

Research on the Instruction of Literacy and Language (RILL):

A Randomised Controlled Evaluation
in UK Primary Schools



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Executive Summary

Background

Persistent literacy gaps in UK primary education remain a critical challenge, especially for pupils from socio-economically disadvantaged backgrounds. Research has consistently shown that early reading difficulties, if not addressed, lead to long-term negative impacts on educational achievement, well-being, and life opportunities.

Significant gaps in literacy attainment have emerged in the wake of the COVID-19 pandemic, particularly among children in the later stages of primary school from disadvantaged backgrounds. Disruptions to in-person learning and limited access to structured literacy instruction have had lasting effects, with a substantial number of children falling behind national expectations in reading and language. The need for scalable, effective interventions to support literacy recovery is more urgent than ever, particularly for learners at risk due to socio-economic disadvantage.

Aims and Objectives

The primary aim of this study was to evaluate the effectiveness of the RILL programme in improving word-level decoding, vocabulary, and reading comprehension among struggling readers aged 7–9. The trial also sought to examine whether short-term gains in decoding and vocabulary could lead to longer-term improvements in reading comprehension, and to explore the feasibility of delivering a structured literacy intervention through a digitally supported, Teaching Assistant-led model. Additional objectives included assessing the fidelity, acceptability, and scalability of RILL in real-world classroom settings, with a focus on supporting children from socio-economically disadvantaged backgrounds.

The Intervention

In response to these urgent needs, the Research on the Instruction of Literacy and Language (RILL) programme was developed. RILL comprised two 40-minute small group sessions per week over 15 weeks, delivered by trained TAs. Each session included vocabulary learning, story reading, phonics games, spelling, and narrative activities, supported by structured digital resources and video-led training.

RILL builds on decades of reading science and literacy intervention research (Gough & Tunmer, 1986; Downing et al., 2024; Duff et al., 2008; Hatcher et al., 1994; 2004; Bowyer-Crane et al., 2008; Snowling & Hulme, 2025) and was specifically designed for delivery by Teaching Assistants (TAs) using structured digital materials. The intervention targets children aged 7–9 identified as low-attaining readers and provides tailored, small group (2-3 children) support in key literacy domains: vocabulary, phonics, spelling, fluency, and narrative construction. Its format allows for in school or remote implementation, supporting continuity during potential disruptions.

Prior interventions have often relied on highly trained specialists, limiting scalability and accessibility. RILL addresses these challenges through a digitally enabled, TA-led model that maintains fidelity while reducing training demands and cost. This report presents findings from a large-scale randomised controlled trial assessing the impact, feasibility, and acceptability of RILL across 26 UK primary schools.

Design and Participants

A cluster randomised controlled trial (RCT) was conducted across 33 UK primary schools, with randomisation at the school level. A total of **285 pupils** aged 7–9 (Years 3 and 4) identified as poorer readers through standardised screening were recruited. Schools represented a mix of urban and rural contexts, with varied levels of socio-economic disadvantage.

Assessments were conducted at pre-test (T1), post-test (T2), and four-month follow-up (T3). Primary outcomes were word-level reading (decoding and spelling) and reading comprehension.

Key Findings

- » **Immediate effects (T2)** – Pupils receiving RILL made significantly greater gains than control pupils in both decoding and reading comprehension immediately post-intervention.
- » **Sustained effects (T3)** – Gains in both areas were maintained at follow-up, with comprehension outcomes showing further improvement several months after the programme ended.
- » **Pathways to improvement** – Mediation analysis showed that growth in decoding and vocabulary knowledge immediately after the intervention contributed indirectly to later comprehension gains via concurrent gains in reading comprehension. The gains in later comprehension were more strongly related to improvements in decoding.
- » **High engagement and fidelity** – TA interviews and observations indicated strong adherence to the programme, high pupil engagement, and positive attitudes towards the one-to-one format.

Data Collection

Quantitative data were collected using standardised literacy assessments at pre-test (T1), post-test (T2), and planned follow-up (T3).

Process Evaluation

- » Teaching Assistants reported increased confidence in delivering structured literacy support and in using digital teaching tools.
- » The training was viewed as clear, practical, and directly applicable.
- » Pupils enjoyed the interactive activities and personalised attention, often expressing pride in their progress.

Key Learnings and Conclusions

This trial provides robust evidence that a digitally supported, TA-led literacy programme can produce meaningful and lasting improvements in both decoding, vocabulary, and comprehension for poorer readers in Key Stage 2. The sustained gains particularly in comprehension suggest that RILL not only addresses immediate literacy needs but also equips pupils with the skills to continue progressing independently.

The digital model ensures scalability while maintaining fidelity, offering a cost-effective approach for schools with limited specialist staff. By embedding professional learning within the intervention, it also builds long-term school capacity for literacy support.

In a post-pandemic landscape where literacy recovery is a national priority, RILL offers a tested, adaptable, and impactful model for closing the literacy gap.

1. Introduction

1.1 Addressing Literacy Inequality in primary aged children

Literacy skills are foundational to academic success, future employment, and wellbeing. Yet, many UK children especially those from disadvantaged backgrounds struggle to acquire the necessary skills in reading, spelling, and comprehension to access the wider curriculum. These inequalities are shaped not only by differences in classroom experiences but also by broader socio-economic disparities, which can limit the richness of language input and literacy support children receive at home.

Reading achievement by the end of Key Stage 1 predicts long-term educational outcomes (Snowling et al., 2011; Sammons et al., 2008, yet a substantial proportion of children particularly those eligible for free school meals or learning English as an additional language fall behind early and do not catch up (Strand, Malmberg, & Hall, 2015; Department for Education [DfE], 2019). For these children, decoding difficulties can persist into Key Stage 2, compromising their ability to understand texts and learn across subjects. Evidence from longitudinal research highlights the developmental link between word reading and comprehension, but few studies have tested whether improving decoding causally boosts later comprehension (Catts et al., 2003; Torppa et al., 2007; Leach et al., 2003).

The COVID-19 pandemic amplified existing inequalities, with prolonged school closures, disrupted phonics teaching, and reduced access to school libraries or in-person support. Children most at risk of underachievement suffered the greatest setbacks. The resulting 'literacy gap' has prompted urgent calls for catch-up interventions that are scalable, evidence-based, and inclusive.

1.2 Literacy intervention following an evidence-based approach

A large body of research has shown that successful reading comprehension depends on two key components: the ability to decode written words fluently, and the capacity to understand language. This view is formalised in the Simple View of Reading (Gough & Tunmer, 1986) and elaborated by more recent models such as the Reading is Language framework (Snowling & Hulme, 2025), which highlight the developmental interplay between word reading and language comprehension.

In opaque orthographies such as English, where spelling-to-sound relationships are inconsistent, decoding tends to take longer to master and plays a particularly central role in early reading development (Caravolas et al., 2013; Florit & Cain, 2011). Longitudinal studies have demonstrated that decoding is the dominant predictor of reading comprehension in the early years, but as children become more fluent readers, comprehension becomes increasingly influenced by broader language skills such as vocabulary, grammar, and inferencing (Kim et al., 2011; Tilstra et al., 2009).

For many struggling readers, however, the transition from decoding to comprehension is delayed. Persistent difficulties with decoding not only limit reading fluency, but also constrain the cognitive resources available for making sense of text (Leach et al., 2003; Lervåg & Hulme, 2010). This decoding bottleneck can continue to hinder comprehension well into the upper years of primary school (Catts et al., 2003; Torppa et al., 2007). Intervention studies have consistently shown that systematic phonics instruction can improve word-level reading in children with decoding difficulties



(Ehri et al., 2001; Torgesen et al., 2001). However, gains in reading comprehension are often less pronounced unless interventions also incorporate support for language comprehension (Clarke et al., 2010; Fricke et al., 2013). This has led to increased advocacy for multi-component approaches that combine decoding instruction with targeted development of vocabulary, oral narrative, and sentence-level understanding (Silverman et al., 2020). See Figure 1.

This evidence base provides a clear rationale for developing interventions that target both decoding and language comprehension skills in tandem, and that do so in ways that are feasible, scalable, and responsive to children's developmental needs.

Figure 1. The Simple View of Reading model (Gough & Tunmer, 1986)



1.3 A New, Digital Generation of Literacy Intervention

Despite clear evidence for the effectiveness of structured literacy interventions targeting both decoding and language comprehension, many existing programmes are limited in their reach. A common challenge lies in the delivery model: interventions often require highly trained specialists, intensive supervision, or costly one-to-one instruction, all of which reduce their feasibility for large-scale implementation in typical school settings (Lyon & Koerner, 2016; Shonkoff, 2017). This restricts access to the very children who may benefit most those attending under-resourced schools or living in communities facing socioeconomic disadvantage.

The COVID-19 pandemic exposed and intensified these systemic limitations. At the same time, it accelerated interest in flexible and technology-enhanced learning models, particularly those that could be delivered remotely or within blended formats (Green et al., 2021; Harris et al., 2020). Digital platforms, when thoughtfully designed, offer an opportunity to scale high-quality instruction without compromising fidelity. They can reduce the training burden on school staff, embed evidence-based routines into everyday practice, and increase engagement through interactive content and multimedia formats (Dowdall et al., 2021).

Technology also enables more consistent implementation across settings, while supporting adaptation to a range of learning environments including one-to-one instruction, small groups, and virtual or hybrid formats. Importantly, many pupils today are digitally literate and motivated by interactive learning tools, particularly when these include voiceovers, animations, or game-like features that reinforce key concepts in a playful but structured way (Clark et al., 2020). Digital interventions can also empower non-specialist educators such as Teaching Assistants to deliver effective instruction using guided resources and built-in scaffolds (Martin et al., 2020).

To be successful, however, digital delivery must be carefully aligned with existing school workflows, infrastructure, and professional development needs. Programmes that are overly complex or that impose additional burdens on staff often fail to be adopted or sustained (Axford et al., 2020). Effective interventions at scale must strike a balance between structure and flexibility: offering research-informed content while remaining adaptable to schools' diverse contexts and operational constraints.

These insights point to the need for a new generation of literacy interventions those that combine rigorous pedagogy with pragmatic design, leverage digital technology to support scalability, and are accessible to the non-specialist workforce within mainstream primary schools. Interventions developed along these lines are well positioned to contribute to national strategies for education recovery and for reducing long-standing inequalities in literacy achievement.

1.4 The Research on the Instruction of Literacy with Language (RILL) Programme: Aims and Objectives.

The goal of this study was to evaluate an evidence-based literacy intervention designed for delivery in primary schools to support children in Years 3 and 4 who are struggling with reading. The Research on the Instruction of Literacy and Language (RILL) programme was developed as a scalable and digitally supported approach to address persistent literacy inequalities in Key Stage 2, particularly in the wake of the COVID-19 pandemic.

To achieve this, a large-scale, pre-registered randomised controlled trial (RCT) was conducted to assess the effectiveness of RILL in improving reading and language outcomes for lower-attaining pupils. The study was guided by principles of developmental literacy science, policy relevance, and collaborative design with educational practitioners.

Key objective:

Our primary objective was to assess the efficacy of RILL in improving decoding, vocabulary, and reading comprehension outcomes in poorer readers aged 7–9, through a pre-registered Randomised Controlled Trial (RCT), registered with ISRCTN, and conducted according to CONSORT guidelines.

Within this objective, we had several other aims:

- » To ensure scalability and relevance by working closely with key stakeholders, including the Department for Education, Welsh Government Schools Group, local authorities, and education professionals, with a view to future implementation.
- » To target a critical developmental stage – when reading skills are still emerging – and prevent the long-term consequences of children falling behind in literacy due to early reading difficulties, which have been further exacerbated by the pandemic.
- » To incorporate feedback from teaching staff and school partners to iteratively refine programme content and training, drawing on co-design principles used successfully in prior research.

2. Method

The development and evaluation of the Research on the Instruction of Literacy and Language (RILL) programme followed a rigorous process that included digital design, trial implementation, and multi-site testing. The study was granted ethical approval by the School of Psychology and Sport Science Ethics Committee at Bangor University.

2.1 Programme Development and Digital Adaptation

The RILL programme was conceptualised as a structured, scalable literacy intervention focused on vocabulary learning, word and passage reading, spelling, and comprehension. It was designed for delivery by trained Teaching Assistants (TAs) in primary schools, supported by digital resources and largely pre-scripted lessons.

Initial development was informed by established frameworks such as the Simple View of Reading (Gough & Tunmer, 1986) and the Reading is Language (RiL) model (Hulme et al., 2022), as well as successful non-digital intervention predecessors including both word-level and oral language instruction (Hatcher et al., 2006; Hulme et al., 2012; Bowyer-Crane et al., 2008; Clarke et al., 2010).

The RILL Intervention

The RILL programme is a 15-week, twice-weekly, individualised intervention (totalling ~20 hours). It builds upon previously validated literacy programmes including REVI (Duff et al., 2008) and Reading Intervention (Hatcher et al., 1994; 2004; Bowyer-Crane et al., 2008), focusing on phonological awareness, vocabulary, and decoding. Lessons incorporate distributed learning principles (Latimier et al., 2021) and are delivered online by trained teaching assistants (TAs).

Each 40-minute session followed a structured sequence:

- » **01.** Words of the Day (5 min): Two Tier 2 vocabulary words introduced with definitions, visual support, and discussion (Beck et al., 1982; 2002).
- » **02.** Passage of the Day (10 min): Children read aloud a short passage containing the target words, followed by 2–3 comprehension questions.
- » **03.** Word Games (5 min): Activities to support phonemic awareness (e.g., blending).
- » **04.** Word Writing (10 min): Spelling instruction with a focus on vowel patterns and sound-letter correspondence.
- » **05.** Story Time (5 min): Narrative skills practice using scaffolded story creation tasks (Clarke et al., 2010).
- » **06.** Recap (5 min): Children reviewed and applied target vocabulary.

See Figure 2 for examples of the lesson tasks.

See Appendix A for the full RILL curriculum including lesson progression.

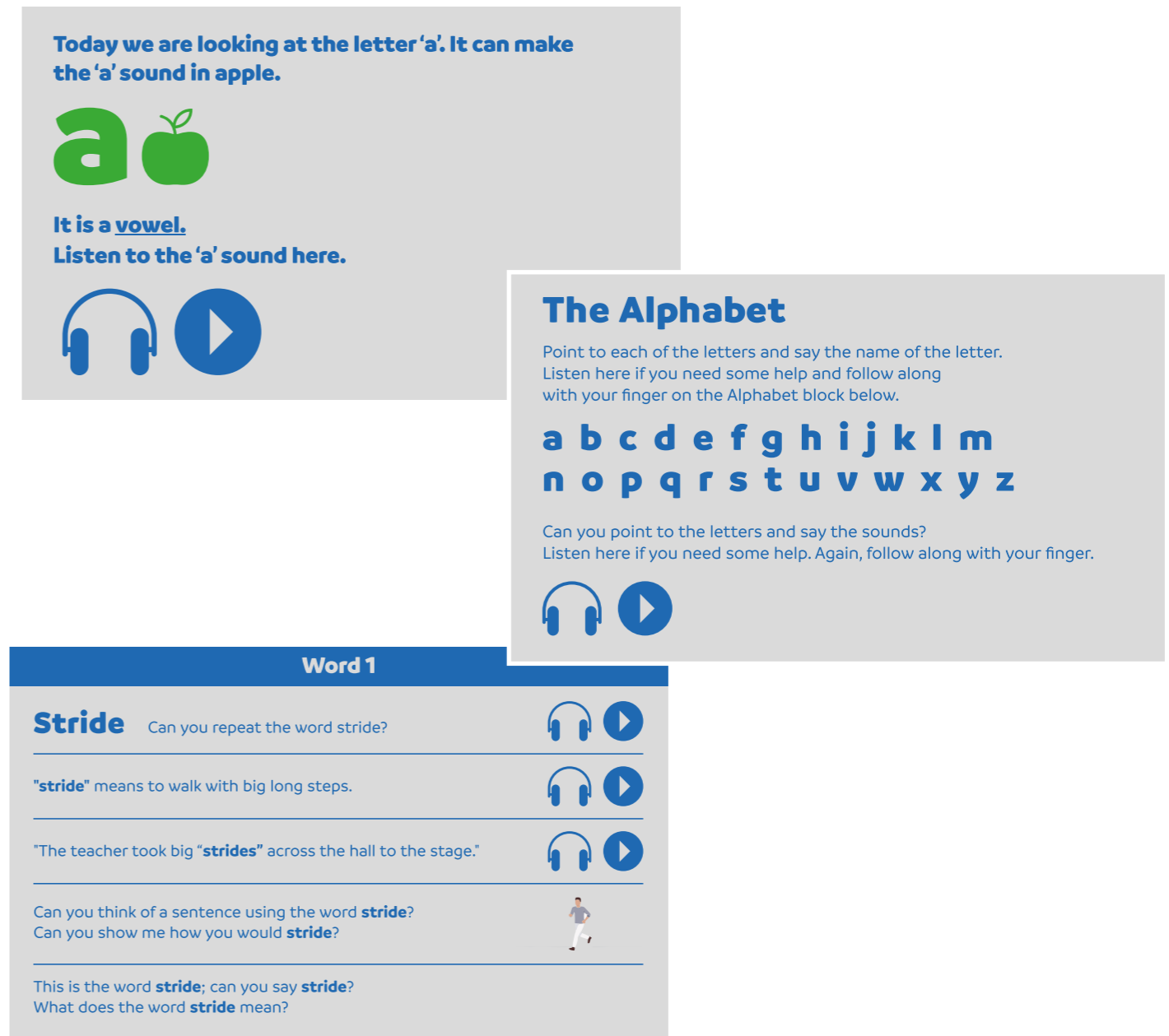


Figure 2.

Digital delivery was a key design goal, and all 30 lessons were presented on the platform Microsoft OneNote. Interactive and video materials were created using gifs and Vimeo software. Lesson digital features included audio voiceovers, animated instruction, and interactive elements to scaffold TA delivery and ensure fidelity. Lesson materials and pupil resources were accessed via school-based devices.

2.2 Recruitment

We aimed to recruit 360 children from 33 primary state schools across England and Wales. We prioritised schools in disadvantaged and low socioeconomic areas where possible. Schools were recruited via mass distribution of emails to headteachers and via local government contacts. Once contact had been made, headteachers occasionally sought more information via a Teams call, and written informed consent from headteachers was obtained in all cases. Most recruited schools were in the North Wales area, with a number of other participating schools located in mid Wales and Cumbria. The final number of schools recruited to the project was $N = 26$.

2.3 Teaching Assistant Training

Once schools were recruited, we next provided training for the headteachers and Teaching Assistants (TAs) assigned to implementing the programme. A blended digital training model was developed to prepare TAs to deliver RILL. Training was led by a specialist teacher in each case. The training consisted of the following components:

- » Self-paced online training modules, including pre-recorded video content introducing the RILL pedagogical principles, scientific rationale, and technical setup (e.g., Microsoft Teams and OneNote). Materials were accessible via the RILL user guide portal (<https://www.rillresearch.org/user-guides/for-teachers>).
- » Live online workshops, conducted over one or two half-day sessions via Microsoft Teams with small TA groups (max. five per session), focused on pedagogical confidence and technical support.
- » Fidelity monitoring: Each TA underwent at least one observed lesson delivery, evaluated by a postdoctoral researcher to ensure consistency with the intended protocol.

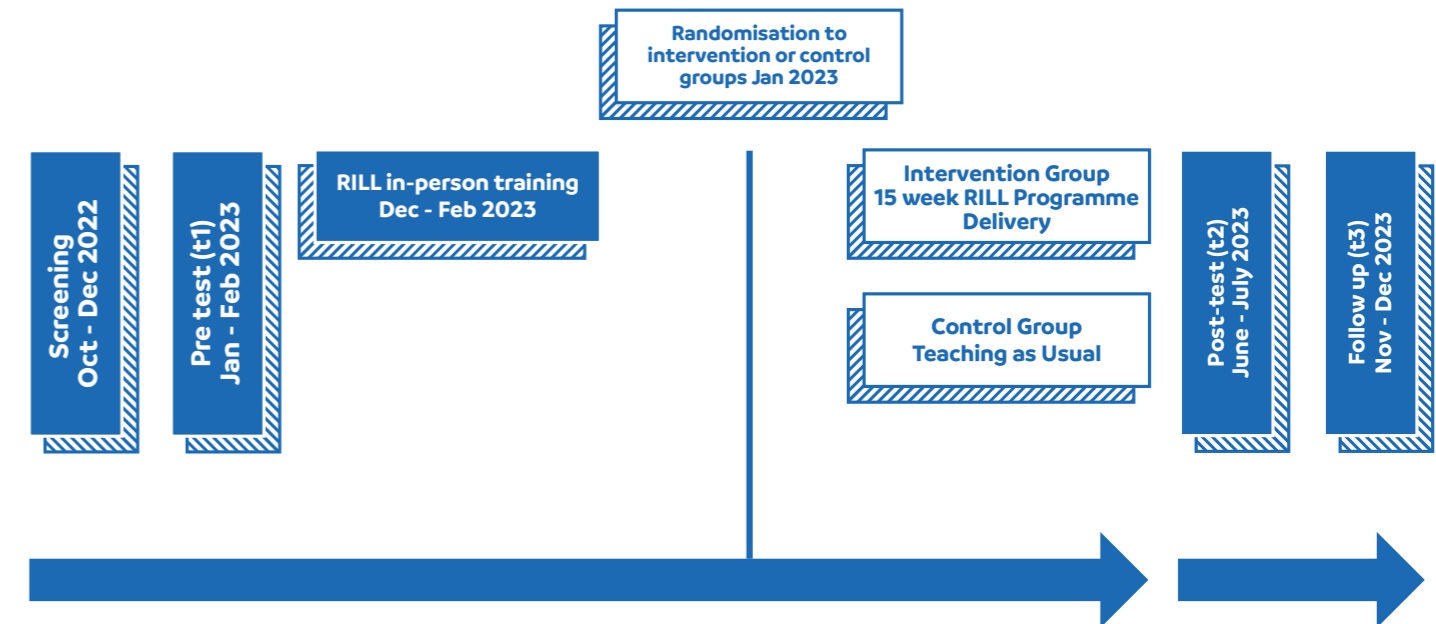
TAs were encouraged to reflect on their training experience and programme delivery, with qualitative feedback informing ongoing development and potential scale-up. They were encouraged to remain in contact with the research team for the duration of the implementation phase to resolve problems quickly and for fidelity purposes.

2.4 Procedure

Once schools were enrolled on the programme and TAs had been trained, children in Years 3 and 4 in each class were screened on their reading ability using ReadingScreen (<https://oxedandassessment.com/readingscreen/>) in order to select the six readers in each class with the lowest scores. 1,152 children were screened in total. Schools then sent out our parental consent forms to the parents of these children, and where parental consent was given, children were entered into the trial. Concurrently, Teaching Assistants were contacted by an assigned Research Officer to begin implementing the programme. They were provided with all lesson content on Microsoft Teams. Once children in each class had been screened and consent obtained from parents, implementation began. TAs were required to complete two lessons per week over a period of 15 weeks with groups of 2-3 children at a time.

Implementation fidelity was assessed via a single, structured 45-minute observation per school by a trained Research Assistant. Each lesson component (words of the day, passage of the day, word games, spelling, story writing, revisiting words of the day), as well as overall lesson timing, pupil engagement, and use of technology, was rated on a 3-point scale (1 = minimal, 2 = partial, 3 = full implementation). Observers also recorded qualitative notes, and TAs were invited to provide feedback. All schools achieved total scores >20 (out of 27), indicating high fidelity.

Figure 3. Timeline of Project Stages



2.5 Randomised Controlled Trial Implementation

The six lowest-scoring children per class on the ReadingScreen assessment were randomly assigned to either the RILL intervention or a wait-list control group, stratified by classroom.

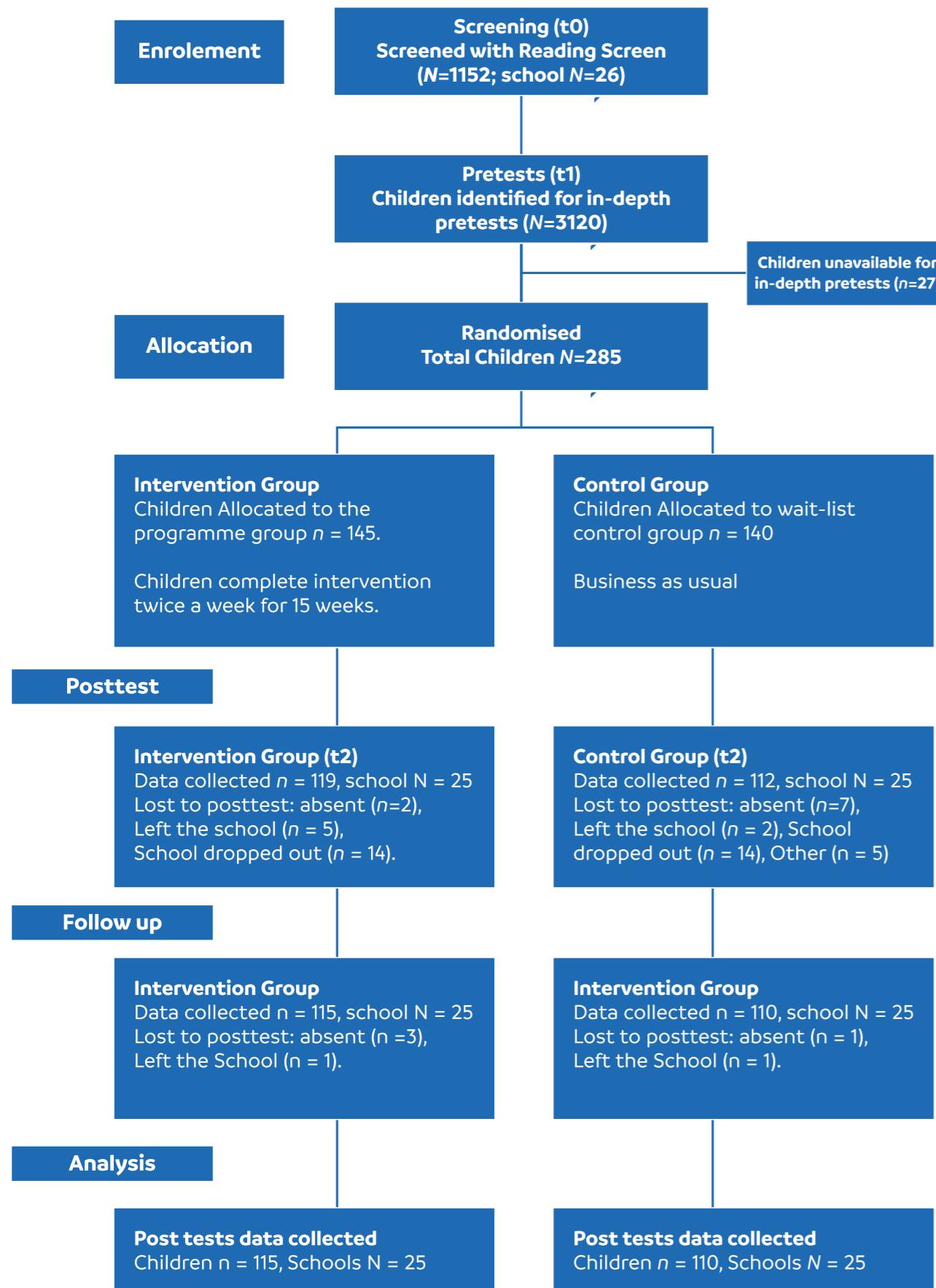
- » Participants: 285 pupils in Years 3 and 4 identified as struggling readers using the ReadingScreen assessment.
- » Intervention delivery: 145 pupils received the RILL intervention; 140 formed the control group.
- » Teaching Assistants: TAs were trained via a blended model and had access to online materials throughout the trial. TAs were also observed for fidelity and provided implementation feedback.
- » Duration: Pupils received two 40-minute RILL lessons per week for 15 weeks.

2.6 Assessments and Data Collection

- » Data were collected at three time points:
- » T1 (Pre-test): Baseline assessments in literacy and language
- » T2 (Post-test): Immediately after the intervention period
- » T3 (Follow-up): Four months after T2 to assess sustained gains

The evaluation included a range of standardised and study-specific assessments to measure the impact of the RILL intervention on children's literacy skills. Assessments were administered at three time points: pre-intervention (T1), immediately post-intervention (T2), and four months post-intervention (T3). Testing was conducted one-to-one in schools by trained assessors blinded to group allocation. The timeline of the study can be seen in Figure 3 and the flow of participants through the study can be seen in Figure 4.

Figure 4. CONSORT diagram showing study progression.



Analysis Plan:

Word-Level Reading was assessed using four measures:

- | | |
|--|---|
| <p>01. Word Reading Accuracy</p> <ul style="list-style-type: none"> » Wide Range Achievement Test – 5th Edition (WRAT-5; Robinson & Wilkinson, 2017) » Standardised task with strong internal consistency ($\alpha = .95-.96$) <p>02. Word Reading Accuracy</p> <ul style="list-style-type: none"> » ReadingScreen (custom task) » Used for eligibility screening and outcome tracking | <p>03. Word Spelling Accuracy</p> <ul style="list-style-type: none"> » WRAT-5 Spelling Subtest » Internal consistency $\alpha = .91-.92$ <p>04. Passage Reading Accuracy</p> <ul style="list-style-type: none"> » York Assessment of Reading for Comprehension (YARC; Snowling et al., 2009) » Measures oral reading fluency and accuracy ($\alpha = .85-.93$) |
|--|---|

Vocabulary was assessed using:

- » Custom expressive language
- » Children defined a subset of 18 words taught during the intervention

Reading Comprehension was assessed using:

- » ARC Comprehension Questions
- » Children answered literal and inferential questions after reading passages aloud
- » Internal consistency was modest ($\alpha = .48-.69$ across levels)

3. Results

Table 1 shows the descriptive statistics for all measures at screening (t0), pretest (t1), posttest (t2), and follow-up (t3) for both groups. Both groups performed similarly at pretest.

Mean, standard deviations, and reliabilities of raw scores for the intervention and control groups for the outcome measures at screening (t0) pretest (t1), posttest (t2), and follow-up (t3)

	INTERVENTION			CONTROL GROUP			Reliability
	N	M	SD	N	M	SD	
Age							
t0	145	100.82	9.98	140	101.11	7.57	
Word Literacy							
Reading Screen							.95 ^a
t0	116	16.67	10.26	111	17.72	9.98	
t2	68	24.46	10.74	68	24.73	11.48	
t3	76	26.37	11.64	76	27.12	10.49	
WRAT Reading							
t1	124	9.48	5.67	122	10.66	5.69	
t2	115	11.59	5.95	107	11.78	6.23	
t3	113	13.64	5.75	106	13.84	6.28	
WRAT Spelling							
t1	143	5.13	2.80	137	5.18	2.58	
t2	115	6.29	3.52	112	6.03	3.12	
t3	113	7.12	3.34	109	6.82	3.29	
YARC Reading Accuracy							
t1	134	111.44	67.07	124	125.77	67.79	
t2	111	208.29	96.56	102	201.09	97.12	
t3	110	225.09	87.80	105	222.87	86.20	
Reading Comprehension							
Passage 1							
t1	118	3.03	1.92	115	3.63	1.76	
t2	89	3.93	2.05	89	4.01	2.18	
t3	95	4.13	2.00	95	4.18	2.29	
Passage 2							
t1	118	3.50	2.06	117	4.13	2.31	
t2	95	2.84	2.14	85	2.51	1.92	
t3	96	3.18	1.98	93	3.19	2.24	
Passage 3							
t1	118	2.90	1.73	102	3.38	1.67	
t2	107	3.45	1.71	93	3.66	1.65	
t3	106	3.75	1.71	97	3.77	1.62	
Passage 4							
t1	113	1.46	1.66	100	1.89	1.68	
t2	101	2.24	1.90	86	2.45	1.75	
t3	102	2.84	2.11	97	2.94	1.75	
Language							
Vocabulary 1							
t1		2.30	1.53	115	2.10	1.72	
t2		3.37	2.04	102	2.31	1.97	
t3		3.58	2.14	109	2.80	2.20	
Vocabulary 2							
t1		1.22	1.55	115	1.26	1.55	
t2		2.62	2.28	102	2.02	2.31	

Note. Reliabilities are Cronbach's Alpha.

Research question: Is RILL effective in improving decoding vocabulary and reading comprehension outcomes in poorer readers aged 7–9?

Within this broad research question assessing the efficacy of RILL, we also asked three other, more specific research questions:

01. Immediate intervention effects: Do poorer readers who undergo RILL show greater gains – compared with poorer readers who do not – immediately following the intervention?
02. Longer-term intervention effects: Do poorer readers who undergo RILL show greater gains – compared with poorer readers who do not – several months after the intervention has passed?
03. The relationship between various reading skills: Does immediate growth in word decoding, vocabulary lead to longer term growth in reading comprehension skills?

See Appendix B for the models underpinning the effects described below.

3.1. Immediate intervention effects:

Our first question asked whether children with reading difficulties who participated in the RILL programme showed immediate improvements in their reading skills compared with similar children who did not receive the intervention. The results were clear: children in the RILL programme made significantly stronger gains in both decoding (being able to accurately and fluently read individual words), vocabulary (being able to accurately define words) and reading comprehension, which is understanding the meaning of the text. This suggests that the programme is effective not just for teaching children to recognize words, but also for helping them make sense of what they read. These immediate gains highlight the value of targeted, structured support for children who struggle with reading,

demonstrating that even within a short timeframe, focused teaching can produce measurable improvements in core literacy skills. See Figures B1-B2 (Appendix B).

3.2. Longer-term intervention effects:

Next, we asked whether the benefits of RILL lasted beyond the end of the programme. We followed up with the children several months later and found that the improvements in decoding, vocabulary, and reading comprehension were maintained and in some cases, reading comprehension gains were even stronger than immediately post-intervention. This finding is particularly encouraging because it shows that the skills children develop through RILL are not fleeting; the programme appears to create lasting changes in how children read and understand text. Sustained improvement is critical for struggling readers because it gives them the foundation to continue learning across subjects and grades, rather than just providing a temporary boost that fades once the programme ends. See Figures B3-B4 (Appendix B).

3.3. The relationship between reading skills

We also examined how improvements in different reading skills supported later reading comprehension. In particular, we looked at whether early gains in word reading and vocabulary helped children better understand what they read in the months that followed.

The findings suggest that both played a role, but not in the same way. Improvements in word reading were the stronger predictor of later reading comprehension. There was also evidence that gains in taught vocabulary made an additional contribution. In other words, children benefited both from becoming more accurate and fluent readers, and from knowing more of the words they encountered in texts.

Put simply, the programme did not just help children read words more effectively. It also helped build the knowledge they needed to understand what they were reading. For teachers and parents, this highlights the importance of supporting both aspects of reading: secure word reading and vocabulary knowledge.

Overall, the RILL programme helped children aged 7–9 who were struggling with reading to make clear and lasting progress. Soon after the intervention, pupils improved in word reading, vocabulary, and reading comprehension, and these gains were still evident several months later. The findings suggest that stronger word reading provided a foundation for later comprehension, with vocabulary gains offering additional support.

To explore how these skills were connected over time, we examined whether early improvements in word reading helped drive later gains in comprehension. The results suggest a clear pathway: as children became more efficient at reading words, they were able to focus more on understanding the text. In this way, improvements in word reading supported later comprehension, with vocabulary also contributing to this progress.

Process evaluation

As part of our process evaluation, we aimed to address the following questions:

- » What aspects of the RILL programme support effective small-group delivery for children with reading difficulties?
- » What barriers did schools encounter when implementing the programme?
- » How does the RILL programme align with each school's wider literacy curriculum?
- » In what ways have teaching assistants adapted their practice as a result of participating in the programme?

To explore these questions, we invited teaching assistants involved in the project to take part in a short, semi-structured interview with a member of the research team. These interviews were conducted during scheduled fidelity visits to each school. Thematic analysis was then used to identify key patterns across responses, providing insight into the implementation and perceived impact of the programme in school settings.

We describe the findings from this analysis addressing each of the process evaluation questions on the following page.

Question 1. What aspects of the RILL programme support effective small-group delivery for children with reading difficulties?

Teaching assistants highlighted several features of the RILL programme that supported its successful delivery in small-group settings. Both digital and printed resources were described as well-organised and easy to navigate, with minimal preparation required:

“It’s all there for us.”

The lesson structure was consistent and logically sequenced, which enabled smooth transitions across activities and sessions. This predictability was particularly helpful for teaching assistants managing small groups.

The clear routines within lessons, including structured turn-taking (e.g., changing reader each paragraph), were praised for supporting pupil engagement and helping children follow the text closely. Materials also enabled teaching assistants to model key reading strategies such as skimming and identifying specific word types.

Question 2. What barriers did schools encounter when implementing the programme?

While overall feedback on the programme was positive, a few areas for improvement were noted. Teaching assistants reported that introducing two new phonemes per lesson occasionally felt rushed, and additional time or practice opportunities would have helped consolidate learning. For example, further activities such as constructing words with the target sound (e.g., i–e) were sometimes improvised by staff to deepen understanding.

Another barrier related to phonics instruction was the absence of standardised guidance on pronunciation. Teaching assistants reported uncertainty over whether to use phonetic sounds or letter names and often used both interchangeably. Including pronunciation guidance within training or materials was suggested as a way to improve consistency across sessions and staff.

Question 3. How does the programme fit within the school’s wider literacy curriculum?

Feedback indicated that RILL aligned well with existing literacy provision in most schools. The programme was perceived as complementary to whole-class instruction, particularly in its structured focus on phonics, vocabulary development, and comprehension strategies. Teaching assistants noted that the programme extended children’s exposure to literary devices (e.g., personification, metaphor, dialogue) that were often introduced in classroom teaching but not revisited in small-group contexts.

The programme’s vocabulary focus was especially valued, with TAs noting that it introduced pupils to new and nuanced meanings of familiar words, aligning well with broader curriculum goals for language development.

Question 4. In what ways have teaching assistants adapted their practice as a result of participating in the programme?

Participation in RILL appeared to influence teaching assistants’ approaches to small-group literacy instruction. Several TAs described increased confidence in delivering phonics and comprehension activities, and in using visual prompts to support pupil discussion. Many reported placing greater emphasis on expressive reading and interactive strategies such as pupil annotation (e.g., underlining or circling target words), which they felt improved engagement and comprehension.

Teaching assistants also commented on developing a deeper understanding of the building blocks of reading, particularly around sound–symbol correspondence and structured vocabulary work. Some reported incorporating aspects of the programme’s structure and routines into their other literacy support activities beyond the intervention.

Conclusion

Overall, feedback from teaching assistants suggests that the RILL programme was well-received and effectively implemented in small-group settings. Its clear structure, engaging content, and alignment with school literacy goals facilitated delivery and supported pupil engagement and progress.

While some areas for refinement were identified particularly around phonics guidance and opportunities for consolidation the programme positively influenced staff confidence and practice. These findings provide useful insights for future iterations of the programme and for scaling delivery across broader school contexts.

4. Findings from a Roundtable on Challenges and Priorities in Language and Literacy Interventions

What are the most effective components of reading interventions, and how reliably are these implemented?

Panel members unanimously agreed that effective reading interventions in primary schools must integrate key components such as phonemic awareness, letter knowledge, vocabulary, and narrative comprehension within a rich oral language environment. However, they noted that these components are often not delivered consistently in practice.

“You need to be able to link sounds to text and reinforce this through reading... sometimes people just focus on phonemic awareness in isolation.”

Despite a well-established evidence base, schools often rely on interventions with limited or no supporting data. As one panel member noted:

“There’s a massive base of literature on reading in primary... but many of the programmes being used in schools are untested or even shown to be ineffective.”

Implementation inconsistencies were also attributed to a lack of training and clarity for teachers, particularly in bilingual or multilingual contexts.

What barriers do schools face when adopting and implementing evidence-based approaches?

Several systemic barriers were identified. These included competing priorities in schools, limited time and resources, staff turnover, and fragmented initial teacher training (ITT). Participants expressed concern that without adequate leadership and system-level support, even well-evidenced interventions struggle to gain traction.

“You’re asking people to do interventions, but they’re also managing behaviour all day the root causes, like poor language, go unaddressed.”

“Doing something that is evidence-based but time-consuming is better than doing several piecemeal things that don’t make a difference.”

The group also highlighted the lack of confidence some practitioners feel when trying new approaches. Peer modelling and local advocacy were identified as more effective than top-down mandates in encouraging uptake.

“Sometimes the best ambassadors are teachers at the same level who have done an approach and succeeded — not just a directive from the top.”



What additional considerations are needed for bilingual or multilingual learners?

The roundtable raised significant concerns about the absence of clear frameworks for supporting bilingual learners, especially in Welsh-medium or dual-language contexts. Although the importance of valuing and supporting home language development was widely recognised, participants noted that teachers often lack practical guidance.

“Schools are muddling through; there’s no framework for how to support bilingual learners effectively.”

Adapting interventions to reflect home language skills – while maintaining fidelity to core instructional principles – was considered critical. However, many practitioners felt under-equipped to do this.

“You’ve got individual differences in strength of home language skills, plus the challenge of teaching a transparent versus opaque orthography. We need much more support here.”

What role should system leaders play in embedding high-quality, evidence-based practice?

The final part of the discussion focused on policy, leadership, and infrastructure. Participants strongly endorsed the idea that responsibility for identifying and promoting effective interventions should not rest solely with classroom teachers.

“We shouldn’t expect every teacher to reinvent the wheel. Tell them how to make it — give them the instruction manual.”

Others echoed the importance of clear, coordinated messaging across local authorities, trusts, and national bodies.

“Teachers need clear guidance on what works, but also flexibility to adapt for their context. Policy and practice have to align.”

There was also concern that decision-makers often focus on anecdotal or familiar solutions rather than rigorous evidence, and that infrastructure to support evidence-based implementation is lacking in many areas.

Priorities for the Future

In closing, panellists and audience members identified shared priorities for future research, policy, and practice:

- » Improve ITT and CPD so that all teachers — including newly qualified staff — are confident in teaching reading, assessing oral language, and intervening early.
- » Develop an evidence base for bilingual interventions and establish frameworks to support multilingual learners across diverse settings.
- » Strengthen infrastructure and accountability, so that data, policy, and leadership structures align to support evidence-informed practice.
- » Shift resources upstream, addressing language and literacy difficulties as root causes of behavioural and academic challenges, rather than focusing solely on downstream management.

“If I can’t read, and you’re giving me a history textbook in secondary school, how am I going to feel about that?”

The roundtable offered a rare opportunity for researchers, practitioners, and policymakers to reflect together on the state of language and literacy interventions in UK schools. While there was a shared understanding of what works, there was also a consensus that current implementation falls short due to structural barriers, insufficient training, and a lack of policy clarity. Participants called for more coherent, evidence-based, and system-wide responses underpinned by strong leadership, better use of data, and inclusive, practical guidance for the classroom.

5. Discussion

This study was designed in direct response to a pressing educational challenge: an increasing proportion of children in UK primary schools particularly those from disadvantaged backgrounds are not acquiring the reading and comprehension skills they need to access the curriculum, potentially hampering their academic success. The pandemic has widened these gaps, and traditional intervention models are not always suited to meeting the scale and urgency of the need. Many programmes rely on highly trained specialists, intensive supervision, or delivery formats that are costly and inflexible. As a result, the children who need the most support are often unlikely to receive it.

Our approach sought to address this gap by testing a model that is evidence-based, targeted at a critical stage of development, and designed from the outset for scalability. By using digital technology, the programme could be delivered consistently by trained Teaching Assistants (TAs), supported by structured resources, and adapted to fit different school contexts, including remote or hybrid settings. The findings of this trial provide encouraging evidence that such an approach can deliver meaningful improvements for struggling readers, and that these improvements can be sustained over time.

The efficacy of the RILL programme

We first asked whether poorer readers who participated in the programme made greater gains in decoding and reading comprehension than their peers who did not. The results show a clear and positive answer: children in the intervention group improved significantly more in word-level reading, vocabulary (oral language and reading comprehension). This is an important practical finding because it shows that a TA-delivered, digitally supported model can achieve measurable literacy gains without the need for extensive face-to-face specialist input. For schools, this means that high-quality literacy support can be integrated into existing structures and delivered by existing staff.

The second question was whether these benefits lasted beyond the end of the intervention. Follow-up testing several months later showed that not only were the gains maintained, but reading comprehension scores were in some cases higher than immediately after the programme. This is a crucial point for applied practice: it suggests that once children are given the tools to decode more fluently and strategies to understand text, they can continue to make progress through everyday classroom learning and independent reading. Sustained gains are particularly valuable for school leaders deciding how to invest limited resources in interventions that have lasting impact represent better value and better outcomes for pupils.

The third question explored how progress in one area of reading might support later progress in another. In particular, we looked at whether gains in decoding and vocabulary helped explain later improvements in reading comprehension. The findings suggest that both played a role, but decoding appeared to be the stronger predictor of later comprehension. In other words, children who became better at reading words accurately and fluently were more likely to make later gains in understanding what they read. Gains in vocabulary also seemed to make an additional contribution, helping children make more sense of the words and ideas in the text. For practitioners, the key message is that strengthening decoding is not enough on its own, but it is a crucial foundation. At the same time, building vocabulary can provide extra support for comprehension by helping children attach meaning to what they read.



Scalability and digital delivery

From an applied perspective, one of the most significant aspects of this study is the delivery model itself. The digital resources reduced the training burden for staff, ensured consistency across schools, and supported engagement through interactive and well-structured lesson materials. Because the programme was designed for delivery by TAs, schools could deploy it without recruiting additional specialist staff—a major advantage in the current climate of teacher shortages and budget pressures.

The technology also allowed flexibility in delivery. Lessons could be adapted for different timetables, implemented one-to-one or in small groups, and even delivered remotely when necessary. This flexibility is not just a convenience; it is a safeguard against future disruptions, whether due to public health crises, school closures, or pupil absence. It also aligns with the increasing digital literacy of pupils, many of whom respond well to technology-enhanced learning formats.

Conclusion

Taken together, the results provide strong support for the idea that literacy interventions can be both effective and scalable if they are designed with these dual goals in mind from the outset. By combining rigorous, evidence-based content with a delivery model that makes sense for schools, we can reach more of the children who need help without sacrificing quality or impact.

The challenge ahead lies not in proving that such interventions can work, but in ensuring that they are adopted widely, implemented with fidelity, and supported by the systems that allow them to flourish. This study offers a clear example of how a digital, TA-led approach can deliver immediate improvements, foster sustained progress, and integrate seamlessly into the realities of modern school life.



Looking to the Future

The success of this trial highlights the potential of digitally supported, TA-delivered interventions to close persistent literacy gaps in primary schools. However, the findings also point to important opportunities for extending and refining this approach to maximise its impact.

One clear next step is to explore how a similar model could be adapted for younger pupils in Key Stage 1. Early intervention remains the most effective way to prevent long-term reading difficulties, and a “Junior RILL” programme tailored for 5–7-year-olds could place greater emphasis on oral language development alongside foundational decoding. This would allow children to build the vocabulary, grammar, and listening comprehension skills that underpin later reading success, while also ensuring that decoding is introduced in a structured and systematic way. By strengthening both strands early, we can give children the best possible start in literacy before problems become entrenched.

Another priority is to deepen the professional learning element of the programme for Teaching Assistants and classroom teachers. While the current training model has been found to be effective, a more comprehensive professional development framework – combining online modules, live coaching, and peer-support networks – could further strengthen delivery quality and staff confidence. Such a framework would not only enhance the fidelity of implementation, but also leave schools with a lasting legacy of skilled practitioners capable of delivering evidence-based literacy instruction beyond the life of a funded project.

Policy Brief: Scaling Digital Literacy Support for Struggling Readers

Closing the Literacy Gap in Key Stage 2 through
the RILL Programme

Summary

Many children in the UK – particularly those from socioeconomically disadvantaged backgrounds – struggle with reading well into Key Stage 2. These difficulties limit access to the wider curriculum and reduce long-term educational and employment opportunities. The COVID-19 pandemic exacerbated this challenge, widening the “literacy gap” for the most vulnerable pupils.

The Research on the Instruction of Literacy with Language (RILL) programme was developed as a scalable, digitally supported literacy intervention for pupils aged 7–9 who are struggling with reading. Delivered by trained Teaching Assistants (TAs) within primary schools, RILL combines systematic decoding instruction with activities to build reading comprehension, all supported by high-quality digital resources.

A large-scale, pre-registered randomised controlled trial (RCT) demonstrated that RILL produces significant and lasting improvements in both word-level decoding and reading comprehension.

Key Findings

1. Immediate gains in reading skills

- » Pupils receiving RILL made significantly greater improvements in both decoding (word reading accuracy and fluency), vocabulary (oral language), and reading comprehension compared with controls immediately after the programme.
- » This dual impact shows that targeted instruction can simultaneously improve foundational skills and higher-order understanding.

2. Sustained improvement over time

- » Gains were maintained several months later, with some evidence that reading comprehension improvements grew even stronger after the intervention ended.
- » This suggests that RILL creates lasting changes that continue to develop through pupils’ everyday reading experiences.

3. Pathway from decoding to comprehension

- » Analysis showed that improvements in decoding boosted comprehension indirectly, by freeing up cognitive resources to focus on meaning.
- » Improvements in vocabulary also boosted reading comprehension, but this was to a lesser extent.
- » This supports the principle that decoding instruction must be paired with explicit comprehension work to produce sustained literacy gains.

Why This Matters for Policy

- » Addressing inequality: The literacy gap is most pronounced for pupils eligible for free school meals and those learning English as an additional language. Scalable, school-based interventions like RILL can reach these groups effectively.
- » Building school capacity: RILL trains TAs to deliver high-quality instruction, enabling schools to make use of existing staff rather than relying solely on specialist teachers.
- » Leveraging digital technology: RILL’s online platform reduces training burden, supports consistent delivery, and allows for flexible implementation across contexts.
- » Post-pandemic recovery: Programmes that embed digital delivery can continue uninterrupted during school closures or staff absences, making them resilient to future disruptions.

Recommendations for Policy and Practice

01. Scale up evidence-based, digitally supported interventions
 - » Expand RILL and similar programmes nationally, targeting schools with the highest rates of poor literacy.
02. Invest in professional development for non-specialist educators
 - » Embed structured training and ongoing coaching for TAs and teachers, ensuring fidelity and sustainability.
03. Adapt interventions for earlier prevention
 - » Develop a “Junior RILL” for 5–7-year-olds, placing greater emphasis on oral language alongside early decoding.
04. Integrate literacy interventions into school improvement plans

- » Align delivery with existing assessment frameworks, curriculum planning, and local authority literacy strategies.
05. Use technology for precision and engagement
 - » Incorporate adaptive learning tools and real-time progress tracking to tailor instruction to pupil needs.

Looking to the Future

The RILL trial shows that digitally supported, TA-delivered interventions can close literacy gaps in primary schools. Next steps include:

- » Early Years Adaptation: Developing Junior RILL for Key Stage 1 to prevent reading problems before they become entrenched.
- » Enhanced Professional Learning: Creating a more comprehensive training framework combining online modules, live coaching, and peer networks.
- » Wider Roll-Out: Building partnerships with local authorities, academy trusts, and national bodies for broader adoption.
- » Tech-Enabled Personalisation: Using adaptive resources and dashboards to support targeted, data-driven instruction.

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Appendix A

Full RILL curriculum including examples

LESSON 01			LESSON 02		
STORY Peter The Pig	WORD 01 Stride	WORD 02 Sway	STORY Molly The Cat	WORD 01 Clambering	WORD 02 Grab
SOUND & SPELLING Short a	SOUND GAME Blending		SOUND & SPELLING Short e	SOUND GAME Blending	
GAME DETAILS e.g., slab, stamp, snap, fab, lab, nap			GAME DETAILS e.g., men, den, mend, end, bend		
LESSON 03			LESSON 04		
STORY Meg	WORD 01 Giggling	WORD 02 Groan	STORY George The Snail	WORD 01 Amused	WORD 02 Observe
SOUND & SPELLING Short i	SOUND GAME Blending		SOUND & SPELLING Short o	SOUND GAME Blending	
GAME DETAILS e.g., mid, lid, kid, sip, rip lip			GAME DETAILS e.g., rock, mock, lock, cot, hot, lot		
LESSON 05			LESSON 06		
STORY Ned The Donkey	WORD 01 Silent	WORD 02 Shiver	STORY NELL'S NEW FRIEND	WORD 01 Applause	WORD 02 Confident
SOUND & SPELLING Short u	SOUND GAME Blending		SOUND & SPELLING 'ay'	SOUND GAME Recap of vowel sounds (a,i,e,o,u), Blending, Identify spelling-sound pattern "ay"	
GAME DETAILS e.g., must, dump, rust, slug			GAME DETAILS e.g., may, day, say, play, stay		
LESSON 07			LESSON 08		
STORY The Little Swallow	WORD 01 Cranky	WORD 02 Poke	STORY Second World War Diary	WORD 01 Crept	WORD 02 Peeking
SOUND & SPELLING 'EE'	SOUND GAME Recap of vowel sounds (a,i,e,o,u), Blending Identify spelling-sound pattern "ee"		SOUND & SPELLING 'igh'	SOUND GAME high, thigh, sigh, night, bright, high, light	
GAME DETAILS a for apple, ect... e.g., beep, feed, bee, beep			GAME DETAILS e.g., rock, mock, lock, cot, hot, lot		

LESSON 09			LESSON 10		
STORY Wings of Icarus	WORD 01 Delighted	WORD 02 Wiggle	STORY Have you seen a Hedgehog	WORD 01 Friendly	WORD 02 Mysterious
SOUND & SPELLING 'ow'	SOUND GAME Recap of vowel sounds (a,i,e,o,u, ay, ee, igh). Blending Identify spelling-sound pattern "igh"		SOUND & SPELLING 'oo' Long vowel	SOUND GAME Recap of vowel sounds (ay, ee, igh, ow), Blending Identify spelling-sound pattern "oo"	
GAME DETAILS blow, flow, know, low, bow, blow			GAME DETAILS e.g., zoo, pool, food, roof, too, food		
LESSON 11			LESSON 12		
STORY Tom's Master	WORD 01 Tiny	WORD 02 Nibble	STORY The Money Chest	WORD 01 Amused	WORD 02 Observe
SOUND & SPELLING 'oo' Short ū	SOUND GAME Blending Identify spelling-sound pattern "oo"		SOUND & SPELLING Recap	SOUND GAME Match audio sound to spelling (ay, ee, igh, ow, oo, oo)	
GAME DETAILS e.g., cook, took, look, good, hood, took, book			GAME DETAILS Recap of vowel sounds (ay, ee, igh, ow, oo, oo) Identify spelling-sound pattern		
LESSON 13			LESSON 14		
STORY Sally's Football Team	WORD 01 Snatched	WORD 02 Gloomy	STORY The Dragon's Best Book	WORD 01 Stamp	WORD 02 Consider
SOUND & SPELLING 'ar'	SOUND GAME Match audio sound to spelling (ay, ee, igh, ow, oo, oo)		SOUND & SPELLING 'or'	SOUND GAME Identify spelling-sound pattern, 'or' Blending, Sentence reading with key words	
GAME DETAILS Count the sounds in s-t-ar, e.g., card, hard, dark, sharp part, sharp,			GAME DETAILS Count the sounds in f-or-k e.g., sort, short, sport, snort		
LESSON 15			LESSON 16		
STORY Arthur and his horse	WORD 01 Doze	WORD 02 Flutter	STORY The Legend of Rhitta Gawr	WORD 01 Dismay	WORD 02 Shaky
SOUND & SPELLING 'air'	SOUND GAME Identify spelling-sound pattern 'air', Blending, Phoneme counting		SOUND & SPELLING 'ir'	SOUND GAME Blending, Identify spelling-sound pattern 'ir'	
GAME DETAILS Count the sounds in ch-air e.g., hair, fair, pair, flair Count sounds in flair, stair, lair			GAME DETAILS e.g., circus, birth, birthday, stir Count the sounds in: bird, first		

LESSON 17			LESSON 18		
STORY Crabs	WORD 01 Gazing	WORD 02 Sternly	STORY The Legend of Melangell	WORD 01 Annoy	WORD 02 Gasp
SOUND & SPELLING 'ou'	SOUND GAME Blending, Identify spelling-sound pattern 'ou'		SOUND & SPELLING 'oy'	SOUND GAME Blending, Identify spelling-sound pattern 'oy'	
GAME DETAILS e.g., round, shout, out, found, count. Count the sounds in: out, count			GAME DETAILS e.g., toy, boy, joy Count the sounds in: boy, joy		
LESSON 19			LESSON 20		
STORY The Empty Watering Hole	WORD 01 Narrowed	WORD 02 Calm	STORY Little Cloud Games	WORD 01 Fasten	WORD 02 Stumble
SOUND & SPELLING Recap	SOUND GAME Recap of spelling-sounds: air, ir, ou, oy		SOUND & SPELLING Recap	SOUND GAME Recap of sounds: air, ir, ou, oy Blending with all sounds	
GAME DETAILS Think of a word for each sound			GAME DETAILS Snap sound matching game, think of a word with sound in it. e.g., circus, shout, fork, car, toy		
LESSON 21			LESSON 22		
STORY The Last Story of King Arthur	WORD 01 Filthy	WORD 02 Chilly	STORY A Feast in the Garden	WORD 01 Howl	WORD 02 Outstanding
SOUND & SPELLING 'ee' and 'ea'	SOUND GAME Blending and counting sounds Introduce ea in "tea" Blending, Identify spelling-sound pattern 'ee' and 'ea'		SOUND & SPELLING 'oy and oi'	SOUND GAME Recap of vowel sounds (a,i,e,o,u), Blending, Identify spelling-sound pattern "ay"	
GAME DETAILS e.g., green, tree, tea, e.g., tea, seat, scream, dream What sounds to these letter make?			GAME DETAILS e.g., joy e.g., voice, coin What sounds to these		
LESSON 23			LESSON 24		
STORY I'm The Best	WORD 01 Stare	WORD 02 Gather	STORY Tiny Seed Surprise	WORD 01 Miserable	WORD 02 Mumble
SOUND & SPELLING 'ay and 'a-e'	SOUND GAME Recap of 'ay', Blending, Identify spelling-sound pattern - blending and counting sounds with written word form Identify spelling-sound pattern 'ay' and 'a-e'		SOUND & SPELLING 'igh' and 'i-e'	SOUND GAME Recap of 'igh'. Identify spelling-sound pattern - blending and counting sounds with written word form Identify spelling-sound pattern 'igh' and 'i-e'. Identify spelling-sound pattern 'igh' and 'i-e'	
GAME DETAILS Find letters on keyboard e.g., day e.g., cake, bake, late. What sounds to these letter make?			GAME DETAILS Find letters on keyboard e.g., fright, bright, might e.g., nice, Like, time, hide What sounds to these letter make?		

LESSON 25			LESSON 26		
STORY I don't want to go!	WORD 01 Marching	WORD 02 Anticipate	STORY Jack and the Bats	WORD 01 Perform	WORD 02 Terrified
SOUND & SPELLING 'ow' and 'o-e'	SOUND GAME Recap of 'ow', Identify spelling-sound pattern - blending and counting sounds with written word form Identify spelling-sound pattern 'ow' and 'o-e'		SOUND & SPELLING 'oo and u-e'	SOUND GAME Recap of 'oo' Identify spelling-sound pattern - blending and counting sounds with written word form. Identify spelling-sound pattern 'oo' and 'u-e'	
GAME DETAILS Find letters on keyboard e.g., show, know, slow e.g., home, hope, spoke, broke. What sounds do these letter make?			GAME DETAILS Find letters on the keyboard e.g., pool, moon, spoon e.g., huge, tube, rude What sounds to these letter make?		
LESSON 27			LESSON 28		
STORY Zeus and the missing crown	WORD 01 Leap	WORD 02 Rapid	STORY The Perfect Gift	WORD 01 Sprinkled	WORD 02 Tangled
SOUND & SPELLING 'or and 'aw'	SOUND GAME Recap of 'or'. Identify spelling-sound pattern - blending and counting sounds with written word form. Think of example word Identify spelling-sound pattern 'or' and 'aw'		SOUND & SPELLING 'air and 'are'	SOUND GAME Recap of 'air' Identify spelling-sound pattern - blending and counting sounds with written word form Think of example word Identify spelling-sound pattern 'air' and 'are'	
GAME DETAILS Find letter on keyboard e.g., corn, horn, torn, e.g., dawn, claw, draw, straw. What sounds do these letters make?			GAME DETAILS Find letters on keyboard e.g., air, hair, chair e.g., scare, dare, bare, stare. What sounds to these letters make?		
LESSON 29			LESSON 30		
STORY Robin and his Harp	WORD 01 Distress	WORD 02 Drowsy	STORY Wally	WORD 01 Chewed	WORD 02 Wander
SOUND & SPELLING 'ir and ur'	SOUND GAME Recap of 'ir'. Identify spelling-sound pattern - blending and counting sounds with written word form Think of example word Identify spelling-sound		SOUND & SPELLING Recap ay/a-e, igh/i-e, ow/o-e, oo/u-e, or/aw, air/are lr/ur	GAME DETAILS Snap sound matching e.g., chair, show, stir	
GAME DETAILS Find letters of keyboard e.g., girl, swirl, whirl e.g., curl, burn, hurt, nurse What sounds to these letters make?				SOUND GAME Ask children what sound each spelling makes, Sound recognition, Blending	

Appendix B

To better understand how the intervention worked, we conducted a structural equation modelling analyses using path models. This allowed us to examine whether gains in decoding and reading comprehension skills during the programme were sustained over time, and whether gains in these skills helped to explain later improvements in reading comprehension.

Immediate intervention effects:

The RILL intervention led to immediate improvements in word-level literacy.

Figure B1. Path diagram for latent variables of word-level literacy at pretest (t1) and posttest (t2). Factor loadings and the autoregressive path are standardised estimates. The effect of the intervention is shown by the path from the group dummy (intervention vs control) to word-level literacy at posttest, which is γ -standardised (equivalent to Cohen's d). CIs are 95% robust 95% CIs accounting for clustering within schools are reported in square brackets. *** $p < .01$.

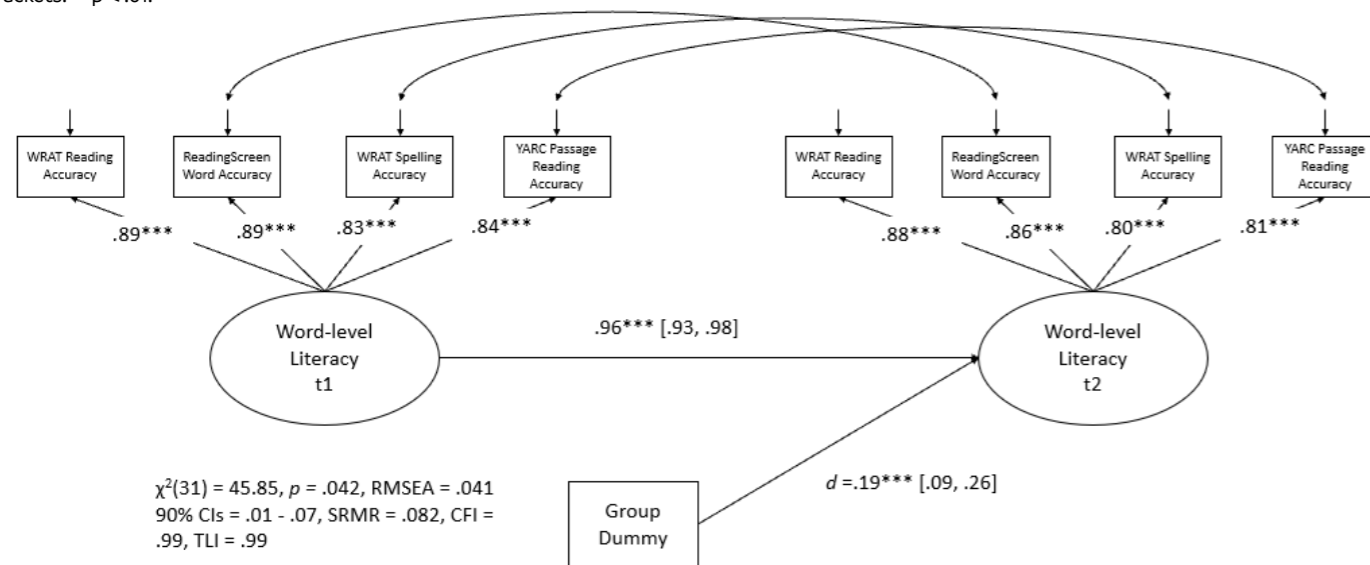
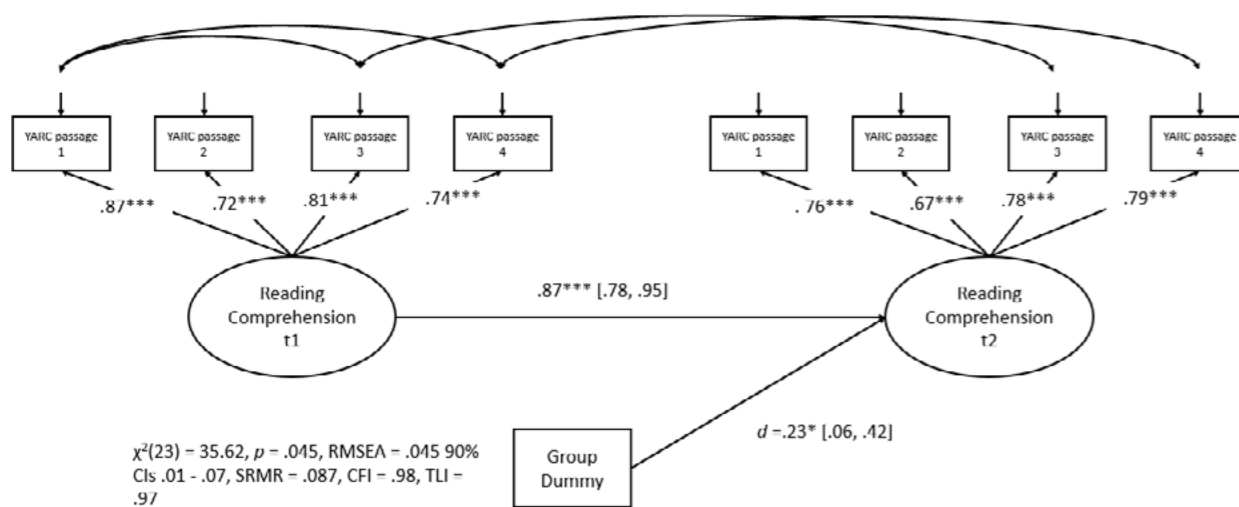
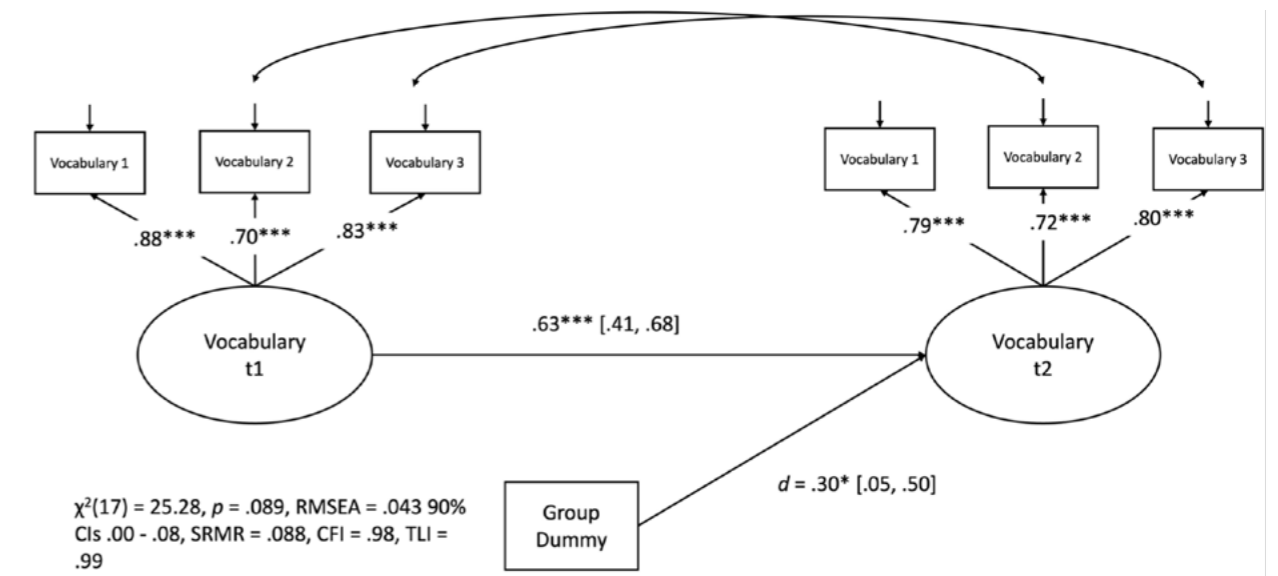


Figure B2. Path diagram for latent variables of reading comprehension at pretest (t1) and posttest (t2). Factor loadings and the autoregressive path are standardised estimates. The effect of the intervention is shown by the path from the group dummy (intervention vs control) to word-level literacy at posttest, which is γ -standardised (equivalent to Cohen's d). CIs are 95% robust 95% CIs accounting for clustering within schools are reported in square brackets. ** $p < .01$. *** $p < .01$.



The RILL intervention also led to immediate improvements in vocabulary

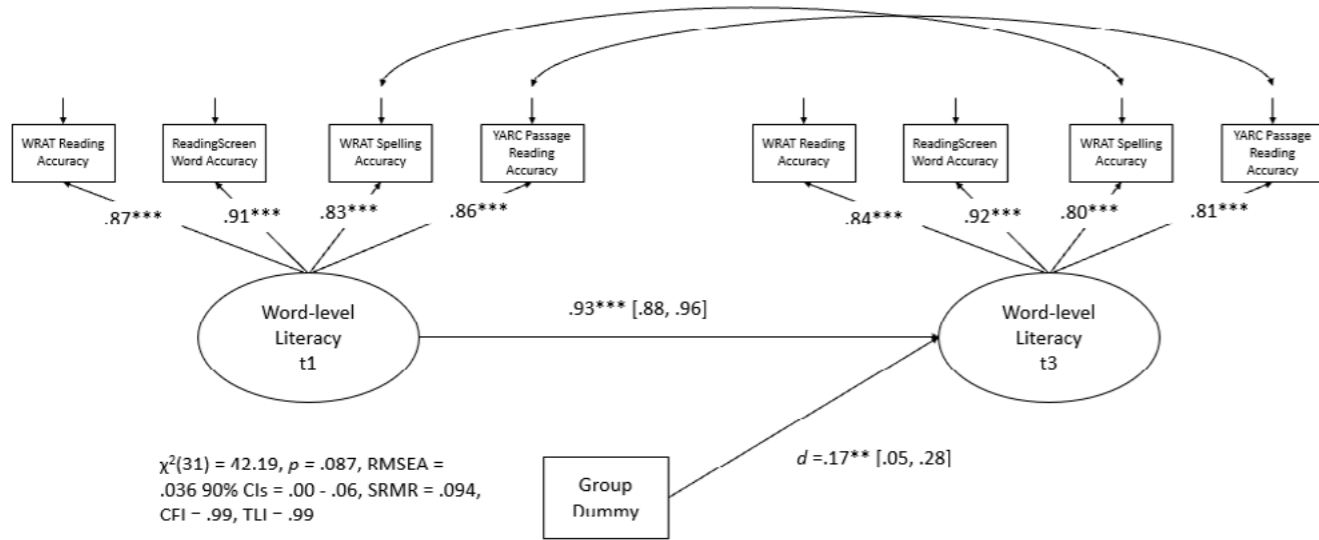
Figure B3. Path diagram for latent variables of taught expressive vocabulary at pretest (t1) and posttest (t2). Factor loadings and the autoregressive path are standardised estimates. The effect of the intervention is shown by the path from the group dummy (intervention vs control) to word-level literacy at posttest, which is γ -standardised (equivalent to Cohen's d). CIs are 95% robust CIs accounting for clustering within schools are reported in square brackets. ** $p < .01$. *** $p < .01$.



3.2. Longer-term intervention effects:

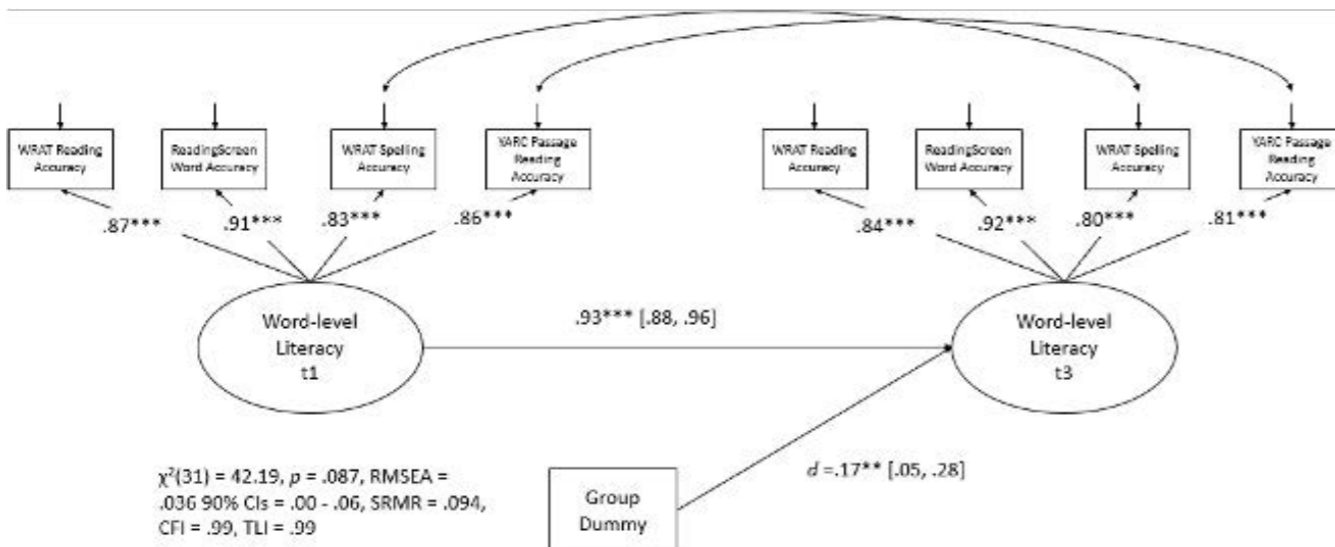
The intervention led to longer-term improvements in word-level literacy

Figure B4. Path diagram for latent variables of word-level literacy at pretest (t1) and follow-up (t3). Factor loadings and the autoregressive path are standardised estimates. The effect of the intervention is shown by the path from the group dummy (intervention vs control) to word-level literacy at follow-up, which is y-standardised (equivalent to Cohen's d). CIs are 95% robust 95% CIs accounting for clustering within schools are reported in square brackets. **p < .01. ***p < .01.



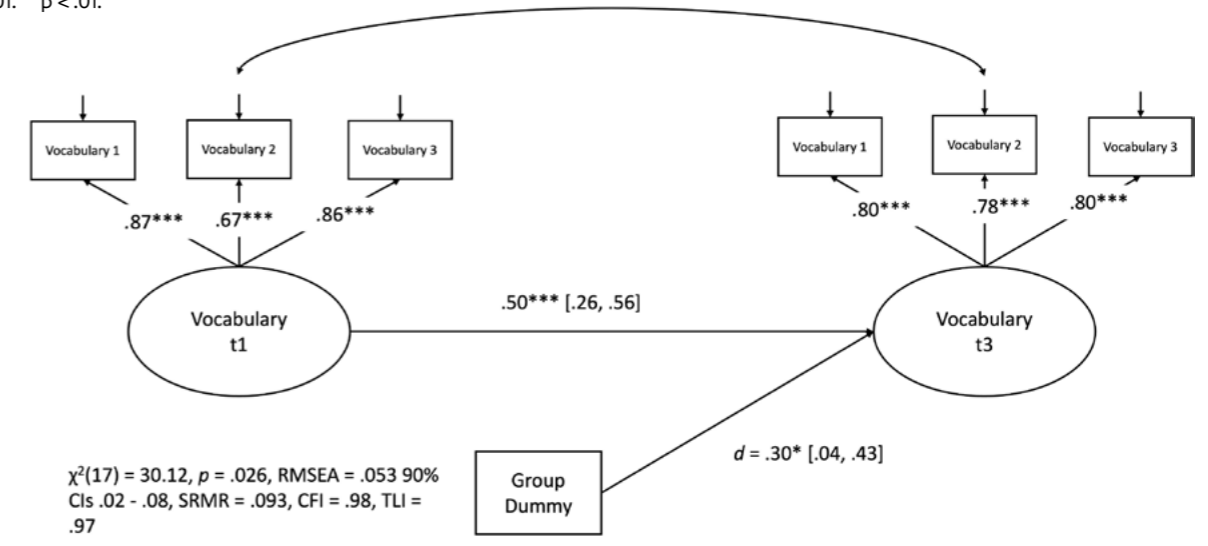
The RILL intervention also led to longer-term improvements in reading comprehension

Figure B5. Path diagram for latent variables of reading comprehension at pretest (t1) and follow-up (t3). Factor loadings and the autoregressive path are standardised estimates. The effect of the intervention is shown by the path from the group dummy (intervention vs control) to reading comprehension at follow-up, which is y-standardised (equivalent to Cohen's d). CIs are 95% robust 95% CIs accounting for clustering within schools are reported in square brackets. **p < .01. ***p < .01.



The RILL intervention also led to longer-term improvements in vocabulary

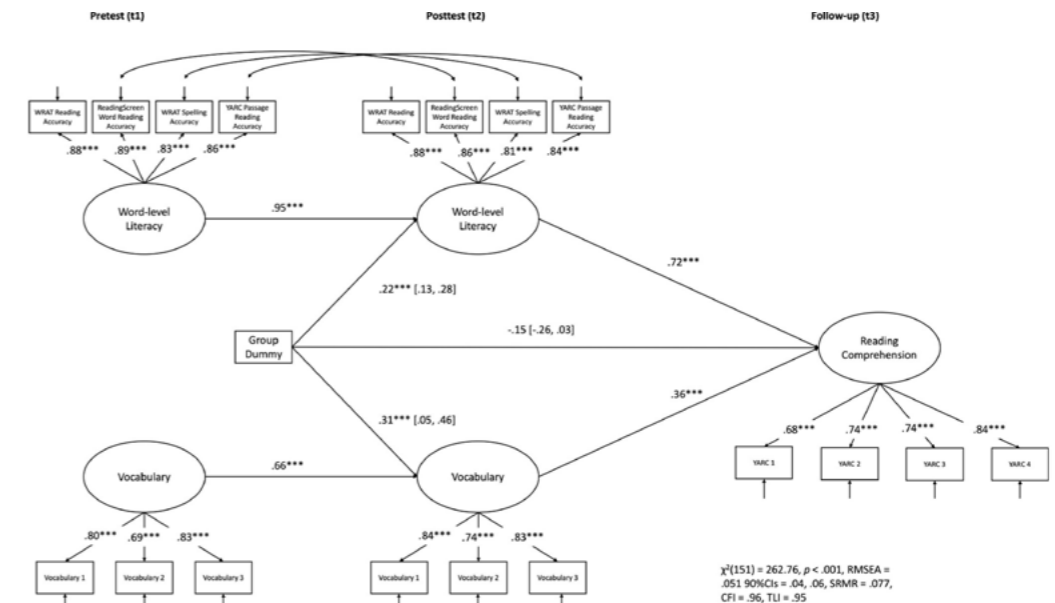
Figure B6. Path diagram for latent variables of expressive vocabulary at pretest (t1) and follow-up (t3). Factor loadings and the autoregressive path are standardised estimates. The effect of the intervention is shown by the path from the group dummy (intervention vs control) to reading comprehension at follow-up, which is y-standardised (equivalent to Cohen's d). CIs are 95% robust CIs accounting for clustering within schools are reported in square brackets. **p < .01. ***p < .01.



The relationship between reading skills:

The RILL intervention led to immediate improvements in word-level literacy and vocabulary. These improvements led to indirect, longer-term effects on reading comprehension.

Figure B7. Path diagram of the mediation model testing the indirect influence of the intervention on reading comprehension via word-level literacy. Factor loadings and the autoregressive path are standardised estimates. The effect of the intervention is shown by the paths from the group dummy (intervention vs control) to word-level literacy and reading comprehension at follow-up, which is y-standardised (equivalent to Cohen's d). Panel B. Path diagram of the mediation model testing the indirect influence of the intervention on reading comprehension via word-level literacy and vocabulary. Factor loadings and the autoregressive path are standardised estimates. The effect of the intervention is shown by the paths from the group dummy (intervention vs control) to word-level literacy, vocabulary, and reading comprehension at follow-up are y-standardised (equivalent to Cohen's d). CIs are 95% robust CIs accounting for clustering within schools are reported in square brackets. **p < .01. ***p < .01.





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