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Evidence-based support provided to struggling readers in later primary years in the UK: A scoping review

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Background: In the last two decades, a number of empirical studies investigated the impact of UK-based interventions for struggling readers in later primary years (called Key Stage 2 or KS2 in the UK). However, to date, there are no reviews that look at the extent and nature of the existing UK-based literature. This scoping review explores the extent of the available literature focusing on struggling readers in KS2 and aims to summarise the findings of available research.
Methods: A scoping review methodology was used, and six databases were searched from 2000 to 2022. The initial search yielded 1236 studies, of which 24 met the eligibility criteria and were included in this review.
Results: Most of the included studies (21 out of 24) demonstrated positive outcomes, and the support provided led to improvement in the reading skills of struggling readers in KS2. The available intervention programmes included a wide range of intensity, varied group sizes and targeted different reading skills. There is currently insufficient evidence to suggest the relative efficacy of one intervention over another.
Conclusions: The review confirmed the need for more robust research in this area and highlighted the importance of learning lessons from the international evidence base.

Keywords: reading intervention, scoping review, later primary, struggling readers, UK

Highlights

What is already known about this topic

- The reading needs of struggling readers in the later primary years are different than their younger counterparts.
- There are a number of systematic reviews and meta-analyses that examine the support provided to struggling readers.
- All previous reviews are US-based and may not fully reflect the needs and characteristics of struggling readers in the United Kingdom (UK) due to differences in pedagogical approaches, reading practices and the different ages at which children start formal reading instruction

What this paper adds

- The current review is the first to map and summarise the available research focusing on reading interventions for struggling readers in KS2 in the UK.
- It provides insight into the aspects that can impact the successful implementation of interventions in the UK.
- Regardless of their intensity, duration, delivery method and target skills, most interventions led to improvement in the reading skills of struggling readers in KS2.

Implications for theory, policy or practice

- Based on the characteristics of the studies, most support was provided to the lower KS2 ages; however, support should be provided to a similar degree to all ages across KS2 and be in accordance with the changing needs of the children.
- More methodologically robust research is needed to understand the impact (if any) of the intervention intensity, group size and delivery method.
- Understanding how reading theory translates to diverse local practices is an important priority for reading instruction research internationally, as different practices may vary in their overall efficacy.

In the early years of schooling the main focus of reading is learning to read, however, this shifts to reading to learn during the later primary school years, which poses a unique challenge for many children. After a strong focus on word recognition accuracy and fluency in the early primary years, in later primary children are expected to read and comprehend texts that are increasingly complex (Department for Education, 2013). At this point, struggling readers can face residual difficulties in more basic word reading skills, as well as struggling with more advanced reading skills such as reading comprehension (Leach et al., 2003), especially in relation to discourse-level skills and processes, such as understanding inferences or complex sentence structures and using context to aid in

comprehension (Cain & Oakhill, 2007). This can pose a challenge and contribute to the existing difficulties of struggling readers or can lead to late emerging reading difficulties in older readers (Leach et al., 2003; Lipka et al., 2006). In the UK, 27% of children leave primary school without being able to read at their age-expected level (GOV.UK, 2023). Not being able to read at an age-expected level has a significant impact on the academic success of these children (Clemens et al., 2016). Hence, provision of age-appropriate evidence-based support that meets the needs of struggling readers in later primary is crucial (Flynn et al., 2012).

Most of the reviews on the support provided to struggling readers in later primary years are US-oriented (Donegan & Wanzek, 2021; Edmonds et al., 2009; Scammacca et al., 2015; Wanzek et al., 2013). These reviews provide useful information for practitioners in the UK, as both countries share the same language. However, while reading theory disseminates across countries relatively synchronously (e.g., Gough & Tunmer, 1986; Hogan et al., 2011), knowledge mobilisation and implementation is a much more localised process, dependent upon a country or region's historical approaches to education, as well as contemporaneous curricular practices (OECD, 2000). Understanding how common theory translates to diverse local practices is an important priority for reading instruction research internationally, as different practices may vary in their overall efficacy. Reviews allowing international comparison also enable local contexts to reflect more critically on the effectiveness of knowledge mobilisation in their setting.

In the UK, formal schooling starts in primary school, which spans across seven years and is divided into Reception and two more stages known as key stages. Key Stage 1 (KS1) is the earlier part of primary school, where children are typically aged between 5 to 7, and encompasses Years 1 and 2. Whereas Key Stage 2 (KS2), which includes Years 3 to 6, is the later part of primary school, and children are typically aged between 7 to 11. Formal reading instruction starts at age 4 to 5 in reception, and there is a strong emphasis on systematic synthetic phonics instruction, which involves teaching the relationship between sounds and letters (Stainthorp, 2020). While phonics instruction has also been influential in the US, where formal reading instruction starts at age 5 to 6 in kindergarten, there has arguably been a broader range of approaches to reading instruction, including whole language and balanced literacy (Bingham & Hall-Kenyon, 2013). In the UK, as part of reading instruction, reading schemes consisting of graded books, usually known as book bands in the UK and levelled readers in the US, are widely used to match children with appropriately graded books. In practical terms, published reading programmes that are available in the US are typically not available in the UK and vice versa. Reading comprehension relies on background knowledge, which will differ on various sociocultural dimensions across the two countries, with different dialects, accents and regionalised publishing companies further localising reading instructional resources.

In the UK, there is a range of literature that discusses the support provided to struggling readers in KS2. This support varies in terms of age, target skills, intensity and delivery method. In this scoping review, we aim to examine the existing literature, describe the reading interventions targeting struggling readers in KS2 and their outcomes and provide practitioners with information that will guide practice for supporting struggling readers in later primary years. The objective of this scoping review is to (1) explore the breadth, extent and nature of the available literature and (2) map and summarise the findings of available research focusing on reading interventions for struggling readers in KS2 in the UK.

Method

A preliminary database search using relevant key terms showed that the literature lacked sufficient high-quality studies on the proposed topic to perform a systematic review. Thus, the current study applied a scoping review methodology. As prescribed by the JBI Manual for Evidence Synthesis (Aromataris & Munn, 2020), to better demonstrate the extent of the reading interventions targeting struggling readers in KS2, this review compiled a broad range of data provided by the existing literature on the topic, and took a five stage approach: (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data (data extraction) and (5) collating, summarising, and reporting the results (Arksey & O'Malley, 2005). The scoping review protocol was pre-registered on the Open Science Framework website (https://osf.io/9ht8m/).

Search Strategy

A preliminary search was carried out in the Cochrane Library and Web of Science databases to evaluate the volume of literature available, as well as to determine whether a review on the topic had already been conducted. As scoping reviews involve an iterative and flexible process, this preliminary search was also used in developing the search terms and for determining the electronic databases used for the final search.

Systematic searches were conducted using variations of the following search terms: literacy difficulties, dyslexia, struggling readers, reading comprehension, decoding, reading difficulties and reading disability were used combined with variations of (1) literacy intervention, reading intervention, reading remediation, literacy support, reading support and (2) Key Stage 2, primary school, junior school, Year 3, Year 4, Year 5, Year 6, UK, United Kingdom, England, Scotland, Northern Ireland, Wales, Great Britain. Web of Science; Scopus; PsycINFO via Ovid; and ERIC, MEDLINE and CINAHL via EBSCOhost databases were searched. Additional hand searching was conducted to locate any further relevant papers.

Inclusion Criteria

Studies included in the review met the following criteria:

- Empirical studies evaluating the outcomes of an intervention that directly supported the reading skills of struggling readers. Studies that support other areas, such as music or physical activity, and report changes in reading skills were excluded.
- Interventions targeting children in KS2 (ages 7–11) in the UK (England, Scotland, Wales and Northern Ireland). Studies that reported broader age ranges were included if they had specified the results for participants aged 7 to 11.
- Studies reporting a change in reading or reading-related skills such as phonological awareness (PA), decoding, reading comprehension, vocabulary and fluency. Studies that only reported a change in broader measures, such as school attainment or behavioural changes, were excluded.
- Both peer-reviewed and grey literature, such as government/agency reports, were included.
- Studies with randomised control trials (RCT), quasi-experimental designs (QED) and single-case designs (SCD) were included.

Study Selection

The search results were imported into Rayyan, a free web tool designed to facilitate screening and data extraction for reviews. After removing duplicate articles, two reviewers independently screened the titles and abstracts of the identified studies in accordance with the JBI guidelines. Where a decision could not be made based on the title and abstract, the full text of the study was examined. During the screening process, excluded articles were coded as follows: wrong population, wrong outcome, not conducted in the UK. Reviewers participated in an initial reliability run on a small number of articles to evaluate the proportion of agreement and their adherence to inclusion criteria and to ensure consistent interpretation of the inclusion criteria. Following the title and abstract screening, discrepancies (k = 6) were moderated, and agreement was reached regarding the inclusion of the papers without the involvement of a third reviewer. Next, reviewer one proceeded with the full-text screening of the remaining articles (k = 31), resulting in the removal of a further seven articles. This decision was made after consultation with the second reviewer. Then the references of selected articles were screened, but this did not yield any additional articles. See Figure 1 for an illustration of the search and screening process.

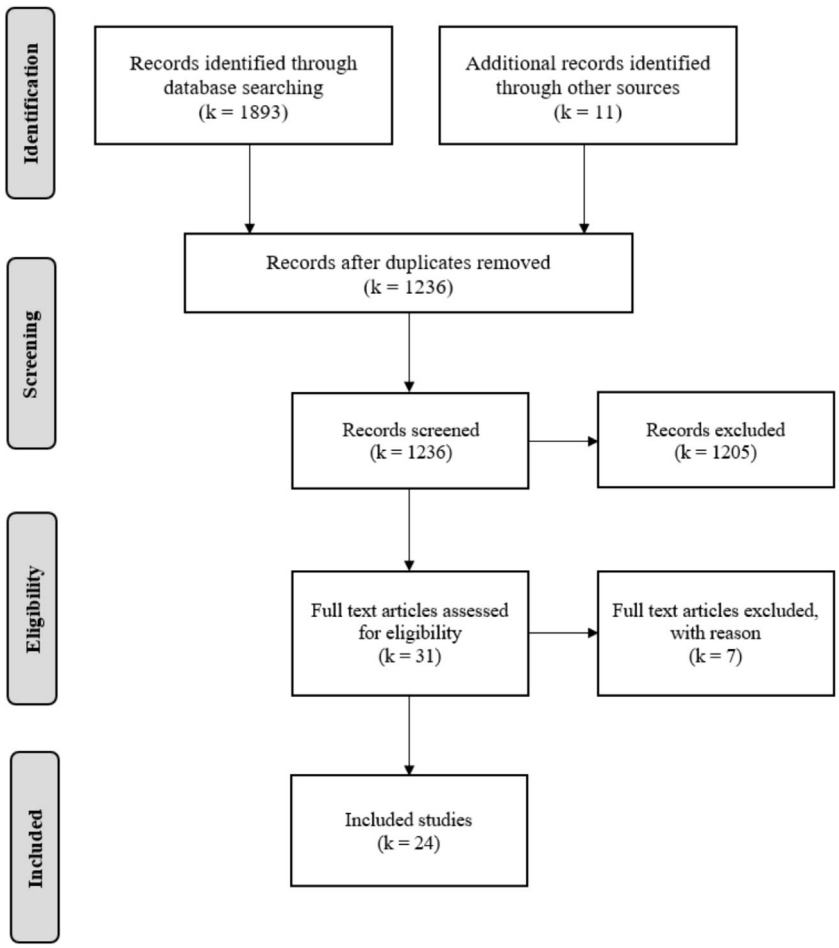

Figure 1. Search and screening process.

Data Charting

Data from the selected articles were extracted using a table that included the following main headings: general information and characteristics of the source, population, intervention characteristics, outcome measures and key findings. General information and characteristics of the source included citation, author(s), year of publication, type of literature and study design. Population included sample size, participants' age and inclusion criteria (if any), such as children having a certain reading profile or having English as an additional language (EAL). Intervention characteristics included the specific intervention (if named), targeted skills, group size, who delivered the intervention and the frequency, duration and length of the intervention. Outcome measures included measurement frequency and reported outcomes. Key findings included the main outcomes of the study. Studies were then grouped and analysed based on the intervention characteristics (intensity, duration, delivery method and targeted skills) and their outcomes. Because this is a scoping review, a formal quality of appraisal was not conducted; however, key indicators of quality such as study design, level of control, clarity of inclusion/exclusion criteria, attrition rate, implementation fidelity, how the outcomes were measured and the details regarding analysis were considered.

Results

A total of 24 articles were included in this scoping review. All were peer-reviewed journal articles, apart from one that was an evaluation report and executive summary (Biggart et al., 2015). The most common study design was QED (k = 15), where in almost half of the studies participants acted as their own controls, and RCT (k = 9), where random assignment to groups was at the level of school, class or individual. Two of the studies were conducted in Scotland (Moir et al., 2020; Topping et al., 2012), one in Northern Ireland (Miller et al., 2012) and the remainder in England. Most were small-scale studies with less than 100 participants (k = 16) and largely focused on the lower KS2 (ages 7–9, Years 3–4, k = 21). Most studies (k = 15) targeted one reading skill (word reading or reading comprehension or vocabulary) while others targeted a combination of these skills. In the main, studies directly targeted the skill(s) to be improved, except for two studies (Cockerill et al., 2021; See et al., 2017) where participants' vocabulary was supported with the aim of improving their reading comprehension. In terms of the long-term effectiveness of a programme, only a quarter (k = 6) of the studies in this review had follow-up assessments, ranging from three weeks to a year, with the majority being at six months.

When looking at the comparison conditions, almost half (k = 11) of the studies compared a reading intervention with typical school instruction. Almost a quarter (k = 5) of studies compared different interventions/conditions with each other as well as typical school instruction. A small number of studies (k = 2) compared different interventions/conditions with each other. A quarter (k = 6) of the studies did not have a comparison group and compared participants' pre- and post-intervention reading scores. Table 1 summarises the studies with a control group while Table 2 provides further details on studies that did not have a typical school instruction control group.

Delivery method and group size varied across studies. In one-third of the included studies (k = 8), the intervention was computer-based, where children were mostly in small groups but interacted with the computer on a one-to-one basis. In almost a third of the

Table 1. Description and summary of studies with a control group.

Study	Study design	Participants	Targeted skill(s)	Intervention	Outcome measure(s)	Results
Biggart et al. (2015)	RCT, albeit with high drop-out rates Pre- and post-test with standardised assessment instruments	*n* = 72 (35 control) Y6 children who are at risk of not achieving the expected level at the end of KS2	Reading comprehension	Tutoring with Alphie Computer-based – children worked in pairs Duration 6 weeks Daily 30-min sessions	Reading comprehension ➔ NGRT digital edition (sentence and passage completion)	A small but *statistically nonsignificant* improvement was observed for reading comprehension in the experimental group. Process evaluation suggests that the programme might be suitable for a younger age.
Bunn (2008)	QED with 4 conditions; (1) ALS, (2) other intervention, (3) ALS + other intervention and (4) control group Pre- and post-test with standardised assessment instruments	*n* = 256 (not clear how many children are in each group) Y3&Y4	Reading skills (not clear which reading skills)	Additional Literacy Support (ALS) Group size, duration and frequency not clearly specified	Reading age ➔ Salford Sentence Reading test SATs tests and QCA end-of-the-year tests	There were *no significant* differences in the reading gain between ALS, ALS combined with other interventions, and other interventions alone. There was *no significant* difference between the control group and intervention groups.
Clarke et al. (2010)	RCT with 4 conditions; text-comprehension (TC) training, oral language (OL) training, combined (COM) and control group Pre-, mid (at 10 weeks), post-test and follow up (at 11 months) with standardised assessment instruments and bespoke assessment for vocabulary	*n* = 160 (40 in each group) Age 8–9 (Y4)	TC ➔ reading (text) comprehension OL group ➔ vocabulary, language (oral) comprehension COM ➔ skills focused in TC and OL	In pairs and one-to-one 20 weeks 1.5 h/week (2 × 30 min in pairs, 1 × 30 min individual)	Reading comprehension ➔ NARA II and WIAT II Vocabulary ➔ The vocabulary subtest from WASI, and a bespoke measure to test the taught vocabulary	At post-test, all intervention groups showed *statistically significant* gains in reading comprehension. These gains were maintained at follow up with the OL group, showing further significant improvement. At the end of the intervention OL and COM groups improve in taught words. For the OL group, the improvement in vocabulary was generalised to untaught words as well.

(*Continues*)

Table 1. (Continued)

Study	Study design	Participants	Targeted skill(s)	Intervention	Outcome measure(s)	Results
Clipson-Boyles (2000)	QED with (1) matched time group where same time as Catch Up Literacy was allocated without a clear framework or guidance and (2) a control group Pre- and post-test with standardised assessment instruments	*n* = 48 (17 Catch Up Literacy, 14 matched time, 14 control) Age 7–8 (Y3)	Reading skills (not clear which reading skills)	Catch Up Literacy Small group and one-to-one Duration 10 weeks 1 × 10 min individual & 1 × 15 min group	Reading age ➔ Hodder Reading Progress Literacy Baseline Test Ratio gain	Children in Catch Up Literacy showed the biggest gains in reading age followed by the matched time group. The gains between the three groups were *statistically significant*. Catch Up Literacy was more effective than teachers' own interventions.
Cockerill et al. (2021)	RCT Pre- and post-test with standardised assessment instruments	*n* = 101 (52 control) Age 7–10 (Y3 and Y5) Good decoding but limited/poor reading comprehension and vocabulary skills	Vocabulary (tier 2 vocabulary, 5 new words per week) ➔ aim is to improve reading comprehension	Small group Duration approx. 20 weeks (min 12 weeks) 15–20 min per session Minimum 3 times per week, optimal daily	Reading accuracy ➔ NGRT Sentence completion subtest Reading comprehension ➔ NGRT Passage comprehension subtest NGRT Overall reading score (calculated from the above two)	*Statistically significant* gain observed for reading accuracy, reading comprehension and overall reading in experimental group
Horne (2017)	RCT Pre- and post-test with standardised assessment instruments	*n* = 38 (control 19) Age 7–11	Reading comprehension	Comprehension Booster Computer-based Duration 6 weeks School A 1 × 30 min/week, School B 2 × 30 min/week	Reading comprehension Reading accuracy Reading rate NARA II used for assessing all outcomes	For the experimental group *significant* effects of the intervention were found for reading comprehension and accuracy but not reading rate. School B showed *significantly bigger gains* then School A.

(*Continues*)

Table 1. (Continued)

Study	Study design	Participants	Targeted skill(s)	Intervention	Outcome measure(s)	Results
Messer and Nash (2018)	RCT Pre- and two post-tests with standardised assessment instruments	*n* = 78 (33 control) Age 7	Decoding PA	Computer-based Duration 10 months where only the experimental group received the intervention then another 6 months where both groups received the intervention 10–15 min per session 2–3 times per week	Decoding ➔ TOWRE PA & Naming speed➔ subtests from PhAB Phonological short-term memory & Executive loaded working memory ➔ two subtests from WMTB-C Nonverbal intelligence ➔ BAS II Matrices Scale	*Statistically significant* gain was observed for all the outcome measures at the end of the 10 months for the experimental group. Longer intervention is more effective than shorter one.
Miller et al. (2012)	RCT Pre- and post-test with standardised assessment instruments	*n* = 512 (249 control) Age 8–9	Reading comprehension (paired reading) – through a relatively unstructured (non-specialist) volunteer mentoring programme	Time to Read One-to-one Duration 1 school year 2 × 30 min/week SHORS	Decoding ➔ GNRT Reading rate, accuracy, fluency and comprehension ➔ GORT Reading confidence & enjoyment (secondary outcomes) ➔ ERAS & RSPS	*Significant* gain in decoding, reading rate and reading fluency was observed in the experimental group. *No difference* between groups was observed for reading comprehension, reading confidence and enjoyment of reading.

(*Continues*)

Table 1. (Continued)

Study	Study design	Participants	Targeted skill(s)	Intervention	Outcome measure(s)	Results
Moir et al. (2020)	QED, group allocation at school level Pre- and post-tests with standardised assessment instruments	*n* = 74 (38 control) Age 9–10	Reading comprehension	Whole class, small group or individual (as appropriate) Duration 8 weeks 4 × 45 min/week	Reading comprehension ➔ WAIT II RC Scale Decoding (of target words) ➔ WAIT II target words Children's reading strategies ➔ self-reports	*Statistically significant* gains were observed in reading comprehension as well as the secondary outcomes of decoding and the strategies children used while reading for experimental group.
Moore et al. (2005)	QED, group allocation at class level, Pre-, post-test and follow up (at 6 weeks) with standardised assessment instruments	*n* = 30 (12 control) Age 8–10 (Y4)	PA	Phonomena Computer-based Duration 4 weeks 3 × 30 min/week	PA skills (alliteration, rhyme, Spoonerism, non-word reading) ➔ PhAB Word discrimination ➔ MindWeavers WDT	*Statistically significant* gains were observed in PA and word listening skills in the experimental group. These gains were sustained at 6 weeks follow up.
Nicolson et al. (2000)	QED, matched on reading and chronological age Pre- and post-tests with standardised assessment instruments	*n* = 92 (36 traditional support, 16 RITA, 45 control) Age 7–8 (Y3)	Decoding	RITA Computer-based Duration 10 weeks 2 × 30 min/week	Reading standard score, spelling standard score and literacy standard score ➔ WORD Reading and Spelling Tests	The RITA group showed *significantly* more progress compared with controls and showed *similar results* compared with the traditional support group.
O'Connor and Solity (2020)	QED Pre- and post-tests with standardised assessment instruments	*n* = 6 (3 control group) Age 8–9 (Y4)	Decoding Vocabulary	Optima Reading Small group Duration 6 weeks 3 × 20 min/week	Reading accuracy (single word reading) ➔ BAS 3 Reading comprehension ➔ YARC	The experimental group showed improved performance in reading accuracy. Both groups performed less well on reading comprehension post-intervention.

(*Continues*)

Table 1. (Continued)

Study	Study design	Participants	Targeted skill(s)	Intervention	Outcome measure(s)	Results
See et al. (2015)	RCT, random allocation at school level Pre- and post-tests with standardised assessment instruments	*n* = 385 (204 control) Age 10–11 (Y6)	Phonics Reading fluency Reading comprehension	Response-to-Intervention (RTI) Whole class, small group or one-to-one depending on child's needs Last term of school year Number and length of the session varied between schools	Overall NGRT reading score (calculated based on reading accuracy and comprehension)	Results suggests that RTI had a positive effect on reading accuracy and comprehension in the experimental group.
See et al. (2017)	RCT Pre- and post-tests with standardised assessment instruments	*n* = 1337 (678 control) Age 7–9 (Y3&Y4)	Vocabulary ➔ but the aim is to improve reading comprehension	Whole class (as part of the literacy class) Duration 1 school year 2 × 45 min/week	Reading Comprehension ➔ PiE scores	The result *showed no discernible difference* in reading comprehension between the control and experimental groups.
Topping et al. (2012)	Quasi-RCT multiple conditions based on (1) same-age tutoring vs cross-age tutoring, (2) intensive vs light and (3) maths & reading vs only reading Pre- and post-tests with standardised assessment instruments	Macro-evaluation *n* = 3520 Year 1 micro-evaluation *n* = 592, year 2 micro-evaluation *n* = 591, control *n* = 240 Age 8 or 10 (P4/Y3 or P6/Y5)	Reading accuracy (Reading support was provided alone or combined with Maths)	Paired Reading Peer tutoring (same-age or older peers) One-to-one 30 school weeks (over 18 months) Intensive condition 3 × 30 min/week Light condition 1 × 30 min/week	Macro-evaluation ➔ PIPS (assessing reading, vocabulary and nonverbal ability) Micro-evaluation; In Year 1 ➔ Group Reading Test & Primary Reading Test In Year 2 ➔ Suffolk Reading Test	There were *significant* gains in reading attainment for cross-age tutoring. Light and intensive tutoring were equally effective. Tutoring reading and maths together was more effective than tutoring only reading.

(*Continues*)

Table 1. (Continued)

Study	Study design	Participants	Targeted skill(s)	Intervention	Outcome measure(s)	Results
Yuill (2009)	QED with 2 conditions based on reading comprehension skill (poor vs better) Pre- and post-tests with standardised assessment instruments	*n* = 48 (12 poor comprehender, 12 better comprehender, 24 control) Age 7–9	Reading comprehension by focusing on semantics and ambiguity in joke riddles	Computer-based, children worked in pairs – a poor comprehender was paired with a better comprehender Duration 2 weeks 3 × 20 min sessions in total	Reading accuracy and comprehension ages ➔ NARA	*Statistically significant* gains were observed in reading comprehension scores in the experimental group. There was *no significant* difference between the gains of poor and better comprehenders, and the comprehension age of the 'poor' comprehenders was now above average

Table 2. Description and summary of studies without a typical school instruction control group.

Study	Study design	Participants	Targeted skill(s)	Intervention	Outcome measure(s)	Results
Bowen and Yeomans (2002)	QED, no control group Pre- and post-test with standardised assessment instruments	*n* = 43 Age 7–9 Children at risk of reading failure	Decoding Reading comprehension	ENABLE-plus Small group of 3 and one-to-one Duration School A 5 months, School B 10 months 1.5 h/week (2 × 30 min group & 1 × 10 min individual)	Reading age (decoding) ➔ word reading subtest from BAS II Ratio gain (to account for the different duration in different settings)	2 children no progress 29 children made accelerated progress (the increase in their reading age was more than the increase in chronological age)
Dixon et al. (2020)	QED, no control group Baseline, pre- (6 weeks after baseline), post-test and follow up (at 6 months) with a bespoke assessment	*n* = 12 Age 8–9 (Y4) Children with EAL	Vocabulary (tier 2 vocabulary, 2 new words each week)	One-to-one Duration 10 weeks 1 × 25 min/week	Vocabulary ➔ bespoke measures	Children showed *statistically significant* gains in knowledge of taught words, and this was largely retained six months later
Duff et al. (2008)	QED, no control group Baseline, pre- (6 months after baseline), post-test and follow up (at 6 months) with standardised and bespoke assessment instruments	n = 12 Age 8 (Y3) Poor readers with severe and persisting difficulties who previously responded poorly to intervention	Reading (story reading accuracy) PA Vocabulary	One-to-one Duration 9 weeks Daily, 2 session of 15 min – one targeting reading and one vocabulary	PA skills ➔ Three subscales from Sound Linkage Test of Phonological Awareness, CNRep Vocabulary➔ WASI vocabulary subtest, bespoke measures Word reading ➔ BAS II word reading test	Even though children's reading was still below average at the end of the intervention, it facilitated gains in reading accuracy, PA and language skills which were maintained 6 months later

(*Continues*)

Table 2. (Continued)

Study	Study design	Participants	Targeted skill(s)	Intervention	Outcome measure(s)	Results
Holmes et al. (2012)	QED, no control group, Pre-, post-test and follow up of a subgroup (n = 186) of children with standardised assessment instruments	n = 3134 (who received Catch Up Literacy between 2002 and 2010) Mean age 7	Reading accuracy Reading comprehension	Catch Up Literacy One-to-one Duration on average 7 months – data were collected over 10 years and different schools started at different times and durations 2 × 15 min/week	Reading Age (combined for accuracy and comprehension) ➔ Salford Sentence Reading Test Ratio gain (to account for the different duration in different settings)	Children who received Catch Up Literacy intervention 2.5 as much gain over time compared with the passage of time alone
McGee and Johnson (2003)	QED – 2 × 2 between subject design based on (1) reading comprehension skill level (2) inference training vs comprehension exercises, no control group Pre- and post-tests with standardised assessment instruments	n = 40 (10 in each condition) Age 7–10	Reading comprehension	Small group of 5 Duration 3 weeks 2 × 20 min/week	Reading comprehension age ➔ NARA	Both interventions benefited both groups. The best result was seen in less skilled comprehenders who received inference training. Inference training resulted in greater improvement in both skilled and less skilled readers
			Vocabulary	Small group of 6		

(*Continues*)

Table 2. (Continued)

Study	Study design	Participants	Targeted skill(s)	Intervention	Outcome measure(s)	Results
Nash and Snowling (2006)	QED with 2 conditions; teaching using definitions and deriving meaning from text, but no control group Pre-, post-test and follow up (at 3 months) with standardised and bespoke assessment instruments	*n* = 24 (12 in each condition, assigned in a closely matched pair) Age 7–8 (Y3) Poor language/ vocabulary		Duration 6 weeks 2 × 30 min/week – in each block 1 new word (either a noun or a verb) was introduced	Reading comprehension ➔ NARA II & 2 bespoke passages containing the taught words Vocabulary ➔ bespoke measure	Both groups improved equivalently in vocabulary for taught words, but the context group showed *significantly better* expressive vocabulary knowledge at follow up. They also showed *significantly better* comprehension of text
Raspin et al. (2019)	QED, no control group Pre- and post-tests with standardised assessment instruments	*n* = 33 Mean age 11 Looked after children in KS2	Reading accuracy Reading comprehension	ARROW Computer-based Duration 3–4 weeks (6–10 sessions in total) 30 min per session	Reading and spelling raw score & reading age ➔ Schonell Reading and Spelling Tests Ratio gain	Children made measurable gains (the increase in their reading/spelling age was more than the increase in chronological age) in reading and spelling
Vincent (2020)	QED, no control group, Pre- and post-tests with standardised assessment instruments	*n* = 16 (3 of the participants in Y2) Age 6–11 (Y2–Y6)	PA Decoding	Nessy Reading and Spelling Computer-based Duration 5 weeks 20–25 min, daily	Reading and spelling age ➔ Schonell Reading and Spelling Tests	Except for a Y4 child whose spelling score dropped, children's post-intervention reading and spelling ages increased. Older children showed more improvement than younger children

studies ($k = 7$), the intervention was delivered in small groups of two to six children. Three of the interventions that were delivered in small groups provided additional one-to-one sessions (Bowen & Yeomans, 2002; Clarke et al., 2010; Clipson-Boyles, 2000). In five of the studies, the intervention was delivered on a one-to-one basis, and in two of the studies, the intervention was delivered to the whole class. In one of the studies where the intervention was delivered to the whole class, the delivery could also be adjusted to small group or one-to-one depending on children's needs (Moir et al., 2020). In the majority of the studies ($k = 21$), the interventions were implemented by trained school staff, but they were also implemented by trained university students ($k = 1$; Dixon et al., 2020), peer tutors ($k = 1$; Topping et al., 2012) and nonspecialist volunteer mentors ($k = 1$; Miller et al., 2012).

Results of the current analysis suggest that interventions supporting struggling readers in KS2 in the UK have been researched over the last two decades with a varying degree of quality. For instance, some of the included studies reported issues with fidelity in the participant selection process where schools included children who were not eligible to the experimental group (See et al., 2015), issues with implementation due to software-related problems (Biggart et al., 2015) or teachers/schools having varying degrees of implementation fidelity (Moir et al., 2020; See et al., 2015), as well as, high attrition rates above 25% across different schools (Messer & Nash, 2018; See et al., 2015) or whole school attrition (where 15 out of 21 schools left the study; Biggart et al., 2015). Despite variation in the nature, duration, structure and quality of the implementation, most intervention programmes demonstrated positive effects on children's reading skills in terms of reading accuracy, vocabulary and/or reading comprehension, where out of 24 studies only three reported no improvement or improvement similar to the control group in participants' reading skills at the end of the intervention.

Discussion

The current scoping review evaluated the interventions aiming to support the needs of struggling readers in KS2 in the UK. Even though the field has been dominated by small-scale studies, research conducted in the last two decades shows promising results. The positive results from 21 out of 24 studies suggest that by providing some type of intervention, the reading needs of struggling readers in later primary years can be successfully supported. However, there was no single approach that has been more prominent or more successful than others. A recently conducted US-based review advocates for multicomponent interventions that focus on both word reading and reading comprehension skills (Donegan & Wanzek, 2021). Even though in the current review, a quarter of the included studies were multi-componential, we could not reach the same conclusion, due to the smaller, and more fragmented body of evidence reviewed here.

More specifically, one reason that made it difficult to compare study outcomes is that their reported outcome measures were very varied. Some studies reported a change in reading ages and ratio gains while others reported a change in reading scores using a standardised measure. Also, only two thirds of the included studies reported effect sizes, which posed another challenge in comparing the educational impact of different interventions. However, if the interpretation of effect sizes follows that of Cohen (1988), where 0.2 is considered small, 0.5 is considered medium, and 0.8 is considered a large effect, studies that reported an effect size had mostly medium to large effect sizes, that is, children showing substantial improvement in the targeted skill(s) at the end of the intervention.

In terms of intervention characteristics, there was no clear trend regarding the delivery method of the intervention; however, whole-class interventions were less common. Similarly, there were no clear trends regarding the intensity of the intervention or the skills that interventions focused on. This lack of trend could be a reflection of the varied needs of older struggling readers (Vaughn et al., 2008). Having evidence-based interventions with different intensities, delivery methods and target skills allows practitioners to find the most suitable intervention for a range of readers as interventions that are tailored to the needs of individual children can yield better results (Denton et al., 2013).

Most studies in this review focused on lower KS2 ages. Only three studies focused on the upper KS2 (Years 5–6; ages 9 to 11). All three of these studies targeted children in the final year of primary school; however, only two of them, both multi-componential, yielded significant results. The most robust study that saw literacy gains (measured via reading accuracy and comprehension) was an RCT (See et al., 2015) that targeted children's phonics, reading fluency and reading comprehension skills. In a much smaller scale QED, Raspin et al. (2019) trialled a computer-based intervention supporting reading accuracy and reading comprehension skills, which yielded improvements in reading and spelling accuracy, although comprehension was not explicitly measured in this study. Nonsignificant results were reported by Biggart et al. (2015) who trialled a computer-based intervention, supporting reading comprehension, that was originally developed in the US for 6 to 7 years old children; a process evaluation of the intervention and feedback from the teachers and children suggested that the intervention might have been more suitable for a younger age group. This finding and the low number of available studies that focus on upper KS2 ages highlight the importance of age-appropriate support that will not diminish as children get older but rather adapt developmentally, in form and content, to the increasing demands of reading in advanced school years.

A quarter of the studies in this review had follow-up assessments. Although the size of the effect reduced by the time of the follow-up, (Dixon et al., 2020; Duff et al., 2008), it was observed in differing degrees in different conditions (Clarke et al., 2010) or was no longer observed in all skills (Nash & Snowling, 2006), these studies suggest that intervention impact can be long lasting. Given that considerations for the long-term effectiveness of interventions are crucial when choosing an intervention and that the immediate effectiveness of an intervention does not always translate to long-term impact, it is important for more studies to include follow-up assessments.

Seven studies reported attrition rates and/or information regarding the fidelity of implementation. Three of these studies reported no concerns, suggesting that the interventions could be implemented in the way they were designed. However, four studies reported issues that might impact their rigour, such as high attrition rates and fidelity issues in participant selection and implementation of the intervention. These studies also acknowledged the impact such issues might have had on their results. For instance, See et al. (2017) adapted a US-based vocabulary intervention with little success. While the mixed evidence base behind the approach they used could be the reason behind the nonsignificant results, the authors also reported that some schools had poor quality of implementation – this, too, could have reduced the intervention's potential to have a positive effect. Fidelity of implementation in interventions has been shown to have a significant impact on outcomes (Durlak & DuPre, 2008) and can be multifaceted, including factors such as adherence, dosage and quality of delivery (Troyer, 2017). Given this potential impact, which can increase when interventions are scaled up (Combs et al., 2022), it will be important to see more studies measuring and reporting implementation fidelity and attrition rates.

Limitations and Implications for Future Research

The most significant limitation of this review is its narrative nature. The analysis in this review is less structured than it would have been in a meta-analysis, which reduces the ability to infer clear conclusions on what works best in supporting struggling readers in KS2 in the UK. More detailed exposition that would allow for clearer conclusions on what works best in terms of intensity, group size and targeted skills is needed. However, first, more experimental research with robust research designs that include control groups, randomisation, reports fidelity of implementation and attrition rates, and considers the unique cultural and educational context of the UK is required.

While the current work identified three studies with nonsignificant results, which can provide critical insights into the potential barriers influencing the success or failure of intervention implementation and adaptation in the UK, it is crucial to recognise the broader issue of under-reporting of nonsignificant results, known as the file drawer problem (Rothstein, 2008). This may skew the overall understanding of what works and what does not work in the UK and elsewhere. Future research could proactively combat the file drawer problem by actively searching for grey literature, which can provide valuable insights into interventions that might not have been highlighted in traditional publication channels. This can enhance the comprehensiveness and robustness of the evidence base.

Regarding implications for the future, the findings of this review are an important reminder that despite a shared international evidence base concerning the core components of reading skill in childhood and how they develop, including anglophone models such as the Simple View of Reading (Gough & Tunmer, 1986) and Scarborough's Reading Rope (2001), as well as consensus on best practice for early reading instruction (see Structured Literacy, e.g., Spear-Swerling, 2019), the international evidence base for instructional practice in the later primary years is currently more heterogeneous. While the predominantly US-focused review of Donegan and Wanzek (2021) reported on many multi-componential intervention programmes for this age group, this UK-based review suggests an intervention landscape where the focus of any one programme is typically narrower. There may be merits to both approaches for different profiles of struggling readers; however, with the evidence base in this review also at a relatively early stage of the evidence pipeline (spanning pilot studies through to large-scale effectiveness RCTs), this comparison cannot be systematically made.

Conclusion

This scoping review described the characteristics of 24 reading interventions that aimed to support the reading needs of struggling readers in KS2 in the UK. The results of this review are far from conclusive, but at least three points are clear. First, the findings indicate a promising number of different interventions, most of which demonstrated positive outcomes in terms of an improvement in the targeted reading skill(s) at the end of the intervention. This suggests that with adequate support these children's reading skills can improve and maybe even catch up to their peers.

Second, due to the wide range of intervention and research designs, we cannot advocate for a particular intervention. This shows that there is still an urgent need for more studies investigating the support provided to struggling readers in KS2 in the UK with rigorous

design and larger sample sizes. Finally, most studies were conducted on the lower KS2 ages; however, support should be provided to a similar degree to all ages across KS2. Based on the studies conducted in upper KS2, multi-componential interventions seem to yield positive results in this age group. However, given the very small number of studies, a clear conclusion cannot be drawn.

Our review aims to send a positive message to practitioners and policy makers, that is, positive outcomes can be seen when struggling readers in KS2 receive evidence-based interventions that are suitable to their needs.

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The authors report no conflict of interest.

Data availability statement

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