parts of the intervention more manageable for their child.	helped promote comfort and autonomy. The researcher's approach was described as respectful and supportive, and the parent noted that the child's needs were consistently acknowledged. "Yes, she was listened to. Like when she's struggled with something then she wasn't pushed, definitely to do more than she could do".	improved, leading her to consistently self-correct, which in turn enhanced the parent's ability to understand her speech. The child also became more motivated and independent in exploring new words, applying questioning strategies. " I think she got independent in this term also. Because now when she doesn't know something she asks "what is this for" or "what this object is" So we could explain to her, " Additionally, the parent reported improvements in the child's ability to process verbal information and in her verbal working memory. " She doesn't struggle like remembering and processing information that she got now, words "	purposes. The parent showed particular interest in how the WM intervention functioned, expressing curiosity about cognitive processes and "how the brain works." The listening recall task was identified as the most challenging but also helpful, while the backward digit span task was mistakenly perceived as part of the intervention rather than as an assessment task.	parent would have appreciated a higher level of involvement in the project. The parent reports that the child had low confidence and found instructions challenging, especially for tasks like listening recall and backward digit span. However, confidence and understanding improved steadily over the course of the project.	irrelevant, and no added childcare expenses for sibling care. Overall, the time commitment was the most significant cost, but it was considered manageable given the intervention's benefits." It's probably most the time. Because it was time consuming that we needed to leave straight after school. We were home just about 6:00 o'clock in the evening and after this I still need to get the hours that I should be working" " we were ready to sacrifice. But yes, it was time consuming"
P4	The parent expressed a positive emotional attitude toward the intervention, valuing its benefits for their child and the opportunity to help others through research. They reported no major concerns and noted that their realistic expectations about the child's attention and emotional capacity reduced worry about the	The parent reported a low burden with limited impact on the family life. Flexible scheduling reduced disruptions. Weekly clinic-based sessions were manageable. The parent was open to more clinic based sessions but questioned their impact on the child's engagement. The frequency and length of the sessions, and project duration were deemed the maximum manageable for the child. Morning school-based	The intervention aligned with family values. They noted that the child's needs were respected, including the need for breaks, encouragement, and support with attention difficulties. The child was not forced to complete tasks, and activities were appropriate for their attentional and language profile. " Definitely, yeah, absolutely. He was never forced to do anything he didn't want to do. And he, you	The parent did not observe significant changes in the child's language or word learning, as difficulties persist. "Nothing majorly significant but little changes I've seen." "He knows something and I'm like, wow, you know that! Then sometimes something he's seen a lot, he still doesn't remember the name of". Working memory changes weren't noticeable in daily life, though	The parent initially had difficulty understanding the aims and rationale of the Lexicon Pirate component, but through observing the sessions, they progressively developed a clear understanding of the intervention. They found the use of puppets, toys, and blocks engaging and effective in supporting learning. The parent described the activities in the working	The parent felt comfortable and happy to be involved in the sessions and expressed confidence in applying strategies at home in the future. They noted that the child, initially lacking confidence, became progressively more comfortable over the course of the project. The child's understanding of LP and WM activities was supported by	The parent reported minimal costs associated with participation. The main financial cost was fuel for weekly clinic visits, but no time off work was required. A parent working from home was able to look after the sibling, avoiding the need for additional childcare arrangements. Researcher flexibility further reduced the impact on the family's

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Table 5 (continued)

Participant	Affective attitudes	Burden	Ethicality	Perceived effectiveness	Intervention coherence	Self efficacy	Opportunity costs
	assessment. Although the level of child's attentional difficulty observed during the session was unexpected and concerning, the child's ability to remain engaged and complete the session was surprising to the parent. The parents also reported enjoying the LP sessions and found the WM sessions interesting.	sessions worked well but afternoon clinic-based sessions were effortful for the child. The mid-project break and breaks during sessions were necessary as the project was extensive. Occasional sibling attendance posed no issue. "It wasn't that impactful. You were very accommodating... "You know, coming once a week wasn't a problem for me... I know sometimes that X didn't really feel like it because he's tired after school "	know, so and we and we could have breaks if he needed them. So yeah, it was totally respected". The researcher's attitude was described as respectful and supportive.	assessments showed improvement. The parent valued LP strategies (e.g., stretching, magic wand) and plans to apply them, though uncertain about long-term impact on word learning. The child was already using questioning strategies at home prior to the intervention. Overall, the activities were seen as appropriate and engaging, though the parent suggested a need for more variety in the routine. The weekly BDS probe was motivating for the child as they could see progression.	memory sessions accurately, demonstrating a good understanding of this component of the project as well. While they understood the purpose of the WM activities and felt they were appropriate, they remained unsure about the underlying brain mechanisms and expressed ongoing curiosity in this area. Listening Recall was perceived as an appropriate task to support working memory, and the use of blocks in the PA component was seen as an effective visual aid.	repetition and the predictable structure of sessions. The parent felt their presence may have reduced the child's engagement and attention, and described their role in WM sessions as more passive. They also noted that they were not previously aware of the concept of working memory before the project.	schedule. Neither the family nor the child had to give up existing activities to engage with the project, as their preference is to schedule extracurricular activities on weekends rather than after school.
T1	The teacher supported the pupil's involvement and anticipated improvements in sustained attention. They expressed a highly positive attitude toward the project, valuing its structure and the potential benefits for both the pupil and other children through its contribution to research. They reported no concerns about participation and appreciated the added structure to the school year: "I was really pleased about it... it was really good to have a structure	The teacher reported minimal burden. The only challenge was scheduling and finding a quiet space, though logistics were manageable. The project fit well within the school setting with no added burden on staff: " From my point of view, there was no effort involved at all. All I've got to do is release the pupil and find the time and the place for the activities to take place." The child's effort was seen as appropriate, though afternoon sessions, especially in the second block, were more tiring, with reduced concentration and behavioral dysregulation. Morning sessions	The teacher felt the project aligned well with both their professional values and the child's needs. The LP sessions were seen as particularly appropriate, as they were engaging and helped increase the child's motivation. A learning support assistant who attended sessions confirmed that the child's attentional and emotional needs were respected. The teacher also valued the one-to-one format, viewing it as consistent with their approach to providing supportive and individualized learning environments.	The teacher observed a range of improvements in the child's language and literacy skills, including expressive language, vocabulary, phonics (as shown in the final assessment), reading, writing, and sustained attention. While acknowledging these gains, the teacher expressed some uncertainty about whether they were directly attributable to the intervention or part of the child's natural development. Given the child's difficulties with verbal working memory, the teacher believed	The teacher appreciated the activities that were considered appropriate and engaging. However, they lacked understanding on the rationale and purpose of both interventions. They suggested that they had a better understanding of memory sessions as they received more information from the TA, but their description of the activities was inconsistent with the protocol. They reported limited communication between the research team and class teacher regarding the intervention's aims and	The teacher expressed a willingness to implement the strategies if provided with guidance and valued their potential as classroom activities. The listening recall and activities in LP protocol were considered appropriate for classroom use. The learning support assistant who attended the sessions reported back to the class teacher that the child was comfortable with the activities and understood what to do during the sessions	The teacher acknowledged occasional scheduling clashed with school events, but conflicts were easily resolved through communication and flexibility. While the child missed some math lessons, the one-to-one support was viewed as more beneficial given the child's complex needs and low classroom engagement. The short length of the sessions and flexible scheduling minimized disruption to the child's school participation, and the child did not miss social or play opportunities.

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Table 5 (continued)

Participant	Affective attitudes	Burden	Ethicality	Perceived effectiveness	Intervention coherence	Self efficacy	Opportunity costs
	throughout the year." The child was described as motivated, willing, and consistently engaged throughout the sessions.	were more sustainable. Session length was appropriate, though overall duration may have been slightly too long: "Maybe it was maybe the second lot of eight ..I think probably that was slightly more of a struggle" "The length of time he managed quite well, it was good for him to have to concentrate that length of time"		the intervention was likely beneficial, even if the outcomes were difficult to measure directly. She also noted it was unclear whether the questioning strategies had been generalised beyond the sessions. Overall, participation in the project was associated with several positive changes, though the exact source of these improvements could not be definitively determined. "I think it was really beneficial. I think he had a really good year.	feedback on outcomes.		The teacher noted that greater curriculum disruption might be more significant for children with milder difficulties or higher classroom involvement.

LP = Lexicon Pirate, WM= Working memory, BDS = Backward digit span

Table 6

Summary of children responses.

Participant	Affective attitudes	Burden	Ethicality	Perceived effectiveness	Intervention coherence	Self-efficacy	Opportunity costs	General acceptability
R3	The child felt frustrated as result of difficulties arising during the activities	The child reported that the LP sessions did not feel effortful. Similarly, the child indicated that the activities during the WM session were easy; however, through follow-up questioning, he confirmed that the listening recall task was difficult. This inconsistency suggests that the child may have not understood the question, affecting the reliability of the data. While he perceived the number of sessions to be too high, he noted that the	the child felt happy overall	The child indicated that Tom was helpful but was unable to explain why, simply recalling that he liked Tom and was fun. Additionally, the child could not articulate any specific effects or outcomes from the WM sessions.	The child indicated that he attended sessions with Tom because he needed help describing things, suggesting some awareness of support for expressive language use. However, he was unable to identify the purpose of the WM sessions.	The child felt confident with all activities completed but did not elaborate on the answers	The child clearly expressed dissatisfaction with participating in the sessions as that would have not been his preferred way of spending his time in school, stating a strong preference for playing football instead.	Overall the intervention was highly acceptable for the child

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Table 6 (continued)

Participant	Affective attitudes	Burden	Ethicality	Perceived effectiveness	Intervention coherence	Self-efficacy	Opportunity costs	General acceptability
R11	The child found the sessions enjoyable. Both PA tasks and LP activities were perceived as fun	<p>sessions themselves did not feel too long.</p> <p>The child perceived the sessions as too long and needing more breaks. The assessments were perceived as challenging, and the effort required for the intervention activities significant but not excessive (3/5). Recalling the last word was difficult, blending was harder than segmentation, and some words of the LP were hard.</p>	Overall, the child felt respected and that he was offered choices. However, sometimes he needed extra support to understand the requests	The child feels that his vocabulary has expanded. For examples, he has learned the word tram that did not know before. The child does not actually remember the word tram so describes the target showing ability to use independently and spontaneously strategies for word recall learned during LP sessions. In relation to LP sessions the child explains the use of puppets was very helpful to learn new words as it was engaging. The child believes that PA helped with phonics. The child also can describe the strategies learned	The child is not aware of the reasons for taking part to the project and the purpose of the LP sessions. He consistently refers that WM session aimed to improve his memory and ability to work with phonics	The child is able to describe the steps to be followed to learn a newly encountered word. The child refers that he would be ready to try these strategies independently. The child felt very confident about the activities completed during the LP sessions. There are some inconsistencies in the level of confidence reported for memory sessions.	Child missed on some PE classes and wished the session would have been after PE rather than before so that he could have attended with his class group	Overall, the child enjoyed the sessions and found participating to the project acceptable
R22	The child demonstrated a positive attitude toward project. She justified her response by saying that she enjoys engaging in "work" suggesting that completing the sessions was a rewarding and fulfilling experience for her. Nevertheless, the child also reported feeling worried	The answers were not fully consistent the mum supported child's understanding and answers. Throughout supported communication the child pointed out that the sessions with Tom were easy but the words used were hard to say. The child found difficult to provide a verbal explanation of why the WM activities were easy however she pointed that	The child answered "yes" when asked if she felt respected and that she was given choices which were heard	Child provides a list of examples of word that she learned during the sessions with Tom, suggesting that she is aware that the sessions supported the expansion of her vocabulary. Child also suggests that the PA training improved her ability to "say words"	The child seems to have low awareness on the purpose of LP sessions. While she pointed out that the WM sessions were supposed to help her to learn and in particular PA training helped he with her sounds.	The child confidently described the strategies she learned during the LP sessions. When asked, she reported feeling confident in using these strategies independently. She also confirmed that she felt confident while completing the activities throughout all sessions of the project, including both the LP and WM components.	The child did not report having missed out on any activities or experiences as a result of participating in the project.	Overall the intervention was highly acceptable for the child

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Table 6 (continued)

Participant	Affective attitudes	Burden	Ethicality	Perceived effectiveness	Intervention coherence	Self-efficacy	Opportunity costs	General acceptability
	during the process. This concern was explained by the mother-and confirmed by the child-as the result of her fear of not performing well.	the colourful blocks were helpful. Overall, the child pointed out that the effort required from the project was significant but not excessive (medium), and she would have liked more time to play during the sessions.						
R24	The child demonstrated a positive attitude toward the project. He justified his response by mentioning "games". It is unclear if he referred to the rewarding activities or the actual intervention tasks. When the researcher followed up the child did not specify nor provided an answer	Overall; the child reported that the burden was low. Nevertheless, thinking and asking about the words during LP and the listening recall were very effortful activities, while the PA was perceived as easier. The child also pointed out that the number of sessions was acceptable but the duration of each session was excessive	The child felt that the requests were excessive and that made him feel angry, but he felt that his requests were heard.	The child states that the sessions helped him but he cannot verbalise how. After some prompting he he said that Tom helped him by asking what things were, and that the memory sessions helped him with words.	The child mentioned that Tom taught him to ask about the names of things, demonstrating some awareness of the intervention's goals. However, when asked directly why he attended sessions with Tom, he gave a general response, stating that it was "to help with language." In contrast, he was unable to articulate the purpose of the WM sessions.	The child confidently described the strategies he learned during the LP sessions. However, when asked, he reported feeling worried about using these strategies independently. During the interview, the child had difficulty understanding questions related to this domain, as he did not know the meaning of the word "confident". Initially, he stated that he did not know what to do during the sessions but later changed his answer to "confident". The inconsistencies in his responses suggest that his understanding may have affected the reliability of the information provided.	The child did not report having missed out on any activities or experiences as a result of participating in the project.	Overall the intervention was highly acceptable for the child
R26	The child demonstrated a positive attitude toward the project. He justified the response by explaining	Overall, the sessions required some effort but were manageable ("easy a little bit hard"). The listening recall task was the	The child answered "yes" when asked if she felt respected and that she was given choices	The child showed difficulty understanding the question and was unable to clearly describe any improvements	The child appeared to have some awareness of the reasons for participating in the project and provided mostly generic	The child confidently described the strategies he learned during the LP sessions. When asked, he reported feeling worried	The child reported having missed out on phonics and spending time with his friends and his teacher.	Overall the intervention was highly acceptable for the child.

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Table 6 (continued)

Participant	Affective attitudes	Burden	Ethicality	Perceived effectiveness	Intervention coherence	Self-efficacy	Opportunity costs	General acceptability
	that he enjoyed the activities and they were fun ("made me laugh")	most demanding; the child reported difficulty making judgments about the meaning of the sentences. PA training required a moderate level of effort. Some words, such as peak, were easy, while others, like friend, were more difficult. LP sessions] less effort overall. Due to disruptions in attendance caused by the child's health, it was sometimes necessary to increase the frequency of sessions to three times per week. The child expressed that this increased frequency felt burdensome, whereas attending twice per week was manageable. Additionally, the sessions were perceived as too long.	which were heard. "yeah. Like like games to choose"	experienced following the sessions. He mentioned that Tom helped him when he did not know certain words, but he did not provide examples of generalised improvements. While the child reported "getting better" at the tasks of phonemic awareness, he did not indicate any broader gains or improvements in skills beyond the tasks practiced during the intervention sessions.	responses. " To make my words better". Tom was perceived as someone who helped when the child did not know a word, but no references were made to the specific strategies taught during the sessions. Additionally, the child did not demonstrate an understanding of the purpose of the working memory activities, and no consistent explanation of the tasks' objectives was given.	but ready to try to use these strategies independently, whereas he felt confident and understood what was asked during both LP and WM sessions.		

LP = Lexicon Pirate, WM= Working memory, PA = Phonemic awareness

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