

# Effectiveness of Spelling Interventions for Learners with Dyslexia: A Meta-Analysis and Systematic Review

eTale 2022



This systematic review and meta-analysis investigated the efficacy of spelling interventions for the remediation of dyslexia and spelling deficits. Results show that treatment approaches using phonics and orthographic and morphological instruction had a moderate-to-high impact on spelling performance.

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Source: Galuschka, K.; Görgen, R.; Kalmar, J.; Haberstroh, S.; Schmalz, X.; Schulte-Körne, G. (2020). Effectiveness of spelling interventions for learners with dyslexia: A meta-analysis and systematic review. *Educational Psychologist*, 55(1), 1–20. DOI: 10.1080/00461520.2019.1659794

This systematic review and meta-analysis investigated the efficacy of spelling interventions for the remediation of dyslexia and spelling deficits. The study included 34 controlled trials that evaluated spelling interventions in

children, adolescents, and adults with dyslexia and spelling deficits. Results show that treatment approaches using phonics and orthographic and morphological instruction had a moderate-to-high impact on spelling performance. Significant influence of interventions that teach memorisation strategies to improve spelling could not be confirmed.

- Learning to spell is a challenging task.
- In most alphabetic orthographies, spelling skills are more difficult to acquire than reading skills.
- Difficulties with spelling (such as adding, omitting, or substituting letters or graphemes in written words) are a common indicator of specific learning disorders and a core characteristic of dyslexia.
- The term dyslexia refers to a pattern of learning difficulties characterised by problems with word recognition, decoding, and spelling.
- Poor spelling is an obstacle for text production in the same way that difficulties in word recognition are an impediment for reading comprehension.
- Spelling not only affects writing and compositional skills but is also closely linked to reading.
- In some phases, spelling is essential for reading because it trains phoneme awareness and the alphabetic principle. In other phases, reading boosts spelling because reading exposure leads to a richer lexicon of orthographic representations.
- Phonological awareness skills and the ability to segment spoken words into phonemes is an important precursor to reading and spelling acquisition.
- It is not surprising that phonological awareness interventions (including oral tasks for recognising phonemes within words, blending phonemes into words, segmenting a word into phonemes, eliminating a phoneme from a word, or adding a phoneme to a word) are often implemented to foster spelling and reading skills.
- Knowledge of phoneme–grapheme and grapheme–phoneme

correspondences make up a self-teaching mechanism, which supports the acquisition of orthographic skills and fosters sight word reading (direct retrieval of phonology and semantics associated with a given written word form from the orthographic lexicon).

- Because of the strong influence of phoneme–grapheme and grapheme–phoneme correspondence skills on reading and spelling ability, research on reading and spelling instruction and intervention has predominantly focused on the acquisition of this fundamental knowledge.
- Such treatment approaches are often referred to as phonics interventions.
- Interventions that aim to help children with dyslexia and spelling deficits deal address the deviations from one-to-one mappings between phonemes and graphemes and provide explanations for these deviations by explicitly teaching morphological or orthographic knowledge.

### **Morphological knowledge**

- This refers to awareness of the smallest meaningful language units.
- Morphological interventions for younger children often include the practice of inflections, whereas morphological interventions for older children often focus on derivations.

### **Orthographic knowledge**

- This refers to understanding of the orthographic rule system that allows correct writing in terms of rules and patterns of written language.
- Interventions that foster orthographic skills mainly focus on graphotactic and phonological–orthographic regularities.

## Orthographic depth

- This is generally conceptualised as orthographic consistency: the presence of more than one pronunciation for a given letter or cluster of letters, or the presence of multiple spellings for one phoneme.
- Consistency thus measures the extent of adherence to the alphabetic principle, which varies greatly between orthographies.
- The Finnish language has been shown to be on the 'consistent' end of the orthographic consistency continuum, both in reading and spelling direction.
- English is on the opposite end of this continuum.
- The higher the number and complexity of rules, the number of exceptions, and sources of inconsistency of an orthography, the more difficult it is to impart this knowledge and to use it for the remediation of spelling deficits.
- For interventional research on spelling, it is important to know if there are treatment approaches that are less effective in one orthography than in another.



## The present study

The purpose of the present review and meta-analysis is to extend the current knowledge about the effectiveness of spelling treatment approaches on reading and spelling performance of learners with dyslexia and spelling deficits.

### *Hypotheses:*

1. *Overall, it is expected that spelling intervention is effective.*

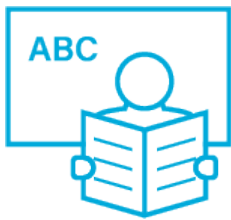
2. *It is expected that the effects are significant for phonics, orthographic, or morphological instructions.*
3. *It is expected that more severely impaired dyslexics would benefit more from a phonics approach compared to an orthographic or morphological intervention, and the efficacy of phonics instruction will decrease with age.*
4. *It is expected that for more consistent orthographies, the effect of spelling interventions on reading and spelling would be larger than for inconsistent orthographies.*



## **Findings**

- Of the studies evaluated, 34 met the inclusion criteria.
- In these 34 studies, the following treatment approaches were implemented: phonics intervention (n = 8), morphological intervention (n = 10), orthographic intervention (n = 7), memorisation intervention (n = 5), audio-visual cue intervention (n = 1), supportive software (n = 2), and assisted writing (n = 1).
- Results of a meta-analysis of 28 quantitative studies showed significant effect sizes of phonics, morphological, and orthographic interventions for reading and spelling outcomes.
- Effect sizes for spelling outcomes were substantially larger than for reading outcomes.
- In addition, a large and significant mean effect size for spelling outcomes was found for studies evaluating supportive software.
- The effectiveness of phonics interventions tended to decrease with age, and the effectiveness of morphological interventions tended to increase with age.

- The efficacy of phonics interventions decreased with increasing severity, whereas the efficacy of orthographic and morphological interventions increased with increasing severity.
- Interventions conducted in the classroom tended to show a smaller mean effect size than those interventions implemented in group or individual settings.



## Conclusions

- It was found that spelling interventions are effective: Learners with dyslexia or spelling deficits who take part in a spelling intervention show better reading and spelling performance compared with children who received regular school practice or no spelling instruction.
- Mean effect sizes for spelling instructions involving phonics, orthographic, and morphological interventions are significantly greater than zero.
- It was not found that phonics instruction is more effective than morphological interventions in the early years of formal literacy instruction or for more severe spelling deficits.
- It seems likely that phonics and morphological and orthographic interventions are applicable across a wide age range.
- It is argued that graphotactic and orthographic-phonological spelling rules, as well as morphological instruction, should be provided as soon as children master the basic phoneme-grapheme and grapheme-phoneme mappings and are confronted with text material for which the basic phoneme-grapheme and

grapheme–phoneme mappings would lead to spelling and reading mistakes.

- Support was not found for the hypothesis that with increasing orthographic consistency, the intervention effects would increase.
- The analysis revealed moderate effect sizes on spelling performance for interventions that were implemented in group settings, indicating that intervention in small groups could be an efficient alternative to individual instruction.