

Delivering language intervention at scale: promises and pitfalls

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Background: There is now substantial evidence that language interventions delivered to small groups can be effective for improving language skills and hence strengthening the foundation for formal schooling. However, there are remaining challenges when delivering such interventions in naturalistic environments at scale.

Method: We reflect on three randomised trials designed to evaluate the impact of an early years language programme, prior to the implementation of a large effectiveness trial, delivered in partnership with speech and language professionals. We consider findings within a framework from implementation science.

Results: We found that, in contrast to policy-led interventions for reading and mathematics, language interventions are not prioritised in mainstream settings. Aside from this, other obstacles to delivery were the time taken to prepare and to timetable

sessions, lack of communication about the requirements of delivery and the need for language screening. Crucial to success was the support from the class teacher of teaching assistants delivering the intervention. However, feedback was largely positive from most stakeholders, and the intervention was found to have a positive impact on children's language with preliminary evidence for effects on behaviour and on reading comprehension.

Conclusions: While many educators recognise the importance of language for communication, the benefits of oral language interventions are only recently becoming prioritised by policy-makers. We propose that challenges to successful delivery and adoption of evidence-based language interventions in mainstream settings can be remedied through better communication with stakeholders and collaboration between researchers and professional colleagues including senior leaders, teachers, teaching assistants, speech and language therapists and psychologists. It is imperative to take account of issues of implementation when designing an intervention and to do this successfully is a multidisciplinary enterprise.

Keywords: Consolidated Framework for Implementation Research (CFIR), implementation, language intervention, professional partnerships, randomised controlled trials

Highlights

What is already known about this topic

- Early language intervention is effective.
- Trials of language intervention show larger effect sizes if fidelity is good.
- Scaling up research-led interventions is challenging.

What this paper adds

- The paper provides an overview of three published trials and reflects on the issue of implementation at scale.
- The paper presents a schools' perspective on the qualitative findings from educational practitioners who delivered the intervention, based on questionnaires and interviews.
- The paper demonstrates how theoretically motivated interventions can be adapted for delivery at scale.

Implications for theory, policy or practice

- Effective interventions need to be theoretically justified.
- Partnership between researchers and practice is essential to delivering sustainable interventions at scale.
- Children with language difficulties and disorders respond well to structured interventions delivered in mainstream schools.

Delivering Language Intervention at Scale: Promises and Pitfalls

A growing body of evidence now suggests that oral language interventions can be effective for improving language use and comprehension (Hulme et al., 2020). In turn, these can provide a better foundation for the development of reading comprehension (e.g. Clarke et al., 2010) and more generally to access the curriculum. They can be especially beneficial for children from disadvantaged backgrounds (e.g. Burgoyne et al., 2018; Suskind et al., 2016). However, there are considerable challenges when delivering such interventions at scale. First, while many educators recognise the importance of language for communication, its importance as a foundation for learning is not well understood (refer to <https://radld.org/> for more information). Second, in contrast to reading interventions, for which there is a large evidence-base and extensive experience of delivery in schools, the benefits of oral language interventions are only recently becoming clear (Rogde et al., 2019).

Implementation science, the study of factors beyond the theoretical motivation for an intervention that ensure both take-up and sustainability, is well researched in medicine (Greenhalgh et al., 2004; Wolfenden et al., 2016). Similarly, frameworks are beginning to be used in clinical child psychology (Bauer et al., 2015; Williams & Beidas, 2019), yet after 100 years of randomised controlled trials (RCTs) in education (Styles & Torgerson, 2018), there has been little consideration of how to ensure an educational intervention will be effective beyond the research trial (Nag et al., 2014; Spier et al., 2016). The early involvement of professionals and practitioners in the design of educational recommendations is critical to the development of interventions that can be successfully scaled-up.

In this paper, we reflect on a series of RCTs designed to evaluate the effectiveness of an early years language programme delivered within the English school system. The Nuffield Early Language Intervention (NELI) was designed by a multi-professional team of teachers, speech and language therapists and psychologists. The team worked together to design the intervention and to develop materials, initially for the first 10 weeks of the programme. The process entailed deciding on the structure of the sessions, drawing on good practice for introducing, reinforcing and consolidating new concepts before developing content that not only drew on available materials but also required dovetailing themes with mainstream work, selecting vocabulary and writing new content. Activities and some sessions were piloted in a range of settings including a language unit. The team did not discuss the practicalities of eventual scale-up; this would clearly have been advantageous from the outset. They did however consider the prevailing policies and curricula in schools.

Following two research-led RCTs with promising findings (Bowyer-Crane et al., 2008; Fricke et al., 2013), an efficacy trial compared a 20-week with a 30-week version of the NELI programme (Fricke et al., 2017). To guard against expectancy bias, the researchers who performed the postintervention assessments were blind as to study arm (which intervention the child had received) and independent evaluators conducted the randomisation and allocation in the efficacy trial. We discuss the feedback from educational professionals who were involved in that trial and how we modified the intervention based on the findings. We then present the Theory of Change that guided a larger effectiveness trial of NELI in Reception¹ classes.

To structure our commentary, we draw upon the Consolidated Framework for Implementation Research (CFIR), a multidisciplinary framework that provides a catalogue of contextual factors that have been associated with effective implementation in health settings (Damschroder et al., 2009). Factors are split into five domains used to identify barriers and facilitators across different aspects of intervention (intervention, outer setting, inner setting, individual characteristics and process). There is no expectation within the CFIR that all domains will be relevant to all trials, and here the framework, which was designed for health settings, is used for an education trial. We therefore selected domains of the CFIR that are most relevant in relation to the school settings in which the language interventions were delivered and structure our discussion to address these in turn, as follows:

- 1 Intervention: the nature of the intervention, its quality, complexity, adaptability, costs and how its value is perceived (A)
- 2 Settings (outer and inner combined): external policies and incentives, school contexts, child needs, cultural factors, networks and communications, readiness for implementation (B)
- 3 Individual characteristics: knowledge and beliefs, self-efficacy, experience, of professionals and practitioners (C). We did not obtain feedback from the recipients of the intervention who were considered too young to provide valid data.
- 4 Process: planning, engaging, executing, reflecting and evaluating (D)

We draw together findings within an implementation framework, highlighting obstacles to successful implementation and how they can be circumvented through collaboration between researchers, professional colleagues and policy-makers at all levels (senior leaders, teachers, teaching assistants [TAs], speech and language therapists and psychologists).

Background

Interventions (A)

Nature of the Intervention

The NELI is an evidence-based language intervention for young (4- to 5-year-old) children with weak oral language skills (Fricke et al., 2018). The programme was originally devised for use in Reception and Year 1 (Bowyer-Crane et al., 2008) and subsequently extended to span the last term before school entry and the first two terms of Reception (Fricke et al., 2013). The final published version of the programme (Fricke et al., 2018) is a 20-week programme designed to be delivered to children in Reception classes (the first year of formal education). Sessions include thematic activities designed to improve children's vocabulary, to develop their narrative skills and to encourage active listening and building confidence in independent speaking.

Factors Concerning Quality, Complexity and Adaptability

Nuffield Early Language Intervention: Research Trials. In the first trial, Oral Language (OL-1) intervention (2004–6), a version of the programme, was compared with

a programme training phonology and reading. The programmes were delivered in the final term of the first year in school (Reception in England) and the first term of Year 1, 10 weeks in each term (Bowyer-Crane et al., 2008). In the time period when NELI was designed, the importance of oral language intervention was not recognised by policy-makers, and the emphasis in schools was on early literacy instruction (phonics). The aim of the study was to investigate two different forms of preparation for children who enter school at risk of reading difficulties – phonological awareness training and early reading instruction or oral language intervention. We expected the two interventions to have differential effects in the short term, but in the longer term, both should support the development of reading for meaning.

A key aspect of the trial was the training of teaching assistants (TAs) to deliver each programme. The format of delivery was that, on alternating days, the TA would deliver a small group session in one arm of the intervention and individual sessions in the other arm; support was provided for them by the research team throughout delivery. Before the trial began, the TAs received 2 days of preparatory training for the Oral Language programme (OL-1) and 2 days for the Phonology and Reading programme. During delivery, they attended fortnightly tutorials and an extra ‘refresher’ training day was organised between the first and the second 10 weeks of delivery (essentially after the summer vacation).

The OL-1 programme produced gains in vocabulary and grammar, whereas the control intervention produced gains in phoneme awareness, letter knowledge and word reading (Bowyer-Crane et al., 2008; Hulme et al., 2012). An increase in the children’s confidence was reported by the TAs, and they themselves reported gains in professional competence. Moreover, in the absence of an untreated control group, it was not possible to gauge the size of the effect of the OL-1 on language skills. Nonetheless, in the light of the promising findings, a second trial addressing the shortcomings was planned.

While it is by no means established that ‘earlier is better’ for interventions (Maughan & Barker, 2019), there is a strong theoretical argument for ensuring that good language foundations are in place before children begin to receive formal instruction (Bishop & Adams, 1990; Snowling et al., 2020). The rationale for what we refer to here as Oral Language intervention-2 (OL-2; 2009–12) was therefore to start the programme earlier during the preschool period and to run it over 30 weeks: 10 weeks of the programme were delivered to small groups of three to four children in preschool (Nursery) classes three times each week, followed by 20 weeks of intervention in the mainstream classroom (alternating daily between small groups and one-to-one sessions). The key skills targeted in OL-1 were retained (vocabulary, narrative skills, active listening and speaking), but in the final 10 weeks, the OL-2 programme was supplemented with work on phoneme awareness and letter knowledge to support learning of phonics in the mainstream classroom (Fricke et al., 2013).

Teaching assistants received 2 days training before each block of intervention, as well as fortnightly tutorials and five on-site observations. Results showed no effect of the intervention on taught vocabulary in the first 10 weeks carried out in nurseries; the most likely explanation is that this represents a ‘dosage’ effect – the programme was very short, and because it was delivered to small groups, it did not have measurable impact in the short term (refer to Haley et al., 2017, for discussion). However, a significant impact was found on both expressive and receptive vocabulary after a further 20 weeks (30 weeks of intervention in all). Using standardised measures, treatment effects were found for language skills and narrative skills immediately after the intervention relative to the business-as-usual (waiting) control group, and these were maintained after 6 months. Finally, the

intervention had a significant impact on children's reading comprehension skills at this delayed follow-up point, and these were shown to be attributable to gains in vocabulary (Fricke et al., 2013). On a rather different note, in OL-2, the intention was that the same TA would deliver the intervention to the children throughout the 30 weeks; this proved particularly difficult when a child attended a nursery that was not part of a mainstream school; however, it was never straightforward to ask a TA to deliver an intervention across two school years.

Nuffield Early Language Intervention: Efficacy Trial. Following the second research trial of language intervention (OL-2), the team conducted an efficacy trial. In this larger trial, the training and support of TAs was delivered by speech and language therapists, rather than by the research team, in order to reduce expectancy effects. The research team conducted the preintervention and postintervention assessments blind to treatment arm, and to ensure independence, the randomisation and data analysis was conducted by an independent team of evaluators who also assessed the fidelity of delivery (Sibieta et al., 2016). A further difference between this trial (2012–2015) and the research trials was that it was conducted in 34 settings (involving 394 children), rather than exclusively in schools local to the research team, in which they were trusted.

In addition to evaluating the 30-week NELI programme in a more realistic educational context, this trial (Fricke et al., 2017) compared the effects of the full 30-week programme (which had posed some implementation problems, as previously mentioned) with that of a truncated 20-week version comprising the second and third 10-week segments of OL-2, delivered to children in Reception classes who had received 'business as usual' in the preschool period. TAs received 3 days of training; one before starting the Nursery intervention, and two before starting the intervention in Reception. While the TAs delivering the intervention had access to a telephone helpline, tutorials (which are costly) were not offered during this trial; they did, however, receive three on-site observations (one for each 10-week block of intervention) by a member of the research team.

Results revealed that both the 20-week version and the 30-week version of OL-2 improved children's language skills significantly (30-week $d = 0.30$; 20-week $d = 0.21$) and these intervention effects were maintained 6 months after the intervention had finished. Although the size of these improvements tended to be larger for the 30-week version, the difference was not statistically significant. In contrast to the positive effects on oral language, there was no evidence that either version reliably improved early literacy or reading comprehension skills. The lower effect sizes in this study (Fricke et al., 2017) compared with Fricke et al. (2013) appeared to reflect lower implementation quality in the later study.

Given the positive effect of the 20-week programme, the next step was an effectiveness trial prior to possible scale-up. To inform the next stage, and the design of high quality user-friendly resources, it was appropriate to seek detailed feedback from the community of educational professionals who had been involved with the intervention. An informal survey was conducted to understand the positive features of the intervention and the challenges to delivery in the early years' settings (see below). Feedback was gathered in three ways: via a questionnaire for project contacts; a short online questionnaire for class teachers of the children in Reception classes; and one-to-one telephone interviews with the TAs who delivered the intervention (refer to Appendix 0 for details). Not all schools completed all sections of the survey; the numbers completing are noted in the relevant sections below.

Costs and Perception of Value

A school running the NELI for the first time with two groups of four children each in Reception would have spent (approximately) £700 on the manual and training and incurred costs of £3500 (not including on costs) of TA time for the 20 weeks of the Reception phase. This would use 40% of the Pupil Premium for those eight children, making it a significant investment for the school. Six teachers mentioned that the intervention had been positive for the children and highlighted improvements in confidence and language and communication skills; six (other) respondents noted that using the intervention had been positive for the TA, allowing a focus on specific children and building knowledge about speech and language difficulties. Class teachers and project contacts were asked if the intervention had been a good use of the TA's time. Of 22 responses, 20 were positive; the two negative responses were because the intervention was time-consuming and because it had been logistically hard to organise as the three children involved were from different classes.

Settings (B)

External Policies and Incentives

School budgets are limited, and decisions need to be made as to how to spend the limited funds they receive. During the development phases of NELI, government policies favoured literacy as a priority and, more specifically, systematic instruction in phonics (Rose, 2006). Indeed progress in phonics was to be monitored at the end of Year 1 in mainstream schools (Duff et al., 2015). More recently, a government emphasis on STEM subjects had brought the teaching of mathematics into focus. Within this climate, it was not easy to convince schools to divert resources to oral language. Moreover, targeted areas for resourcing which, as stated by participants in the trial, were more or equally popular to language and communication included visits to places of interest, ICT equipment, incentives for attendance/staff time to improve attendance, before-school and after-school clubs, parent support advisor/family support worker and mentoring/counselling/therapy/nurture provision.

School Contexts

Of the 30 schools that completed the intervention, information on their school websites was used to consider how they used their Pupil Premium (extra government funding to school to assist in the support of disadvantaged children). Every school gave details of spending to target literacy and numeracy. In contrast, the number of schools who reported financing to target communication and language was much lower (less than half) and, in those that did, the proportion of spending and amount of staff time was much less than that for numeracy and literacy. The relative neglect of oral language and communication in reports on these schools' websites reflected government targets for the use of Pupil Premium funding. One of the requirements of such funding is that schools demonstrate the progress made by the children in outcomes measured through formal assessments in reading, writing and maths. These were therefore the areas targeted. The organisation of intervention delivery differed between schools, but there were a number of common features. The sessions were timetabled, but all the TAs had run the interventions autonomously, organising a separate space for the sessions. Nine TAs mentioned that taking the children out of class

was an issue. Timetabling the sessions was not easy with children either missing their main literacy/numeracy sessions or, in one case, PE. Teachers were also not always supportive of children missing whole-class sessions and found it disruptive. Generally, it seemed that when the teacher was able to liaise with the TA about the work the children were doing and to discuss progress, this was appreciated, and it can be assumed, increased efficacy. In most schools, however, such liaison seemed ad hoc, and in one, it was clear that the teacher had not been supportive of the intervention and had, on occasion, not released the children for their sessions as she considered the whole-class work they were doing to be more important. Better communication to schools about the nature of the intervention and how to support it before they opted in would have been beneficial.

Child Needs

Three project contacts felt that children receiving Pupil Premium funding typically required most support (in order of need) in communication and language, personal social and emotional development, in literacy and in mathematics. The most common speech and language problems faced by children were prioritised as follows: difficulty in sharing thoughts and feelings (expressive difficulties), difficulty understanding others (receptive difficulties), and difficulty in producing or articulating sounds or difficulty in producing correct sentence structure/syntax. Class teachers completing questionnaires ($N = 10$) agreed with project contacts' priorities for children receiving Pupil Premium funding, but some felt that physical development was more a priority than mathematics. All class teachers identified considerably more children than those in receipt of Pupil Premium funding as having entered their class with poor oral language. They identified the most common speech and language difficulties among their pupils as difficulty in producing correct sentence structure/syntax, difficulty in sharing thoughts and feelings (expressive difficulties) and difficulty in producing or articulating sounds. Difficulty in understanding others (receptive language) was felt to be much less prevalent. All teachers considered themselves sufficiently informed about the programme (and three felt well informed). Four class teachers had looked at the materials before the intervention began; half of them looked at the materials during the intervention. Class teachers identified a range of difficulties that children with poor speech and language faced in school. In their view, the problems (listed from the most to least common mentioned) included difficulties mixing and making friends leading to isolation (referred to by ten respondents), lack of vocabulary to ask for help making it difficult for children to express feelings and opinions (mentioned nine times), difficulties in understanding concepts and instructions and children falling behind as a result of this (seven mentions), reading and writing difficulties (six mentions), behavioural issues leading to frustration (four mentions), problems at home such as poor role models, limited early experiences and English as a second language (four mentions), listening problems (one mention) and difficulties for children in showing their abilities to others (one mention). The TAs were all clear that the key challenges for the children they worked with related to problems in interacting with adults and other children due to their poor language skills, particularly as this affected making friends, always a stressful part of starting school, but perhaps doubly so for these children. The TAs all highlighted the frustration this caused the children leading to anger management and general behavioural issues. Two TAs mentioned the effect of children's language difficulties on writing and number skills, but these were secondary to the communication issues. The TAs also stressed the lack of 'life experience' for some of the children, highlighted by the content

of the materials: one child, for example, could not name animals. It was suggested that close liaison with the family about the intervention had been beneficial and might be more embedded in the programme.

Cultural Factors

It was clear that in the research trials, not all classroom teachers were supportive of the intervention and this inevitably resulted in some TAs experiencing difficulties in delivering it and even in some cases, a lack of space in which to work (refer to Carroll et al., 2011, pp. 109–116). A variety of reasons are postulated. An over-arching concern was that the delivery of the intervention was time-consuming; inevitably, this tied up the TA who therefore could not be assigned other tasks in the classroom. In some cases, there were elements of professional jealousy – the TA now had better understanding of language and in some cases, was better equipped to understand children's needs than the mainstream teacher.

Networks and Communications

All project contacts felt sufficiently informed about the programme (and seven felt very well informed). Seven had looked at the materials before the intervention began; five looked at the materials during the intervention. However, some class teachers had not been properly informed of the demands that would be required of their TA because decisions had been made at a higher level (e.g. the head teacher had given permission to the research team). To take account of these concerns, in subsequent trials assessing efficacy and effectiveness, the mainstream teachers were invited to accompany their TA to part of the training and encouraged to work in collaboration with them.

Readiness for Implementation

Teachers identified a number of advantages to the intervention being delivered outside of 'normal' classwork: additional support for the children who needed it ($N = 6$), the benefit of a quiet space where less confident children could speak up ($N = 4$), the ability to focus on specific tasks ($N = 3$), improvement in communication and other skills ($N = 3$) and the children finding it exciting and interesting ($N = 3$). The disadvantages mentioned included the following: difficulty in fitting the sessions into the school timetable ($N = 5$), the fact that children missed part of the whole-class daily sessions ($N = 3$), space constraints and the disruption of moving from the classroom to another space ($N = 4$) and the difficulty of the TA not being available to help with other aspects of the class while carrying out the intervention ($N = 2$). Issues that were mentioned either in tutorials or during on-site observations fell into two groups: school-related factors and feedback on the intervention. School issues included the fact that intervention sessions were not always timetabled and there was sometimes no cover for the TA in the classroom while they were delivering the intervention. Time was also required, but not allowed for, to find the children and to reach the teaching area. Factors that were related to delivery of the intervention included the time taken to prepare sessions/material, which typically had to be done in the evening, out of school time or in time put aside for other preparation needed in school (in this research version of the programme, TAs had to do all the cutting out of cards and preparing other resources, which for the Reception part could sometimes take more than 1 hour for 1 week of intervention). TAs also noted that there was often too much content for the time

allocated for an intervention session especially for weeks 10–30 (Reception); earlier consultation and more thorough piloting may have avoided this. All but one of the TAs commented on how easy it was to use of the resources (the manual was ‘very easy to understand’ and ‘practical’, the resources ‘were incredible’ and ‘colourful’ and there was an excellent balance of activities). The use of a puppet as a device for getting the children talking was felt to be very effective as were the themes and narratives. There were very consistent views on the aspects of the programme that the TAs did not like: the time required to prepare the resources; the amount of time needed to run the intervention; the fact that the programme had to be delivered every day (which had been particularly hard to stick to around Christmas when the children were practising for school concerts and plays, etc.); issues with some of the pictures (‘they were not always clear ... and did not always illustrate the word’; a picture of a panda to illustrate ‘big’ was difficult, for example, as the children did not know about pandas or their size); and some of the vocabulary was felt to be ‘a bit tricky’. The physical size of the manuals had also been ‘overwhelming’; they were ‘bulky’ and ‘very heavy’. It ‘would have been nice if it was all packaged together per session’. Despite this, four of the TAs said that the manual was easy to use. The TAs were asked particularly about the choice of vocabulary in the programme. Three TAs commented that they thought the vocabulary was too easy and that the children would have known the words. However, a TA at another school with a particularly high number of Pupil Premium children also noted that a lot of the vocabulary was new to the children and learning it therefore helped them. Narrative work was highlighted as the most difficult aspect of the programme to deliver in three settings and that the children struggled with them (but then went on to build their skills in this area later in the programme). Three TAs noted that their children had struggled with the listening activities and felt that some of the children may have had listening difficulties, which would not have been noticed so quickly without the intervention.

Individual Characteristics (C)

Of the 34 schools in the NELI Efficacy trial (OL-2), 19 indicated that they did not intend to continue using the programme the following year, whereas 9 were definitely continuing (30% of those completing the trial), and 6 were undecided. Project contacts (the people who had agreed for the trial to run in their school) from 12/17 of the schools surveyed provided responses: 7 were from the senior leadership team (1 class teacher; 4 SENCOs, an Inclusion Manager and a lead TA in speech and language). The schools covered a broad spectrum with 4–68% of the schools receiving the Pupil Premium.

In-depth interviews were carried out with 12 TAs, from different schools participating in the trial. The TAs had a range of experience in their role: 3 of them had been a TA for 14–15 years, 3 for 2–3 years and the remainder for between 7 and 12 years. The length of service and the amount of experience that the majority of them had in Reception and Nursery settings was substantial. It was notable that half of the TAs had Level 3 qualifications in childcare-related and education-related areas and one a degree in Early Years Education. Most of the TAs had previously received training, in speech and language, in how to support children’s learning, ‘emotional literacy support’ training (ELSA), and courses such as sign language and Makaton.

The TAs were unanimously positive about the training they had received to deliver NELI, which they believed prepared them well for delivering the programme. In terms of delivering the intervention, all the TAs had found it straightforward and easy to deliver:

‘It was fine ... I enjoyed every bit of it’. One had struggled with the narrative sections but, after feedback from an observation, had tried out more active storytelling techniques to great effect. One TA suggested that it would have been useful to have seen someone delivering the programme to demonstrate it working in context. While some of the participants had kept in touch with each other after the training, they had not felt they needed to contact the trainers for support. One TA suggested that an online forum might have been a useful space to ask quick questions. The TAs all felt that taking part in the training and intervention had advanced their professional development, helped them gain confidence, given them a deeper understanding of how children with language and communication difficulties make progress and broadened their knowledge of the kind of learning environment required for these children.

One teacher noted that the intervention was very time-consuming, and the majority had not linked the intervention with other classwork. One teacher said that she had discussed strategies that worked for the children and then used them in the classroom within the same themes. Another teacher had used the stories and picked up any vocabulary or narrative aspects in whole-class sessions. Arguably, some of these problems could be circumvented with wider consultation when the intervention was being designed.

Process (D)

Planning

The researchers who had designed and planned the initial research and the efficacy trial constantly monitored all feedback; between trials, the team made improvements to the programme iteratively. The feedback received, including that from the survey, enabled them to produce a new and improved set of resources to support delivery; a main objective was to reduce the time required by TAs to prepare for each session (see below). In addition, video-clips were made available to supplement training (e.g. in narrative skills), and ways of helping TAs to adapt the level of difficulty of the programme for individual children were discussed. To aid revision of the programme, the research team also worked with one specialist teacher and a local authority manager of SEN specialist teaching services. Each delivered parts of the programme. Both were positive about its structure and its principles but more critical of the resources, providing many specific suggestions for improvements. Both reported that they were able to work effectively with the programme, modifying activities to suit the level and interests of the groups with which they worked but they noted that it cannot be assumed that less experienced practitioners would be able to adapt the programme appropriately.

Engaging

Given the findings of the efficacy trial, which had been the subject of robust independent evaluation, NELI began to attract the attention of a wider range of non-academic and professional audiences, and there was growing interest in training to deliver the intervention (both nationally and internationally). Moreover, it was gaining the attention of policy-makers who were increasingly aware of the importance of ‘oracy’ for education. Together, this provided a strong rationale for a larger trial to assess the effectiveness of NELI at scale, but there were remaining obstacles that we reflect on further.

Reflecting and Evaluating

Teacher and TA responses to the questionnaires and interviews made clear that communication and language was the area of learning in which children receiving Pupil Premium tended to struggle with most, rating this above literacy and maths. One TA, whose school had decided to discontinue the intervention, commented that the time requirement had been an issue both for her and for the school, with sessions over-running because of the amount of content to be delivered. She felt that the programme needed to be less intense and that the children should not be taken out of class so frequently. These issues were also raised by some of the other TAs, but it was clear that, as the outcomes of the programme had been positive for the children that had participated (one TA commented, e.g., that ‘the teachers were noticing a change in them ... so it’s definitely something we will do again’), this had overridden some of the concerns. The feedback and views received about the intervention comprised both positive and negative comments to be considered when planning the next stages of roll-out. A summary is included in Table 1 (note: a process analysis conducted as

Table 1. High-level summary of the facilitators and barriers to implementation of language intervention extracted from stakeholder feedback.

	Facilitator (+ve)	Barrier (–ve)
Language intervention	Evidence that it works and can target children in most need of support with language and communication	Language as a foundation for learning not well understood. Reading and Numeracy prioritised in curriculum and high-stakes testing
Design of programmes	Designed by multi-professional team; takes account of curricula themes	Timetabling and frequency of sessions not flexible
Training to deliver	Critical component which needs sufficient time; benefits of continuing professional development and learning	Challenge of time required
Ongoing support	Important for class teacher to support; peer support very useful; interactive helpline; social media networks	‘Mentoring’ requires dedicated time; routine communications need establishing
Information	Clear, comprehensive communications	Information not conveyed to all stakeholders
Identifying eligible children	Screening tools available	Wrong children targeted (e.g. with severe communication issues)
Ease of delivery	Manual; ready-to-use sessions	Limited and lower quality resources
Delivery	Class teacher has knowledge to enable link to class activities	Timing of delivery across two school years/classes
Flexibility	Able to be adapted for different levels of progress and attainment	Adherence to protocols to ensure fidelity of delivery
Pedagogic issues	Shared values between developers and users	Reluctance to withdraw children from classroom
Other	Progress monitoring and feedback; willingness to refer to relevant professionals when appropriate.	Poor use of language in interactions; lack of experience with children’s language needs
Communications	Informal through networks, including positive personal anecdotes	Miscommunication about content of the programme

part of the EEF evaluation report is also reported by Sibieta et al., 2016). The reason that language intervention was not being prioritised at the time remained somewhat unclear. However, one issue that appeared to prevent take-up was the difficulty that teachers were having in identifying which children needed intervention. While there are many good tests of language and communication skills, most require an appropriately trained person, such as a speech and language therapist or psychologist, to administer them. Schools and their governors need to be able to ensure that funds allocated to ‘special needs’ have impact so what was required was a quick screening test that would be easy to administer and score that could be used to monitor child progress. Without data on impact, language intervention would inevitably lag behind that allocated to improve maths and literacy (where reliable measures of progress are available). Thus, the primary issues arising from our evaluation of schools’ experiences of delivering NELI, which required further consideration, were (1) the time required for preparation and delivery of the programme; respondents estimated that the same amount of time was required for preparation and organisation of the intervention and picking up and returning children to their classes and post-session paperwork as for delivering a session. Some of the sessions overran with eight TAs highlighting this as an issue. The implication was that easier-to-use resources would need to be designed (less copying and cutting of paper and more ‘ready-to-go’ session protocols); (2) there were more children in each class who needed the programme. In a full roll-out of the programme, it would be important to include more guidance on how to select children for the programme. Further, an easy-to-administer pre-test and post-test assessment tool would be a very valuable addition to the suite of resources. Finally, the comments regarding time costs highlighted the need to communicate the evidence regarding the benefits of the programme for specific aspects of language, communication, confidence and behaviour. The value of the flexibility and adaptability of the programme is also important to consider, noting that this in a robust trial, this is in tension with the need to ensure fidelity of delivery and adherence to the programme. Following a period of reflection, the research team engaged an experienced editor to improve the quality and usability of the programme’s resources before publishing the 20-week programme as ‘NELI-Reception’ (Fricke et al., 2018). The team developed a partnership with providers of speech and language therapy training, ELKLAN to roll-out the training and support required for successful implementation. The team also developed a language-screening app for teachers to use to screen members of their class. The App was used successfully in the effectiveness trial as one measure of the effects of intervention on language (West et al., 2021).

Theory of Change

The logic model that guided the planning of the next phase, the effectiveness trial (West et al., 2021), is shown in Figure 1. The figure outlines the stages that were agreed as necessary with the funder, the evaluator and the research team. Reading from left to right, the stages outline (1) the preliminary work required, including documentation, selection of staff to deliver the intervention, and screening of children; (2) stages relating to the delivery of the programme, including training and support of TAs; and (3) expected outcomes. Given the feedback discussed above, the model could be revised to incorporate pointers to ‘enabling conditions’ and important stakeholders.

It was clear from the outset that school recruitment would be challenging and also that attrition must be minimised. It was therefore important to provide sufficient information

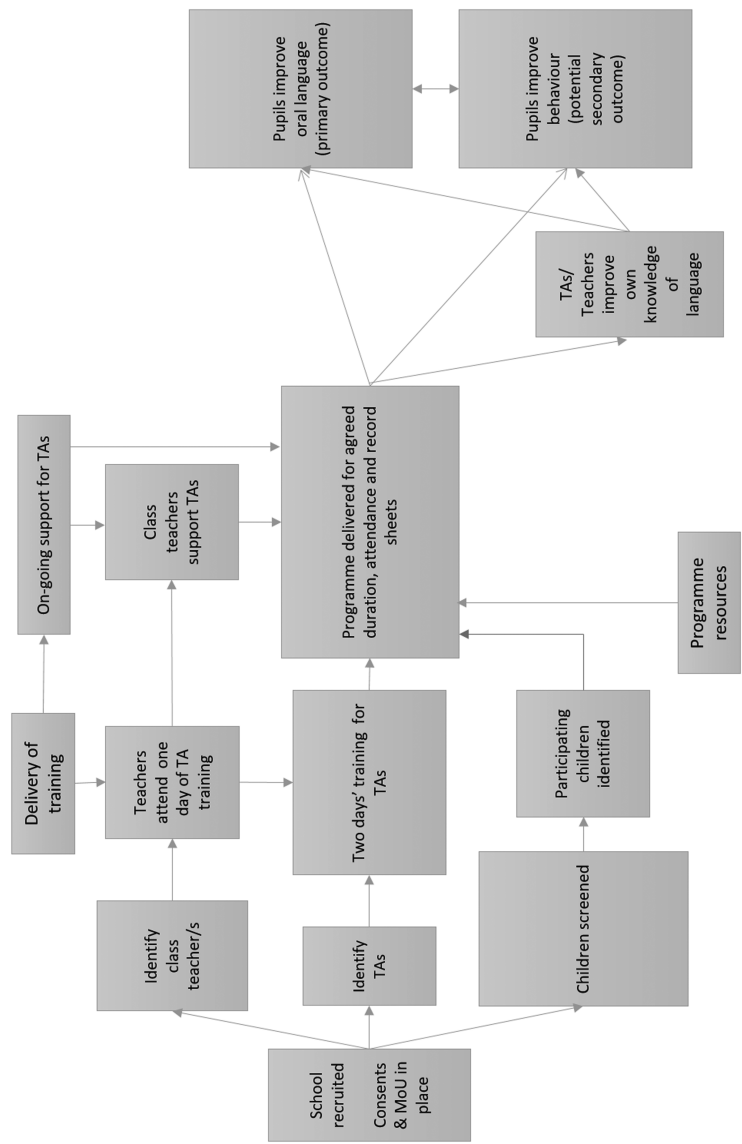


Figure 1. Logic model for language intervention, based on NELI (from left to right: preliminaries, programme content and expected outcomes).
Note: TAs, teaching assistants.

about the benefits of the programme, its strong evidence-base, and the staff support and resourcing that would be required, as well as to the time commitment. A further complexity (given that this was a robust trial and not a quasi-experimental one) was that schools needed to understand the nature of the RCT – specifically, that there was a 50% chance that they would not be allocated to receive the intervention (and, if not, what the incentive for taking part would be). Further, it is not unusual for education practitioners to worry about withholding treatment from some children who need it as much as others do – so this requires careful justification to avoid misunderstandings. Because the aim of the trial was to recruit children from 200 schools, the need to communicate clearly and to work in partnership was clearly critical to success. In addition, there is need for a considerable amount of documentation to be completed in preparation for a trial, not least, ethical consent to be provided by head teachers, parents and carers, and TAs were required to complete records of session attendance and activities.

Before identifying the class teacher(s) from whose class (es) the children eligible for intervention would be drawn, it was important that they understood their responsibility: they would be asked to screen the children in their class using the language-screening app that had just been developed. While little training was required, this would take 10 minutes per child. It was also felt important to strengthen the support available to the TAs by involving the class teacher as well as the TA in the training sessions and for them, as well as the trainers (who were speech and language therapists), to offer ongoing support during programme delivery. Once this ‘infrastructure’ was in place, project contacts were asked to sign a Memorandum of Understanding, and all of the resources required for the intervention would be delivered together with the information about training.

The primary outcome measure of the effectiveness study was confirmed as oral language; it was hypothesised that the language skills of the children in the intervention would improve more than for those in the control arm who received ‘business as usual’ (no special treatment). An independent evaluation team was appointed (different from the one used previously), and the agreed design and assessment measures formed the basis of the preregistration of the trial (<https://doi.org/10.1186/ISRCTN12991126>).

The results from the latest trial to evaluate the NELI programme were positive (West et al., 2021). This was a cluster RCT in 193 primary schools (containing 238 Reception classrooms). Schools were randomly allocated to either a 20-week oral language intervention or a business-as-usual control group. All classes ($N = 5879$ children) in participating schools were screened by school staff using a language screening App assessing receptive and expressive language skills. Screening identified 1173 children as eligible for language intervention: schools containing 571 of these children were allocated to the control group and 569 to the intervention group. Children receiving the NELI programme made significantly larger gains than the business-as-usual control group on a latent variable reflecting standardised measures of language ability ($d = 0.26$) and on the school administered automated assessment of receptive and expressive language skills ($d = 0.32$). In summary, this study provided strong evidence for the effectiveness of the NELI programme when delivered at scale.

Discussion

Children who enter school with language difficulties are at high risk of poor achievement and of persistent problems of language and literacy (e.g. Snowling et al., 2020).

Furthermore, language is considered a proxy for child well-being (e.g. <https://www.eif.org.uk/blog/language-wellbeing-and-social-mobility>). In this light, it is important to consider educational provision for socially disadvantaged children who are likely to have low levels of oral language at school entry and hence poor readiness to learn (Ferguson et al., 2013; Roulstone et al., 2011). Indeed, in one English study, children who were socially disadvantaged (as indexed by eligibility for a free school meal) were reported to be twice as likely to underperform in language and literacy after 1 year in school than their peers (Law et al., 2017).

Together, these findings present a *prima facie* case for early language intervention in mainstream schools, particularly those that serve disadvantaged areas. Moreover, it is important to communicate the benefits of oral language as a foundation for learning and to convince policy-makers that children's language needs must be recognised, perhaps most critically in the early years. Not only can language be measured reliably but also there is a growing evidence-base of effective language interventions (Rogde et al., 2019). However, rolling out language intervention at scale presents significant challenges.

Here, we reflected on the findings of three RCTs completed prior to a large effectiveness trial, all of which demonstrated the efficacy of language intervention for children at the start of formal schooling. The NELI intervention has a strong evidence-base and is considered cost-effective (Dimova et al., 2020). The programme and the training provided for it have been improved iteratively in response to feedback from those delivering the training and the intervention. In particular, there has been an effort to reduce complexity and the time needed to prepare for a session by making the resources more user-friendly, contextually appropriate and adaptable to individual children's needs. All of these changes were made to ensure that its value alongside its evidence-base could be readily perceived. Not preregistered, but hypothesised based on feedback from previous trials, was that the intervention would also have a positive impact on the behaviour of the enrolled children. A behaviour questionnaire completed before and after the language intervention showed that there was indeed an improvement in behaviour for those children who received the language intervention (but note, teacher-raters were not blind to study arm; West et al., *in press*).

We argue that government policy in relation to the teaching of reading has in the past posed a challenge to the adoption by schools of language intervention, even though there is a consensus among practitioners that poor language is the main obstacle disadvantaged children face on school entry. It is anticipated that an emphasis on the importance of delivering reading instruction in a language-rich setting, and on language as well as literacy in baseline and later assessments during the early years of schooling, would remedy this. The more general point is that the success and sustainability of any intervention depends on the readiness of the setting for its implementation and how the benefits are communicated – both top-down from policy-makers and across the schools' network by word of mouth, teacher to teacher. Successful interventions also depend upon the knowledge and experience of the persons delivering them, and it follows that training needs to be thorough and rigorous with ongoing support. In the trials we have run, we have observed extraordinary commitment of TAs who are highly motivated to support the individual needs of the children with whom they work. We speculate that such motivation (and resilience) is among the traits that determine the fidelity of delivery.

One of the main lessons learned from this research programme was the need to communicate early, often and comprehensively with stakeholders who will be involved in the take-up and delivery of a language intervention programme. In particular, there is need

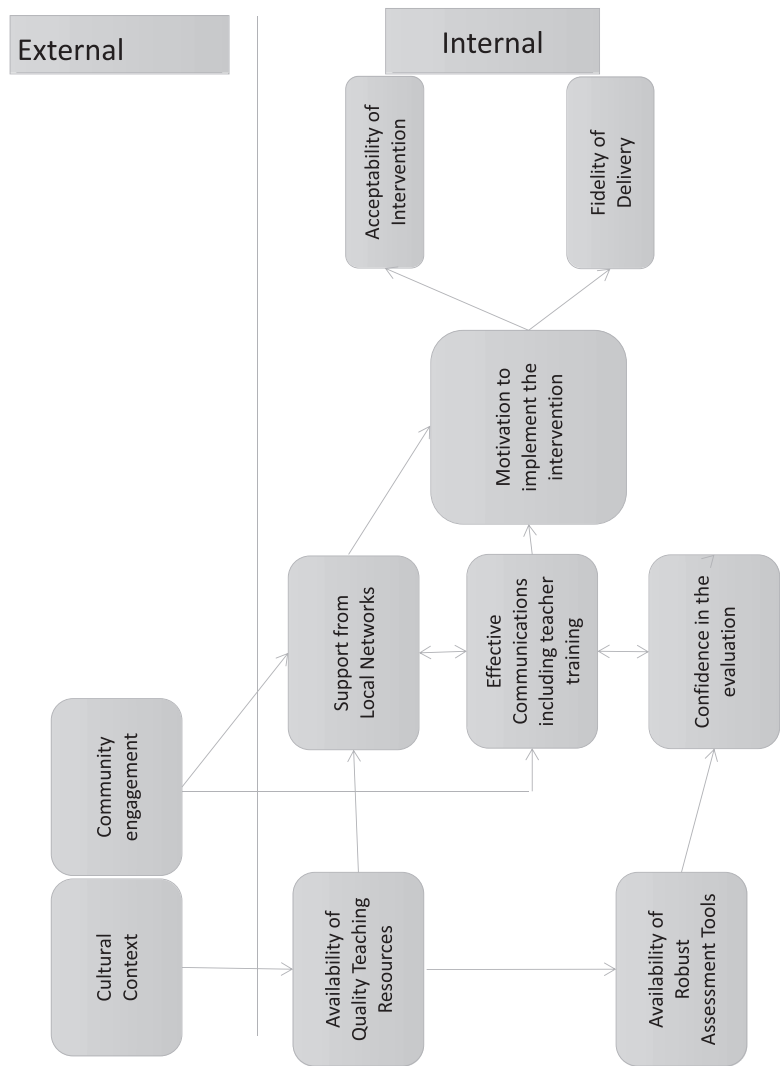


Figure 2. A model to guide implementation of an early years intervention.

for collaborative working between practitioners within schools. Poor language is not an easy fix, and for a programme to have significant and lasting effects, considerable resources need to be devoted to it. However, to support early language development is an imperative if children are to succeed in the educational stakes.

In Figure 2, we propose a model to guide the design, development and scale-up of educational interventions. The model is adapted from what has been learned by scaling up trials of mental health interventions (Williams & Beidas, 2019). It separates internal factors (such as intervention design and outcome measures), which are primarily the focus of scientists who evaluate interventions using RCTs, and external factors that can determine the longer term success of an intervention. The external factors include reference to the cultural context and to community engagement. Ideally, we need to take account of these from the outset and look to local networks for support. Implementation requires scientists to be flexible in order to ensure that the community has confidence in the evaluation and its findings. In addition, the challenge of communicating why evidence matters is an ongoing issue for the academics concerned with the translation of research into practice. Finally, interventions need to be manualised for delivery and to use high quality resources. Ultimately, motivation and engagement is fundamental to fidelity of delivery and to the development of a sustainable intervention that will be adopted even in challenging conditions. Of considerable interest is the effect of training in language intervention on the knowledge and professional competence of teachers and TAs in relation to children's language and communication. This remains a question for future research.

To conclude, robust evaluations of effective language interventions are badly needed, not only so that under-attainment can be addressed but more generally because of their public health significance with respect to levelling the education playing field. As we have discussed here, it is important to consider from the outset the later adoption and longer term sustainability of such interventions when designing an RCT. Our aim has been to offer insights into how interventions are designed in the hope that this will increase awareness of how to question the benefits of such interventions before deciding to adopt one suitable for delivery in the context of an educational authority or mainstream school.

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Conflict of Interest

The programme is published by Oxford University Press, copyright of the programme is held by the Nuffield Foundation and the authors of the programme receive no royalties from sales. Charles Hulme, Margaret Snowling and Gillian West are Directors of OxEEd and Assessment a University of Oxford spin-out company founded to distribute LanguageScreen as a commercial product.

Endnote

¹The first year of formal schooling; equivalent to kindergarten in the United States.

Data Availability Statement

This article reviews several published trials. Data from an informal survey undertaken to gain feedback from stakeholders can be requested from the corresponding author.

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Appendix A

Class Teacher Feedback

In order for us to understand the context in which the intervention was delivered, we asked class teachers to complete an anonymous questionnaire. Completion took 10–20 minutes, and teachers were sent a voucher worth £10 as an honorarium.

Background

School:

Were there children in your class in the academic year 2013–2014 who received the Nuffield Early Language Intervention? Yes/No

Which year group were you teaching when children in your class took part in the Nuffield Early Language Intervention? Nursery/Reception

Pupil Premium

How many children were in your class?

How many children in that class received the pupil premium?.....

In which area of learning do you think that children who receive pupil premium typically require the most support? Please rank from 1 (need most support) to 7 (need least support).

Options: Communication and language, Physical development, Personal social and emotional development, Literacy, Mathematics, Understanding the world, Expressive arts and design.

Please include any additional comments on the areas of learning in which children who receive pupil premium tend to need support.

Oral Language

Approximately how many children entered your class in the academic year 2013–2014 with poor oral language?.....

Please can you indicate the number of children in your class who had any of these specific speech and language problems:

	Number of children
Difficulty producing or articulating sounds	
Stuttering	
Selective mutism	
Difficulty understanding others (receptive language)	
Difficulty sharing thoughts and feelings (expressive language)	
Difficulty producing correct sentence structure/syntax	

What particular challenges do you think children with poor speech and language face in school?

Please list:

Nuffield Early Language Intervention

Implementation:

If you were involved with selecting children for the intervention, how did you choose the children?

How well informed did you feel about the Nuffield Early Language Intervention programme? Very informed/Sufficiently informed/Not informed

If 'Very informed' or 'Sufficiently informed', who gave you the information?

Did you get a chance to look at the materials before, during or after the intervention? Yes – before/ Yes – during/Yes – after/No

Were there any advantages to the intervention being delivered outside of 'normal' classwork?

Were there any disadvantages to the intervention being delivered outside of 'normal' classwork?

In what ways (if any) did you link the intervention work with classwork?

Please comment on whether you thought that the Nuffield Early Language Intervention for a small group of children was a good use of the TAs time.

Did you think that the intervention targeting only a small group of children worked well for your class or would an intervention which targets a larger number of children have been more suitable?

Did you feel that the frequency and duration of the intervention sessions worked well or would a different arrangement of sessions have been more convenient?

Telephone Interview for Teaching Assistant

This is a summary of the subjects that we will talk about in the telephone interview in case you would like to think about some of the questions in advance (we realise that the delivery of the intervention was now some time ago!). However, if you don't have time to look through the questions, that is no problem at all.

Background

How long have you worked in this school?

What did you do before that?

Which year group were the children in when you delivered the intervention?
Nursery/Reception/Both Nursery and Reception

Which year groups are you involved with in the school?

Please can you specify the roles you have within the school.

What training have you received and for what areas of your work?

Pupil premium

Do you support any children who receive the pupil premium (if yes how many)?

What sort of support do you think that these children tend to need?

Of the children you support who have poor oral language, what kinds of problems do they have?

What particular challenges do you think children with poor speech and language face in school?

Nuffield Early Language Intervention

General questions

How was delivering the intervention organised in your school?

How did you become involved in the project?

Can you tell me three things you liked about the intervention?

Can you tell me three things you didn't like about the intervention?

Overall, do you think it is a good or a bad idea for the school to use the programme?

Training to deliver the language intervention

- What did you like about the training? What didn't you like about it?
- How well do you think the training prepared you for delivering the programme in schools?
- How did it compare in this respect to other training you have received?
- How confident did you feel about delivering the programme?
 - Did you have any questions or concerns while you were implementing the intervention about the content or what you were supposed to do?
- What kind of support, if any, during the intervention did you have?
 - Did you talk to the class teacher or others TAs about the programme?
 - Did you contact the trainer/s for advice?
 - Would it have been helpful to have had more support during the intervention or did you not feel you needed additional support? If yes, what type?

Materials

- What did you like about the manual? What didn't you like about it?
- Was the manual clear? If not can you tell us how it could be improved?
- Did you have any problems with any of the materials provided? Again tell us what you think could be improved?
- What did you think about the choice of vocabulary that was included in the programme for the children to learn?
- Which parts of the intervention could the children access the most easily?
- Which parts did they have difficulty with?
- Were there parts of the intervention that you found particularly easy or difficult to deliver?
- Do you think the level was suitable for the children you were working with?
- Did you know how to adjust the programme for children with differing needs?
- How can the materials be made more appealing –either for the children or for the TA?

Practical issues

- From your experience of taking children out of class for the intervention, did that work well or were there problems with it?
- How well did the timing of the sessions work?
- How easy or difficult was it to find space to take the children for the sessions?
- How did you find the children's behaviour during the sessions?

- Were you able to administer all of the sessions to the children? If not, what issues meant that it wasn't possible?

School context

- Overall, to what extent did you feel supported by the school staff?
- Did you find that doing the intervention made a significant difference to your overall work load? (If yes, what was it that increased your workload? delivery? preparation? etc.)
- Do you feel that doing this intervention has advanced your professional development?
 - If yes, how/why?
 - If no, why not?
- What have you learned through delivering the intervention? Or do you think you have improved certain skills or become more confident?
- Would you be happy to deliver it again?
- What changes could be made to make it more feasible for the teaching assistants to deliver the intervention and more suitable for the children in your school?

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Gillian West is a Lecturer in Psychology at the Department of Education, University of Oxford. Her research focusses on reading and language development, and she has expertise in large-scale randomised control trials of school-based language interventions.

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