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Decoding intervention for L2 students in Sweden: A single-subject design study

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Abstract

Many second language (L2) students in Sweden struggle with reading in Swedish. There needs to be more research on how L2 students with weak word decoding skills in Swedish could be individually supported. Therefore, the current study examined the impact of a systematic and intensive word decoding intervention in Swedish among individual L2 students identified as having a risk of reading difficulties in Grade 3. A multiple-baseline single-subject design study was conducted with three L2 students with Arabic or Dari as their first language. They were provided a word decoding intervention with Bravkod. All three students improved their decoding during the intervention phase. They decoded several words in a given time (NAP=0.96-1.00) and decreased their word decoding errors (NAP=0.91-0.98). The results are promising but should be replicated to be considered evidence-based and suitable for L2 students to improve their decoding in Swedish.

Keywords: decoding, bilingual education, instructional intervention, Swedish

For academic achievement, basic reading skills are critical to developing in the early school years (Arnold & Doctoroff, 2003; Herbers et al, 2012). Reading has social and democratic values; therefore, UNESCO (2018) has highlighted reading as an important development goal.

Nevertheless, a significant number of young students find learning to read demanding, and it can be extra challenging for students with another first language (L1) than the school language (Abedi & Gándara, 2006). Reading failures can, in the long run, lead to poor academic achievement (Pluck, 2018). Therefore, early support and evidence-based reading education are essential for students to reduce their risk of reading failure (Snowling & Hulme, 2011). Thus, research on reading education for students with another L1 than the school language is more limited than for L1 students (Grabe, 2014). Consequently, there is a need for more studies on developing reading in second language (L2) students (August & Shanahan, 2006; Hall et al, 2019). Therefore, the current study examined the impact of a systematic and intensive word decoding intervention in Swedish among individual L2 students identified as having a risk of reading difficulties at the end of elementary school level Grade 3.

Theoretical Frameworks

In early reading education, great emphasis is placed on the students learning to read individual words (Bus & Van IJzendoorn, 1999). The older the students become, the more emphasis is placed on their reading comprehension (Oakhill et al, 2014). According to the theoretical model Simple View of Reading, reading comprehension is explained as a product of decoding and linguistic comprehension (Gough et al, 1996). Therefore, decoding and linguistic comprehension must be practiced, making it possible for the students to reach good reading comprehension. Decoding requires knowledge of the alphabetic system and the insight that sounds are represented by print. The skilled decoder must connect phonemes to graphemes and decode isolated words quickly, accurately, and without effort. In addition, linguistic comprehension, i.e., understanding single words, sentences, and different spoken discourses, affects the student's reading comprehension.

A proficient reader can effortlessly read words from memory through a swift glance or visual recognition, commonly called sight word reading. The progression of sight word reading has been delineated into four distinct phases by Ehri (2005), with the possibility of a new phase emerging even if a preceding phase has yet to be entirely mastered. In the pre-alphabetic phase, the reader relies on visual or contextual cues to decode a word. During the partial alphabetic phase, the reader utilizes the phonetic values of certain letters and recognizes the association between spelling and pronunciation to comprehend words. Advancing to the full alphabetic phase, the reader becomes proficient in decoding unfamiliar words, possessing knowledge of all graphemes and phonemes required for decoding. Finally, in the consolidated alphabetic phase, graphphonemic and morphographic units and sight words are established in memory. To further develop reading comprehension, the reader must develop automaticity and speed in sight word reading.

L2 Word Decoding Intervention

As a theoretical model, the Simple View of Reading has been supported in empirical research among L1 students (Gustafson et al, 2013; Tilstra et al, 2009) and L2 students (Verhoeven & van Leeuwe, 2012). The model is reported to explain successful reading and reading difficulties in both L1 and L2 students (Gottardo & Mueller, 2009; Jeon & Yamashita, 2014; Sparks, 2019). Recent research findings showed that L2 linguistic comprehension and L2 decoding skills

accounted for a 50% variance in L2 reading comprehension among L2 students (Lee et al, 2022). According to Lipka and Siegel (2012), linguistic comprehension will play a more critical role when word decoding becomes fluent and efficient. They also claim that the underlying reading comprehension skills seem similar among L1 and L2 students. Those who struggle with decoding will have limited cognitive resources for reading comprehension (Cain & Oakhill, 2006). Therefore, fluent word decoding is necessary (Lipka & Siegel, 2012). Furthermore, fluency in word decoding is shown to be a significant predictor of reading comprehension for L2 students in elementary school Grades 1 and 2 (Huo et al, 2021). Consequently, beginning readers with poor word decoding usually will fall behind in reading comprehension (Elbaum &Vaughn, 2003; Snow et al, 1998).

According to previous research, the Simple View of Reading can also be applicable to reading interventions (Gottardo & Mueller, 2009; Jeon & Yamashita, 2014; Sparks, 2019). It can explain the importance of promoting word decoding skills among struggling readers in early reading education. Research on developing L2 students' word decoding has previously been investigated, and several studies have included word decoding as a part of reading intervention programs with positive results, varying between small and large effect sizes (d = 0.27-1.81)[1] at post-test (Chu & Chen, 2014; Cirino et al, 2009; Nelson et al, 2011; Vadasy et al, 2015; Vaughn et al, 2006).

In general, intensive interventions on word decoding are reported to be closely matched to the needs of the L2 students (for an overview, see Rivera et al, 2009). In addition, as a result of a meta-analysis, Ludwig et al (2019) found that different reading interventions for L2 students with another L1 than English had a large effect on reading accuracy (d = 1.2) and reading fluency (d = 0.8), which referred to the students' skills to decode words correctly and fluently. However, Ludwig et al did not specifically investigate word decoding interventions. Still, Hall et al (2019) review findings revealed that early reading education for L2 students with learning disabilities is beneficial when it includes word decoding instruction.

Single Subject Design in Special Education

Although experimental and quasi-experimental studies on reading interventions have demonstrated large effect sizes on word decoding skills (Hall et al, 2019; Ludwig et al, 2019), the effect for the individual student may vary and be small (Cakiroglu, 2012). In experimental and quasi-experimental studies, the effect size is presented as an average effect of an intervention; therefore, some students may particularly benefit from the intervention, and others may not. Consequently, the results might reflect intervention effects that are impossible to obtain among individual L2 students. Therefore, Cakiroglu argued that studies with a single-subject design offer the possibility of following the development of each student. With such a design, it is possible to clarify whether the intervention is suitable for some students and not for others (Gersten et al, 2005). In addition, it is also possible to compare each student's performance before and during an intervention, which makes it appropriate for special education research and can be implemented in natural educational settings (Alnahdi, 2015). The single-subject design has also been used to explore the impact of reading interventions on students' decoding skills,

[1]Cohen's d: 0.2 should be considered a small effect size, 0.5 a medium effect size and 0.8 a large effect size.

and according to Kim et al (2020), the mean weighted effect size for word decoding is large in single-subject design studies (Improvement Rate Difference = 0.83). There are few single-subject design studies among L2 students in elementary school, yet the results are promising. For example, Sperling et al (2019) showed an increase in word decoding in German among L2 students (percentage of non-overlapping data (PND)[2] [PND = 100%] in all three cases). Similarly, L2 students are reported to have increased word decoding in English (Dussling, 2018). According to Dussling, the largest gains were obtained by L2 students who started with the lowest pre-test scores, and Gan et al (2019) reported successful results for one student in English (PND = 100%).

The Swedish Context

Swedish is a language spoken by approximately 10 million people and belongs to the Germanic languages (Swedish Institute, 2023). The Swedish alphabet consists of 29 letters, and 26 of them come from the basic Latin alphabet. There are 20 consonants and 9 vowels. Compared to English, the Swedish orthography is shallower, and the grapheme-phoneme correspondence is more consistent (Seymour et al, 2003).

The proportion of students born abroad or with at least one parent born abroad in Swedish schools is 27% (Swedish National Agency for Education, 2023). These students generally have Swedish as a second language. L2 students in Sweden can follow the curriculum for Swedish either as a first or second language based on their individual needs. Teaching Swedish as a second language is based on a second language perspective. In Swedish and Swedish as a second language, the connection between sound and letter, and strategies for word decoding, are pinpointed in elementary school Grades 1-3. However, in Swedish as a second language, the direction of reading and the connection between sounds and letters in contrast with other languages the student knows are highlighted (Swedish National Agency for Education, 2022). L1 and L2 students in Grades 1-3 are often taught together in the same classroom, and the teachers in Grades 1-3 are educated to teach Swedish both from a first and a second language perspective.

Both national and international evaluations have shown that L2 students in Sweden have weaker reading comprehension in later grades than L1 students (International Student Assessment [PISA], 2012, 2015, 2018; Progress in International Reading Literacy Study [PIRLS], 2011, 2016; Swedish National Agency for Education, 2022). A recent cross-sectional study of 46,000 young students in Sweden demonstrated that about 40% of the L2 students in Grades 1 to 3 had special needs in decoding (Fälth et al, 2023). These students need to be taught using evidence-based methods in order to be supported in the best way in their reading development. However, although international research has established positive and large effects of interventions to promote word decoding skills among L2 students, it is vital to consider their linguistic and cultural backgrounds (Ludwig et al, 2019). Individual L2 students might respond differently to word decoding interventions (Ludwig et al, 2019). Subsequently, identifying and evaluating decoding interventions in Swedish as a second language is crucial to promoting and supporting L2 students in Sweden.

[2] Percentage of non-overlapping data (PND): PND > 70% for effective interventions, PND 50% - 70% for interventions of questionable effectiveness, and PND < 50% for interventions with no observed effect.

Aim and Research Question

As previous intervention research on developing L2 students' word decoding has demonstrated positive results (Chu & Chen, 2014; Cirino et al, 2009; Nelson et al, 2011; Vadasy et al, 2015; Vaughn et al, 2006), the current study examined the impact of a systematic and intensive word decoding intervention in Swedish among individual L2 students identified as having a risk of reading difficulties at the end of elementary school Grade 3. The following research question guided the study:

Does a systematic and intensive word decoding intervention in Swedish effectively improve each L2 student's performance on measures of word reading in Swedish?

Method

We applied a multiple-baseline single-subject design for the current study, including baseline and intervention conditions across three participants (Ledford et al, 2018). In this type of experimental design, the intervention condition starts at different times (see Figure 1). When the baseline is stable, changes can be referred to as the intervention rather than environmental factors. We aimed to evaluate individual participants' variations, levels, and trends in developing word decoding skills during an intervention focusing on word decoding. The advantage of this design is that we do not have to withdraw the intervention for a period or consider reversal or repeated conditions (Cook et al, 2009). Consequently, it is a design suitable for investigating individual differences during a word decoding intervention, as reading is an ability that is not reversible (Cakiroglu, 2012). The participants were randomized to start at different times.

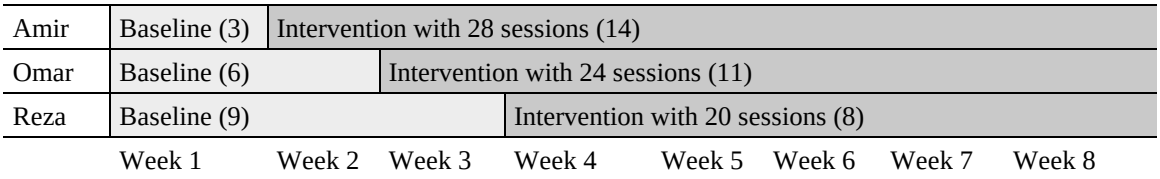

Figure 1
The Design of the Study with Baseline and Intervention phases.
Note: The number of measurements in baseline and intervention are presented in parentheses.

The study lasted eight weeks, and the total number of measurements was 17 for all three participants: Amir, Omar, and Reza. Following the multiple-baseline single-subject design, the participants had different numbers of baseline and intervention measurements, which can be seen in Figure 1. One participant (Amir) had 3 baseline measurements and 14 intervention measurements, whereas another participant (Omar) had 6 baseline measurements and 11 intervention measurements. The third participant (Reza) had 9 baseline measurements and 8 intervention measurements. For all participants, 3 baseline measurements were performed per week, meaning it took one, two, or three weeks for the three participants to complete the baseline measurements. Consequently, the intervention was offered to the participants between five and seven weeks, depending on how many baseline measurements the participants had performed.

Participants

The participants in the current study were recruited from a public elementary school in Sweden. The targeted participants were those students in Grade 3 who studied according to the syllabus in Swedish as a second language and were at risk for reading difficulties. The three male students had Swedish as a second language and studied according to the syllabus in Swedish as a second language. These three students struggled with reading. The teachers regarded them to need individualized support to develop word decoding, as the teachers knew the amount of text the students would need to read would increase in Grade 4 in Swedish schools. According to the teachers, these students could decode words but needed support to develop accurate and fluent reading. All three students agreed to participate after receiving information about the study. In addition, their parents provided written informed consent. We gave the students the pseudonyms of Amir, Omar, and Reza. The present study received ethical approval (reference number: 2018/606-32) from the Ethical Review Authority in Sweden.

None of the participating students was literate in their L1s. All three had neither letter knowledge in their L1s nor could they apply grapheme-phoneme correspondences or decode short single words. In Swedish as their L2, they knew all uppercase and lowercase letters and were confident applying grapheme-phoneme correspondences. They were also able to decode short, single words. Thus, their teachers identified them as at risk for reading difficulties. Amir was born in Syria. He had Arabic as his L1, and this was his strongest oral language. He came to Sweden when he was five years old. At the time of the study, Amir was nine years and seven months old. Omar was also born in Syria; Arabic was his strongest oral language and L1. He came to Sweden at five years old. Omar was nine years and nine months old when the study started. Reza was born in Afghanistan, and he had Dari as his L1. His dominant oral language was Swedish. He came to Sweden when he was four years old and was ten years and one month old at the starting point for the current study.

Setting

The study was conducted in an elementary school in Sweden. About 14% of the students at the school had another L1 than Swedish. The school had 16 teachers working with 14 groups of students. Additionally, a special education teacher supported teachers in meeting the needs of students in the classrooms and providing individualized support to students with special needs. A total of 379 students aged six to nine years attended the school. There were 43 students in Grade 3, and the participants in the study were three of those students.

Measures

Two Swedish standardized tests were used to obtain reliable information about the participants' word decoding skills, LäSt (Elwér et al, 2016) and Word chains (Jacobson, 2016). The students performed the tests individually during the baseline and intervention phases. Both tests are short and take about five minutes to complete.

The LäSt test (Elwér et al, 2016) consists of word lists with increasing difficulty and length (2 to 15 letters). The first 15 words consist of two letters: *du*, *le*, *sa* [*you*, *smile*, *said*], followed by words with an increasing number of letters, complexity, and consonant connections. On the last

level, there are words such as *gymnastiksal, instruktion, genomskinlig* [*SportsCenter, instruction, transparent*]. The LäSt test has two parts, A and B, including lists of individual words. The participating students were instructed to read the words aloud and as quickly as possible in 45 seconds for each part. Parts A and B were summed up, and the maximum score was 200. Test-retest reliability for decoding words for students in Grade 3 is $r = .93$. Also, the number of decoding errors was tallied.

In the Word chain test (Jacobson, 2016), the students were asked to silently read chains of words where the blank space between words had been removed. Students then marked each word boundary with a pencil as in the following exemplars: *hej/mat/snö* [*hi/food/snow*]. Each chain consists of three semantically unrelated words. At the beginning of the test, the words have 2 letters and are monosyllabic, and at the end, the words have 7 letters with two syllables and consonant connections *trafik/flik/stål* [*traffic/tab/steel*]. The task for the students was to mark as many chains as possible in two minutes. One chain gives one score if the student marks the words correctly. All results are reported in raw scores; the maximum score was 60. Test-retest reliability for students in Grade 3 is $r = .92$. The number of decoding errors was also tallied. The test aims to test the ability to decode single words and word recognition.

Intervention

A systematic and intensive intervention with the decoding program Bravkod (Karlsson, 2022) was used to develop the three students' word decoding. Bravkod is a decoding program in Swedish for students who need to automatize their word decoding skills. Bravkod includes a manual with instructions on using and adapting the program to individual students decoding (Karlsson, 2022). The manual guides the teacher in providing sessions that develop students' fluency and speed in decoding. However, when using Bravkod, the teacher must know and start from the individual student's decoding level. The teacher must also adapt the sessions according to the individual progression in decoding. The Bravkod program is structured by word lists that have increasing difficulty from single letter lists to syllables, frequent high words followed by a pattern of different vowels and compound words, which is common in the Swedish language, i.e., *lek-saks-tåget* [*toy train*], *nio-års-dagen* [*nine-year birthday*], *mat-sals-bordet* [*the dining room table*]. The student must decode a word correctly to continue with the following word in the list.

In the current study, all the intervention sessions were provided for each student individually, in addition to ordinary classroom teaching. Each session was planned to be 15 minutes, and the participating students should receive four weekly sessions. After each intervention session, the teacher wrote in an intervention protocol the lists each student read and how many minutes the session lasted. According to the intervention protocol, Amir received 28 intervention sessions lasting 11-16 minutes ($M = 13.35$, $SD = 1.75$). Omar received 24 intervention sessions, which lasted 11-16 minutes ($M = 13.95$, $SD = 1.95$). Reza received 20 intervention sessions, which lasted 11-16 minutes ($M = 13.85$, $SD = 1.80$) (Figures 1 and 2).

Besides using an intervention protocol, treatment fidelity (Horner et al, 2006) was ensured by an experienced special education teacher responsible for the intervention. The teacher had experience supporting individual students within special education and working as a mainstream teacher for younger students. She also had previous experience working with the decoding

program Bravkod (Karlsson, 2022) among young students with Swedish as a second language. The third author also had close contact with the teacher weekly to check if the sessions were implemented according to the Bravkod manual and the study's design. All three participants completed the intervention as planned, and the teacher followed the manual for the intervention.

Analyses

Using visual analyses, the individual student's results on word decoding tests during the baseline and intervention sessions can be monitored (Manolov et al, 2014). Through visual analysis, it is possible to ascertain the stability of the baseline and determine the relationship between students' progress and the number of intervention sessions. The visual analysis encompasses the interpretation of various aspects, including level, trend, and variability, observed during baseline and intervention conditions (Horner et al, 2005). The level involved examining the mean performance of the dependent variable (e.g., decoding skills) across different phases within the current study. The trend was assessed by investigating the rate of increase and the upward trajectory of the dependent variable during the intervention. Variability was assessed by examining how much the dependent variable fluctuated in the baseline and intervention phases. Mean values (*M*) and standard deviations (*SD*) also indicate the variability in the two phases.

In addition, we calculated the effect size of the non-overlap of all pairs (NAP; Parker & Vannest, 2009). Nonoverlap of all pairs (NAP) is an index of data overlap between baseline and intervention phases. We used an online single-case effect size calculator to obtain NAP (Pustejovsky et al, 2022). The NAP reflects a probability score where 0.00 - 0.31 corresponds to weak effects, 0.32 - 0.84 to medium effects, and 0.85 - 1.00 to strong effects (Parker & Vannest, 2009). The confidence level in effect sizes is also presented with standard errors (*SE*) and confidence intervals (CI).

Results

All three participating students completed the word decoding intervention and performed all baseline and intervention measurements. The standard deviation was small for each student, and their variability of test scores was small, indicating a stable baseline (Table 1). After the initial baseline phase, the intervention increased all three students' test scores measuring word decoding (Figures 2 and 3, and Table 1). In addition, the visual analysis revealed that the students had a trend of decreasing their word decoding errors during the intervention phase (Figure 4).

During the baseline phase, Amir's word decoding skill was demonstrated to be weak and stable. His initial scores on the word decoding tests (Table 1) during baseline corresponded to Stanine 1 for students in Grade 3[3]. He could decode monosyllabic words with two and three letters, such as *på, ko, väg* [*on, cow, way*]. Amir was provided 28 intervention sessions, and according to the visual analysis, he had a trend of increased word decoding skills during the intervention (Figures 2 and 3). At the last measurement in the intervention phase, he decoded words with three and four

[3] Stanine 1 is the lowest of nine standard intervals used to describe the results of a given test. See https://dictionary.apa.org/stanines

letters and two-syllabic words, such as *min, noga, fula* [*mine, carefully, ugly*]. When comparing Amir's highest test score in baseline with his scores during the intervention, the scores on the LäSt rose by 50% (range 3% - 113%) and on the Word chains by 65% (range 0% - 113%). The number of word decoding errors also decreased for Amir during the intervention; for the LäSt, the decrease was 61% (range 0% - 100%), and for Word chains, 68% (range 0% - 100%). In the visual analysis, a trend of decrease in word decoding errors was observed (Figure 4). During the intervention, Amir developed his word decoding and was found to have fewer word decoding errors (see Figures 2 and 3). Although Amir improved his word reading in Swedish, his performance on the LäSt corresponded to Stanine 1 and on Word chains to Stanine 2.

Weak decoding was observed for Omar during the baseline phase (Table 1). His word decoding corresponded to Stanine 1 for students in Grade 3. He was able to decode monosyllabic words with two letters, such as *på, ja, ko* [*on, yes, cow*]. Omar participated in 24 intervention sessions, and in the visual analysis, he was found to have a positive trend of word decoding (Figures 2 and 3). At the last measurement in the intervention phase, he decoded words with four letters with two-syllables or consonant clusters, such as *noga, inne, slut* [*carefully, inside, final*]. When comparing Omar's highest test score in baseline with intervention scores, the increase on the LäSt was 87% (range 4% - 159%), and the Word chains 45% (range 0% - 89%). According to the visual analysis, Omar had a trend of decreasing word decoding errors (Figure 4). His word decoding errors fell by 59% (range 0% - 100%) on the LäSt and 64% (range 0% - 100%) on the Word chains. Omar's last measurement of word decoding still corresponded to Stanine 1 on the LäSt and Stanine 2 for Word chains for students in Grade 3 (Table 1). However, during the intervention, he developed his word decoding skills and decoded several words with fewer errors.

Reza had stable and weak word decoding during the baseline phase. He had the most extended baseline phase and was offered 20 intervention sessions. His results in baseline corresponded to Stanine 1 for students in Grade 3 (Table 1). Reza could decode monosyllabic words with two and three letters, such as *nu, sal, var* [*now, hall, was*]. In the visual analysis, a positive trend of word decoding was observed during the intervention phase (Figures 2 and 3). At the last measurement during the intervention phase, he could decode words with four and five letters, two-syllables, and consonant clusters such as *egen, skal, spruta* [*own, shell, sprayer*]. When comparing Reza's highest test score in baseline with intervention scores, his test scores on the LäSt increased by 55% (range 0% - 98%). His improvement on the Word chains was 35% (range 0% - 78%). Visual inspection revealed that Reza had a trend of fewer word decoding errors during the intervention than in the baseline phase (Figure 4). For the LäSt, the decrease was 73% (range 0% - 100%), and for Word chains, 50% (range 0% - 100%). Although Reza received fewer intervention sessions than Amir and Omar, he developed his word decoding skills (Figures 2, 3, and 4). His last measurement still corresponded to Stanine 1 on the LäSt and Stanine 2 for Word chains for students in Grade 3. However, he enhanced his word decoding skill and decoded several words with fewer errors during the intervention.

All three students were closer to the cut-off value for Stanine 2 on the LäSt and Stanine 3 on the Word chains at the end of the intervention. Furthermore, analyses with NAP demonstrated that the decoding intervention was influential in developing the students' word decoding skills (Table 2). There was a strong effect for each student in improving decoding skills. During the

intervention phase, the students decoded several words in a given time (NAP = 0.96 - 1.00). In addition, the students' word decoding errors also decreased (NAP = 0.91 - 0.98).

Table 1
Participants' Scores and Errors on Decoding Tests During Baseline and Intervention

Dependent variables	Amir	Omar	Reza
	M (*SD*)	*M* (*SD*)	*M* (*SD*)
Decoding single words (LäSt)			
Baseline scores	15.33 (0.58)	13.50 (0.55)	22.00 (0.50)
Intervention scores	22.79 (5.00)	24.82 (8.35)	33.63 (8.23)
Baseline errors	5.00 (1.00)	5.33 (1.21)	6.22 (0.97)
Intervention errors	1.57 (1.74)	1.82 (2.00)	2.50 (2.27)
Decoding test (Word chains)			
Baseline scores	7.33 (0.58)	7.67 (0.82)	8.56 (0.52)
Intervention scores	13.21 (3.21)	13.27 (3.34)	12.13 (2.59)
Baseline errors	2.33 (0.58)	2.83 (0.75)	3.00 (0.50)
Intervention errors	0.64 (0.63)	0.73 (0.90)	1.00 (0.93)

Note. For students in Grade 3, the mean value on the decoding test of single words (LäSt) is 108 (*SD* = 29), and on the decoding test (Word chains) 19 (*SD* = 7).

Table 2
Participants' Percentage of Non-Overlap of All Pairs on Decoding Tests During Baseline and Intervention

	Amir			Omar			Reza		
Dependent variables	NAP	*SE*	95% CI	NAP	*SE*	95% CI	NAP	*SE*	95% CI
Test scores									
LäSt	100%	0.02	1.00, 1.00	100%	0.01	1.00, 1.00	99%	0.01	0.76, 1.00
Word chain	99%	0.02	0.63, 1.00	96%	0.04	0.69, 1.00	97%	0.04	0.71, 1.00
Decoding errors									
LäSt	96%	0.04	0.60, 1.00	91%	0.07	0.62, 0.98	94%	0.06	0.69, 0.99
Word chain	98%	0.03	0.62, 1.00	95%	0.04	0.68, 0.99	98%	0.02	0.73, 1.00

Note. NAP represents the non-overlap of all pairs. The NAPs for the test scores represent an increase in decoding words, whereas the NAPs for the decoding errors represent a decrease in decoding errors for the participants.

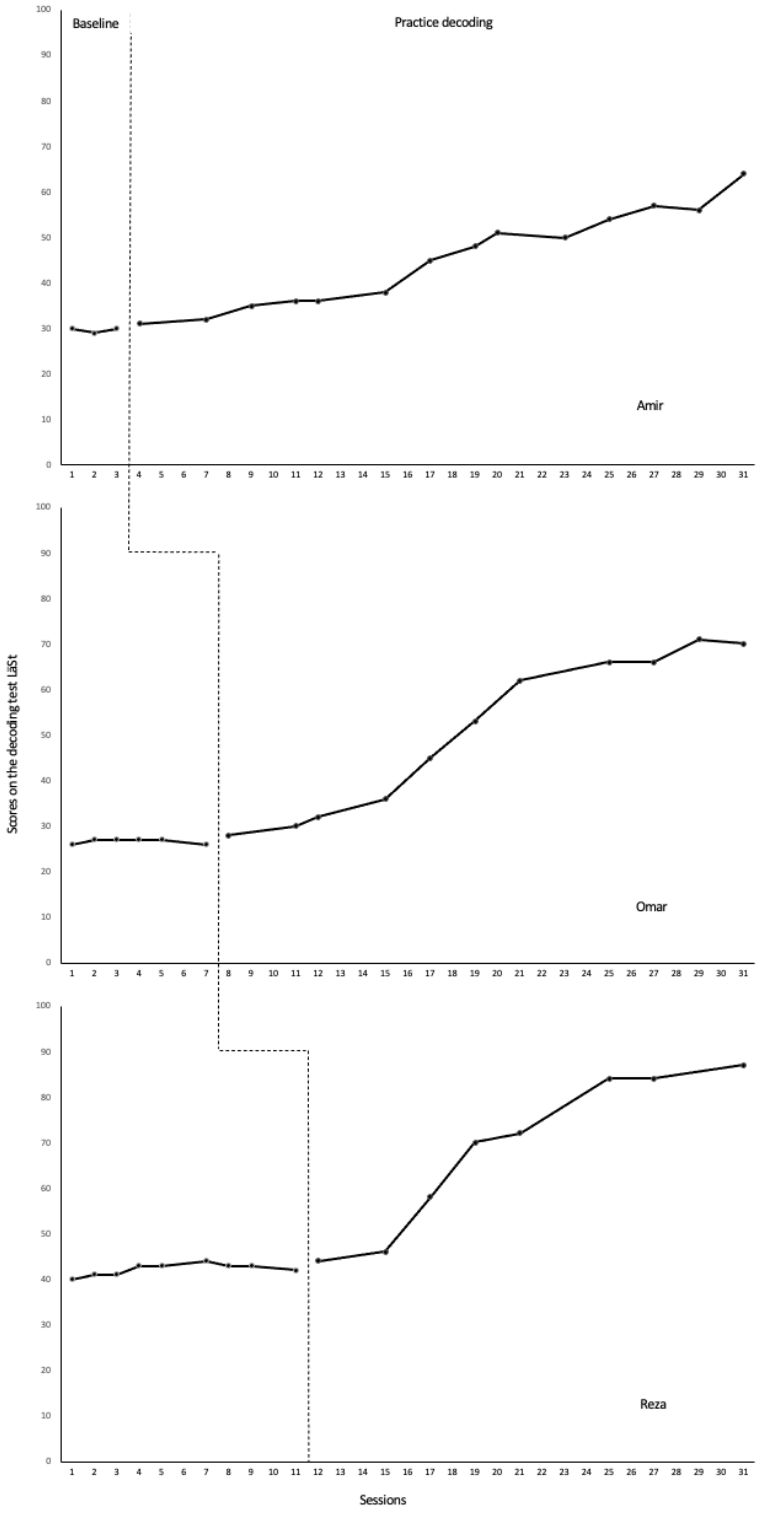

Figure 2

The Three Participants' Scores on the Decoding Test LäSt during Baseline and Intervention Sessions

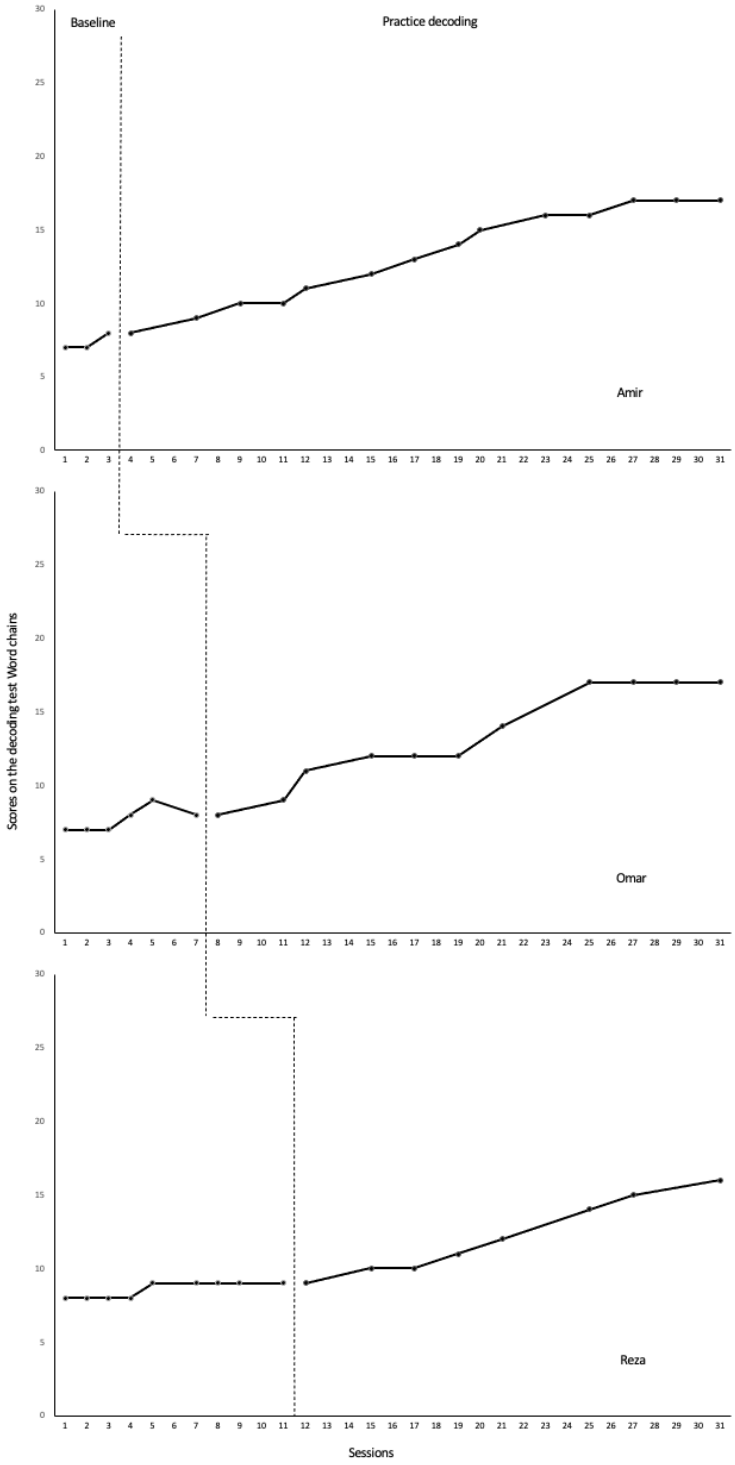

Figure 3
The Three Participants' Scores on the Decoding Test Word Chains during Baseline and Intervention Sessions

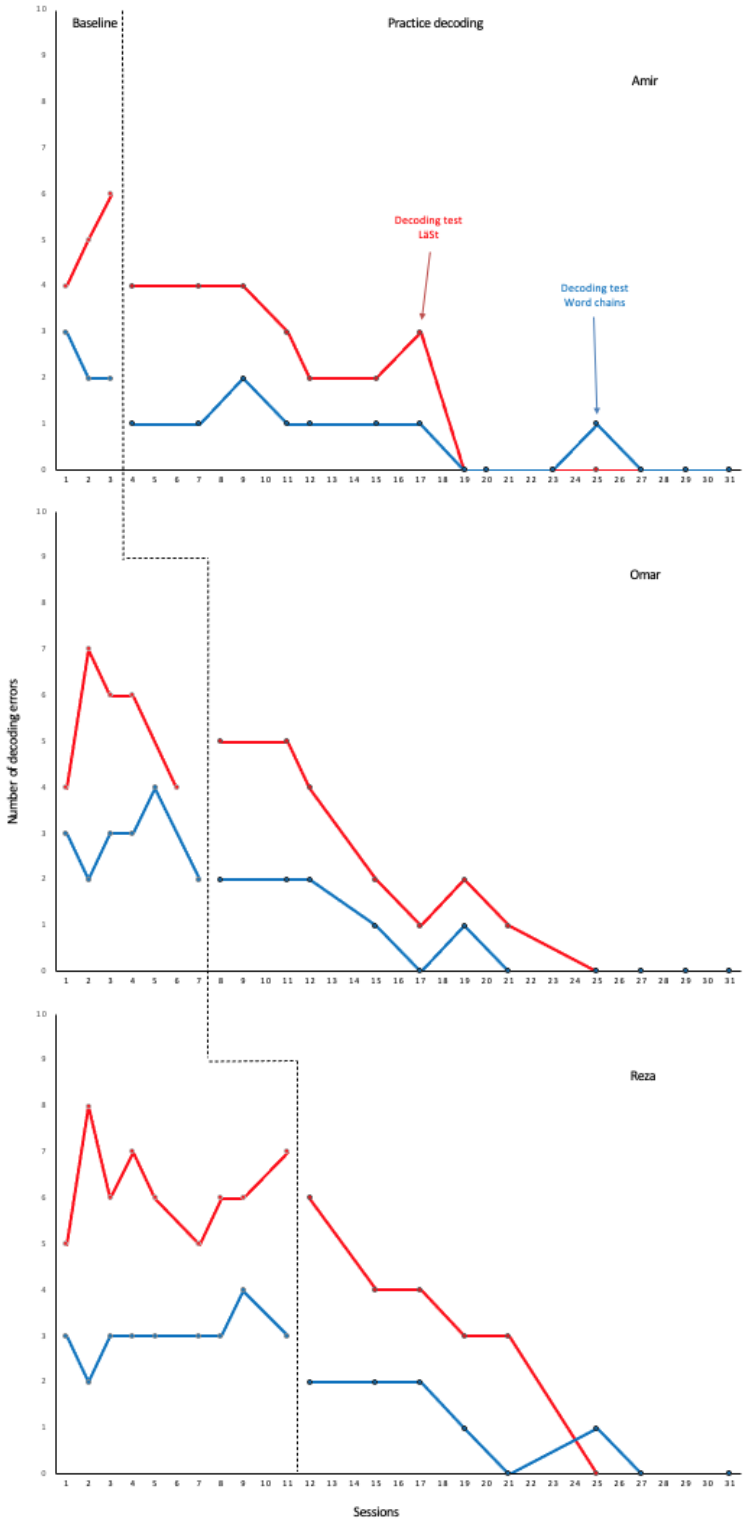

Figure 4
The Number of Decoding Errors for the Three Participants during Baseline and Intervention Sessions

Discussion

The current study aimed to examine the impact of a systematic and intensive word decoding intervention in Swedish among individual L2 students identified as having a risk of reading difficulties at the end of elementary school Grade 3. All three participating students had weak word decoding, and during the intervention, they improved their word decoding skills. They decoded several words in a given time and decreased their word decoding errors during the intervention phase. The NAP scores demonstrated a strong effect (Table 2), indicating that the intervention was beneficial in developing the students' word decoding skills in Swedish. In the visual analyses, the students were found to have a positive trend in developing their decoding skills. However, after the intervention, the students still performed weakly on word decoding tests. Their results from the last measurement still corresponded to Stanine 1 on the LäSt (Elwér et al, 2016) and Stanine 2 for Word chains (Jacobson, 2016).

Interpretation of the Results

Our study showed that an intervention focusing on word decoding with Bravkod (Karlsson, 2022) is effective for individual L2 students with Arabic and Dari as their first language and Swedish as a second language. All three participating students demonstrated weak performance on word decoding during baseline and improved their word decoding ability during the intervention. Hence, our results align with previous single-subject studies where positive results are found in interventions on word decoding in English as a second language (Dussling, 2018; Gan et al, 2019) and German as a second language (Sperling et al, 2019). The current study adds to these results showing that a Bravkod intervention can be useful for teachers to support L2 students to improve their word decoding in Swedish as a second language.

Increase of Decoding Skills and Decrease of Decoding Errors

Although all three students increased their word decoding skills during the intervention and decreased their word decoding errors during the intervention phase, their performances after intervention still corresponded to Stanine 1 on the LäSt (Elwér et al, 2016) and Stanine 2 for Word chains (Jacobson, 2016) for students in Grade 3. Compared to the baseline measures, they were closer to the cut-off value for Stanine 2 on the LäSt-test and Stanine 3 on the Word chains at the end of the intervention. The improvement in test scores indicates that the students have developed their word decoding skills but continued correspondence with Stanine 1 and 2.

The Progression of Sight Word Reading Through Intervention

The results also reveal that the students still struggle with reading after the intervention. Before the intervention, they decoded monosyllabic words with two to three letters. After the intervention, they decoded two-syllabic words with three to five letters. Presumably, they progressed and continued into the partial alphabetic phase during the intervention. Thus, they are not readers with secure decoding skills and would need further instruction to decode longer words with more complexity in the syllable structure and to enter the full alphabetic phase (see Word reading development by Ehri, 2005). According to Ehri, skilled word decoding ability provides a full account of sight words, and consequently, the students in the present study might need further instruction through the phases to boost decoding and enhance their memory for sight

words and enter the consolidated alphabetic phase. This is also confirmed in the test result of the Word chain test (Jacobson, 2016), where the students have not yet read all words as graphphonemic or morphographic units. Similarly, Gest and Gest (2005) emphasized the need for enough time to develop reading skills because, among young students at risk of reading difficulties, the greatest improvement was found among those who spent the most time reading. Lyytinen et al (2007) argue for 80 to 100 hours of instruction. Consequently, the participating students probably need to spend more time practicing decoding to acquire well-developed sight word reading skills. Another aspect worth paying attention to is that none of the participating students was literate in their L1s and could not transfer reading skills from L1 to L2 (see the Threshold Hypothesis by Cummins, 1979).

Word Decoding in a Second Language

Besides the relative shortness of the intervention and the possibility of transferring reading skills from L2 to L1, there might also be other explanations for the students' weak decoding, such as dyslexia, which can lead to limited progress in word decoding (Snowling et al, 2020). However, an alternative explanation for the limited progression according to the low stanine values for the students could be the difference in learning to read in a second language. Verhoeven (2000) argues that L2 students often are less capable of distinguishing sounds in the target language than L1 students and that acquiring grapheme-phoneme correspondence rules may be problematic and the orthographic processes slower than for L1 students. According to Verhoeven, L2 students might have difficulties building up a second language reading vocabulary because of the restricted size of their second language lexicon. Further, Verhoeven claims that students learning to read in a second language should be helped to build up their lexical knowledge and that reading instruction should match this knowledge. Fluent and efficient word decoding is essential and can increase reading comprehension (Lipka & Siegel, 2012). Subsequently, L2 students must reach a threshold level of linguistic comprehension to avoid cognitive disadvantages. If the L1 linguistic comprehension is less well developed, exposure to L2 can impede the continued development of L1 with a limiting effect on the development of L2. There is an interaction between the development of linguistic comprehension in L1 and L2, which needs to be considered.

The students in the current study had weak word decoding skills in the baseline. In line with this, earlier research has shown that the largest benefits in word decoding interventions have been obtained by L2 students who start at the lowest pre-test scores (Dussling, 2018). The program Bravkod (Karlsson, 2022) used in the interventions in the current study starts from the student's level and is adapted according to individuals' progression regarding word decoding. Such individualized sessions might have contributed to the enhanced word decoding skills and decreased word decoding errors when comparing the highest test score in baseline with intervention scores and the decreasing number of word decoding errors during intervention for the three students. Richards-Tutor et al (2016) have also highlighted that individually adapted interventions are better than interventions given in the same way for all at-risk L2 students.

Further Instructions to Reach Reading Fluency

The result of the study shows that the students still struggle with word decoding skills after the intervention. They might need further instruction to develop the ability to decode longer words

with more complexity in the syllable structure in the full alphabetic phase, then advance to the consolidated alphabetic phase and develop automaticity and speed in Sight Word Reading (Ehri, 2005). The importance of the intervention should not be underestimated for the development of reading fluency (Ludwig et al, 2019). Compared to findings by Ludwig et al, the sufficient number of minutes of intervention (M = 2663.8) and sessions per week (M = 4.3). In our study, the total number of intervention minutes was considerably more limited (M = 328.5). However, the number of sessions per week was similar (M = 4.0). Accordingly, providing the students with enough intervention sessions and following students' word decoding skills over time are essential to give the students sufficient time on task to develop further word decoding skills (Gest & Gest, 2014). Nevertheless, with a relatively short intervention, as in this study, increased decoding skills and decreased decoding errors were seen in all three students. Therefore, the results can be considered as promising in the current study. According to Lyytinen et al (2007), 80 to 100 hours of instruction could be needed, which is considerably more than provided in this study. Although Reza had fewer intervention sessions than Amir (20 versus 28 sessions), he still responded positively to the intervention. A possible explanation could be Reza's initial higher test scores on the LäSt test (Elwér et al, 2016) in baseline compared to Amir and Omar. With a higher starting point, he might have assimilated the word decoding training to a higher degree. Hence, the total minutes of intervention and the total number of intervention sessions per week do not necessarily result in an equal proportional increase in word decoding skills and decreased word decoding errors. The student's decoding level could be of greater importance for the outcome.

Limitations

Although our results are promising as an effort for L2 students struggling with word decoding in Swedish, the results could be related to the consequence of alternative explanations rather than intervention outcomes (Slocum et al, 2022). For example, threats to the internal validity of the current study could be testing and session experience in both baseline and intervention phases. As the tests are performed for a few minutes, scores between measurements can depend on external circumstances. A student can get a score depending on the time of the day, motivation, concentration, etc. Consequently, one cannot expect a stable continuous rise in the test scores, but the results reveal a positive trend in the development of decoding skills (Figures 2, 3, 4). The three students had, according to the visual analysis, a trend of increasing the number of decoded words in a given time and decreasing word decoding errors.

To increase validity in the current study, all test occasions were implemented by the same teacher, who had long experience with test procedures. The tests were performed within the students' regular setting. Another threat to internal validity could be coincidental events. Changes in word decoding could, for example, depend on the natural reading development and maturation in early grades. However, a stable baseline with weak word decoding skills was demonstrated for all three students. Therefore, the students' improvement could be referred to the intervention rather than environmental factors (Cook et al, 2009). In addition, the second author was in contact with the teacher, and intervention protocols ensured that the sessions were implemented according to the Bravkod manual.

Concerning external validity, our results should not yet be generalized to all L2 students with Arabic and Dari as their first languages, thus giving our promising results a reason for further

investigations of whether the decoding program Bravkod (Karlsson, 2022) is a valuable effort for younger L2 students with Arabic or Dari as their first language to develop word decoding in Swedish. The current study should be replicated among several young L2 students with Arabic and Dari as their first language (Manolov et al, 2014; Smith, 2012). Also, replications should be performed by other researchers to verify the positive development of word decoding as a result of the intervention with the decoding program Bravkod.

Practical Implications

This study shows that an individually adapted intervention with reading lists was efficacious for L2 students in Sweden with Arabic and Dari as the first languages who need the support of decoding skills at the end of elementary school Grade 3. After a relatively short intervention, all three students improved their word decoding skills and decreased their word decoding errors. They read more words with fewer errors in a given time. In the interventions, the students' word decoding development was followed, and the interventions were adapted to the individual needs of each student, which is emphasized as an essential factor in earlier research (see, for example, Rivera et al, 2009).

The current study also indicated the importance of sufficient time and sessions and monitoring the students over time to reach the consolidated alphabetic phase. Reading lists (in this case, Bravkod) can support the L2 students with Arabic and Dari as L1 to acquire a more secure word decoding. However, our results also show that all three students still needed further support and time on task to reach a similar word decoding level as their peers. Consequently, the students must be stimulated to read (Guthrie et al, 2006), but they might also need special support to develop an awareness of orthographic patterns and to build up lexical knowledge to develop further their word decoding ability (Koda, 2005; Nagy et al, 2000; Verhoeven, 2000; Verhoeven et al, 2019).

Conclusions

All three students effectively improved their performance on measures of word decoding in Swedish and decreased their word decoding errors during the decoding intervention. Subsequently, interventions such as Bravkod (Karlsson, 2022) with reading lists can enhance decoding skills among struggling L2 readers with Arabic and Dari as L1. Thus, after the intervention, the participating students still needed support and practice to reach word decoding skills at a similar level as their peers. The current study should be replicated with students with Arabic and Dari as their L1 and students with other L1 languages.

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Data Availability Statement

The data supporting this study's findings are available from the corresponding author upon reasonable request.

References

Abedi, J., & Gándara, P. (2006). Performance of English language learners as a subgroup in large-scale assessment: Interaction of research and policy. *Educational Measurement: Issues and Practice*, *25*(4), 36-46. https://doi.org/10.1111/j.1745-3992.2006.00077.x

Alnahdi, G.H. (2015). Single-subject designs in special education: advantages and limitations. *Journal of Research in Special Educational Needs*, *15*(4), 257-265. https://doi.org/10.1111/1471-3802.12039

Arnold, D.H., & Doctoroff, G.L. (2003). The early education of socioeconomically disadvantaged children. *Annual Review of Psychology*, *54*(1), 517-545. https://doi.org/10.1146/annurev.psych.54.111301.145442

August, D.E., & Shanahan, T.E. (eds) (2006). *Developing literacy in second-language learners: Report of the National Literacy Panel on language-minority children and youth* (1st ed.). Routledge. https://doi.org/10.4324/9781315094922

Bus, A.G., & Van IJzendoorn, M.H. (1999). Phonological awareness and early reading: A meta-analysis of experimental training studies. *Journal of Educational Psychology*, *91*(3), 403-414. https://doi.org/10.1037/0022-0663.91.3.403

Cain, K., & Oakhill, J. (2006). Profiles of children with specific reading comprehension difficulties. *British Journal of Educational Psychology*, *76*(4), 683-696. https://doi.org/10.1348/000709905X67610

Cakiroglu, O. (2012). Single subject research: Applications to special education. *British Journal of Special Education*, *39*(1), 21-29. https://doi.org/10.1111/j.1467-8578.2012.00530.x

Chu, M.C., & Chen, S.H. (2014). Comparison of the effects of two phonics training programs on L2 word reading. *Psychological Reports*, *114*(1), 272-291. https://doi.org/10.2466%2F28.10.PR0.114k17w0

Cirino, P.T., Vaughn, S., Linan-Thompson, S., Cardenas-Hagan, E., Fletcher, J.M., & Francis, D.J. (2009). One-year follow-up outcomes of Spanish and English interventions for English language learners at risk for reading problems. *American Educational Research Journal*, *46*(3), 744-781. https://doi.org/10.3102/0002831208330214

Cook, B.G., Tankersley, M., & Landrum, T.J. (2009). Determining evidence-based practices in special education. *Exceptional Children*, *75*(3), 365-383. https://doi.org/10.1177%2F001440290907500306

Cummins, J. (1979). Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research, 49*(2), 222-251. https://doi.org/10.2307/1169960

Dussling, T.M. (2018). Examining the effectiveness of a supplemental reading intervention on the early literacy skills of English language learners. *Literacy Research and Instruction, 57*(3), 276-284. https://doi.org/10.1080/19388071.2018.1453898

Ehri, L.C. (2005). Development of sight word reading: Phases and findings. In M.J. Snowling & C. Hulme (Eds.), *The Science of Reading: A Handbook*. (2nd ed.), pp. 135–154. New Jersey: Blackwell Publishing. https://doi.org/10.1002/9780470757642.ch8

Elbaum, B., & Vaughn, S. (2003). Self-concept and students with learning disabilities. In H. L. Swanson, K.R. Harris, & S. Graham (eds.), *Handbook of Learning Disabilities*, pp. 229–241. New York, London: The Guilford Press.

Elwér, Å., Fridolfson, I., Samuelsson, S. & Wiklund, C. (2016). *LäSt. Test i Läsning och Stavning för åk 1–5*. [Test in Reading and Spelling for grade 1-5]. Stockholm: Hogrefe Psykologiförlaget.

Fälth, L., Selenius, H., & Egerhag, H. (2023). A cross-sectional study on reading among young L1 and L2 students in Sweden. *European Journal of Special Needs Education*, *38*(2), 233-244. https://doi.org/10.1080/08856257.2022.2050973

Gan, H.H., Lee, J.A.C., & Ghani, K.A. (2019). Oral reading intervention for an English language learner: A single-case design. *Theory and Practice in Language Studies*, *9*(1), 28-33. https://doi.org/10.17507/tpls.0901.04

Gersten, R., Fuchs, L.S., Compton, D., Coyne, M., Greenwood, C., & Innocenti, M.S. (2005). Quality indicators for group experimental and quasi-experimental research in special education. *Exceptional Children*, *71*(2), 149-164. https://doi.org/10.1177%2F001440290507100202

Gest, S. D., & Gest, J. M. (2005). Reading tutoring for students at academic and behavioral risk: Effects on time-on-task in the classroom. *Education and Treatment of Children*, *28*(19), 25-47. https://www.jstor.org/stable/42899826

Gottardo, A., & Mueller, J. (2009). Are first- and second-language factors related in predicting second-language reading comprehension? A study of Spanish-speaking children acquiring English as a second language from first to second grade. *Journal of Educational Psychology*, *101*(2), 330-344. https://doi.org/10.1037/a0014320

Gough, P.B., Hoover, W.A., Peterson, C.L., Cornoldi, C., & Oakhill, J. (1996). Some observations on a simple view of reading. In C. Cesare, D.B. Rossana, & P. Francesca, *Reading Comprehension Difficulties: Processes and Intervention*, pp. 1-13. New York and London: Routledge. https://doi.org/10.4324/9780203053324-6

Grabe, W. (2014). Key issues in L2 reading development. Proceedings of the 4th CELC. *Symposium for English Language Teachers-Selected Papers*, 8-18. National University of Singapore. https://www.nus.edu.sg/celc/wp-content/uploads/2022/09/2.-William-Grabe.pdf

Gustafson, S., Samuelsson, C., Johansson, E., & Wallmann, J. (2013). How simple is the simple view of reading? *Scandinavian Journal of Educational Research*, *57*(3), 292-308 https://doi.org/10.1080/00313831.2012.656279

Guthrie, J.T., Wigfield, A., Humenick, N.M., Perencevich, K.C., Taboada, A., & Barbosa, P. (2006). Influences of stimulating tasks on reading motivation and comprehension. *The Journal of Educational Research*, *99*(4), 232-246. https://doi.org/10.3200/JOER.99.4.232-246

Hall, C., Steinle, P.K., & Vaughn, S. (2019). Reading Instruction for English learners with learning disabilities: What do we already know, and what do we still need to learn? *New Directions for Child and Adolescent Development 2019*(166), 145-189. https://doi.org/https://doi.org/10.1002/cad.20302

Herbers, J.E., Cutuli, J., Supkoff, L.M., Heistad, D., Chan, C.-K., Hinz, E., & Masten, A.S. (2012). Early reading skills and academic achievement trajectories of students facing poverty, homelessness, and high residential mobility. *Educational Researcher, 41*(9), 366-374. https://doi.org/10.3102%2F0013189X12445320

Horner, R.H., Carr, E.G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional children*, *71*(2), 165-179. https://doi.org/10.1177/001440290507100203

Horner, S., Rew, L., & Torres, R. (2006). Enhancing intervention fidelity: a means of strengthening study impact. *Journal for Specialists in Pediatric Nursing, 11*(2), 80-89. https://doi.org/10.1111/j.1744-6155.2006.00050.x

Huo, M.R., Koh, P., Cheng, Y., Marinova-Todd, S.H., & Chen, X. (2021). The simple view of reading in French second language learners. *Learning and Individual Differences, 92*, 102082. https://doi.org/10.1016/j.lindif.2021.102082

Jacobson, C. (2016). *Läskedjor-2* [Word chains-2]. Stockholm: Hogrefe Psykologiförlaget.

Jeon, E.H., & Yamashita, J. (2014). L2 reading comprehension and its correlates: A meta-analysis. *Language Learning, 64*(1), 160-212. https://doi.org/10.1111/lang.12034

Karlsson, R. (2022). Bravkod. BRA Avkodning. [GOODecoding]. Lund: Studentlitteratur.

Kim, D., An, Y., Shin, H.G., Lee, J., & Park, S. (2020). A meta-analysis of single-subject reading intervention studies for struggling readers: using Improvement Rate Difference (IRD). *Heliyon, 6*(11). https://doi.org/10.1016/j.heliyon.2020.e05024

Koda, K. (2005). *Insights into second language reading: A cross-linguistic approach*. Cambridge: Cambridge University Press.

Ledford, J.R., Lane, J.D., & Gast, D.L. (2018). Dependent variables, measurement, and reliability. In J. R. Ledford & J. D. Gast (Eds.), *Single case research methodology*, pp. 97-131. New York and London: Routledge.

Lee, H., Jung, G., & Lee, J.H. (2022). Simple view of second language reading: A meta-analytic structural equation modeling approach. *Scientific Studies of Reading*, 1-19. https://doi.org/10.1080/10888438.2022.2087526

Lipka, O., & Siegel, L. S. (2012). The development of reading comprehension skills in children learning English as a second language. *Reading and Writing, 25*(8), 1873-1898. https://doi.org/10.1007/s11145-011-9309-8

Ludwig, C., Guo, K., & Georgiou, G. K. (2019). Are reading interventions for English language learners effective? A meta-analysis. *Journal of Learning Disabilities, 52*(3), 220-231. https://doi.org/10.1177/0022219419825855

Lyytinen, H., Erskine, J., Aro, M., Richardson, U. (2007). Reading and reading disorders. In Hoff, E. & Shatz, M. (Eds.), *Blackwell handbook of language development*, pp. 454-474. New Jersey: Blackwell Publishing. https://doi.org/10.1002/9780470757833.ch22

Manolov, R., Gast, D.L., Perdices, M., & Evans, J.J. (2014). Single-case experimental designs: Reflections on conduct and analysis. *Neuropsychological Rehabilitation, 24*(3–4), 634–660. https://doi.org/10.1080/09602011.2014.903199

Nagy, W., Scott, J., Kamil, M., Mosenthal, P., Pearson, P., & Barr, R. (2000). Vocabulary processes. In M.L. Kamil (Ed), *Handbook of Reading Research* (3rd Ed.), pp. 269–284. New York: Routledge.

Nelson, J.R., Vadasy, P.F., & Sanders, E.A. (2011). Efficacy of a tier 2 supplemental root word vocabulary and decoding intervention with kindergarten Spanish-speaking English learners. *Journal of Literacy Research, 43*(2), 184-211. https://doi.org/10.1177/1086296X11403088

Oakhill, J., Cain, K., & Elbro, C. (2014). *Understanding and teaching reading comprehension: A handbook*. New York and London: Routledge. https://doi.org/10.4324/9781315756042

Parker, R. I., & Vannest, K. (2009). An improved effect size for single-case research: Nonoverlap of all pairs. *Behavior Therapy, 40*(4), 357-367. https://doi.org/10.1016/j.beth.2008.10.006

PIRLS. (2011). *Progress in International Reading Literacy Study. IEA*. https://www.iea.nl/studies/iea/pirls

PIRLS. (2016). *Progress in International Reading Literacy Study. IEA*. https://www.iea.nl/studies/iea/pirls

PISA. (2012). *Programme for International Student Assessment. OECD*. https://www.oecd.org/pisa/
PISA. (2015). *Programme for International Student Assessment. OECD*. https://www.oecd.org/pisa/
PISA. (2018). *Programme for International Student Assessment. OECD*. https://www.oecd.org/pisa/
Pluck, G. (2018). Lexical reading ability predicts academic achievement at university level. *Cognition, Brain, Behavior: An Interdisciplinary Journal, 22*(3), 175-196. https://doi:10.24193/cbb.2018.22.12
Pustejovsky, J.E., Chen, M., & Swan, D.M. (2022). *Single-case effect size calculator (Version 0.6.1)* [Web application]. https://jepusto.shinyapps.io/SCD-effect-sizes/ (accessed 28 September 2022).
Richards-Tutor, C., Baker, D.L., Gersten, R., Baker, S.K., & Smith, J.M. (2016). The effectiveness of reading interventions for English learners: A research synthesis. *Exceptional Children, 82*(2), 144-169. https://doi.org/10.1177%2F0014402915585483
Rivera, M.O., Moughamian, A.C., Lesaux, N.K., & Francis, D.J. (2009). *Language and reading interventions for English language learners and English language learners with Disabilities*. Center on Instruction. https://eric.ed.gov/?id=ED521569
Seymour, P. H., Aro, M., Erskine, J. M., & Collaboration with COST Action A8 Network. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology, 94*(2), 143-174. https://doi.org/10.1348/000712603321661859
Slocum, T. A., Pinkelman, S. E., Joslyn, P. R., & Nichols, B. (2022). Threats to internal validity in multiple-baseline design variations. *Perspectives on Behavior Science: An Official Journal of the Association for Behavior Analysis International, 45*(3), 619-638. https://doi.org/10.1007/s40614-022-00326-1
Smith J.D. (2012). Single-case experimental designs: a systematic review of published research and current standards. *Psychological Methods, 17*(4), 510-550. https://doi.org/10.1037/a0029312
Snow, C.E., Burns, M.S., & Griffin, P. (eds.). (1998). *Preventing reading difficulties in young children*. National Academy Press.
Snowling, M.J., & Hulme, C. (2011). Evidence-based interventions for reading and language difficulties: Creating a virtuous circle. *British Journal of Educational Psychology, 81*(1), 1-23. https://doi.org/10.1111/j.2044-8279.2010.02014.x
Snowling, M.J., Hulme, C., & Nation, K. (2020). Defining and understanding dyslexia: past, present and future. *Oxford Review of Education, 46*(4), 501-513. https://doi.org/10.1080/03054985.2020.1765756
Sparks, R.L. (2019). Why reading is a challenge for U.S. L2 learners: The impact of cognitive, ecological, and psychological factors in L2 comprehension. *Foreign Language Annals, 52*(4), 727-743. https://doi.org/10.1111/flan.12432
Sperling, M., Barwasser, A., & Grünke, M. (2019). The effects of a Reading Racetrack intervention on the sight word fluency of learning-disabled elementary school students with German as second language. *Insights into Learning Disabilities, 16*(1), 79-90. https://files.eric.ed.gov/fulltext/EJ1218553.pdf
Swedish Institute [Svenska institutet]. (2023). *Svenska språket – en allmän beskrivning.* [The Swedish language – a general description]. https://si.se/sa-arbetar-vi/svenskan-i-varlden/artiklar-om-sprak/svenska-spraket-en-allman-beskrivning/

Swedish National Agency for Education. (2022). *Curriculum for the compulsory school, preschool class and school-age educare (revised 2018).* https://www.skolverket.se/publikationsserier/styrdokument/2018/curriculum-for-the-compulsory-school-preschool-class-and-school-age-educare-revised-2018

Swedish National Agency for Education. (2023). *Search statistics.* https://www.skolverket.se/skolutveckling/statistik

Tilstra, J., McMaster, K., Van den Broek, P., Kendeou, P., & Rapp, D. (2009). Simple but complex: Components of the simple view of reading across grade levels. *Journal of Research in Reading, 32*(4), 383-401. https://doi.org/10.1111/j.1467-9817.2009.01401.x

UNESCO. (2018). *Functional Literacy and Numeracy: Definitions and Options for Measurement of SDG 4.6. GAML Fifth Meeting 17–18 October 2018 Hamburg, Germany*. https://gaml.uis.unesco.org/wp-content/uploads/sites/2/2018/12/4.6.1_01_Functional-literacy-and-numeracy-Definitions-and-options-for-measurement-for-the-Sustainable-Development-Goal-4.6.pdf

Vadasy, P. F., Sanders, E. A., & Nelson, J. R. (2015). Effectiveness of supplemental kindergarten vocabulary instruction for English learners: A randomized study of immediate and longer-term effects of two approaches. *Journal of Research on Educational Effectiveness, 8*(4), 490-529. https://doi.org/10.1080/19345747.2015.1033120

Vaughn, S., Linan-Thompson, S., Mathes, P.G., Cirino, P.T., Carlson, C.D., Pollard-Durodola, S.D., Cardenas-Hagan, E., & Francis, D.J. (2006). Effectiveness of Spanish intervention for first-grade English language learners at risk for reading difficulties. *Journal of Learning Disabilities, 39*(1), 56-73. https://doi.org/10.1177/00222194060390010601

Verhoeven, L. (2000). Components in early second language reading and spelling. *Scientific Studies of Reading, 4*(4), 313-330. https://doi.org/10.1207/S1532799XSSR0404_4

Verhoeven, L., & van Leeuwe, J. (2012). The simple view of second language reading throughout the primary grades. *Reading and Writing: An Interdisciplinary Journal, 25*(8), 1805-1818. https://doi.org/10.1007/s11145-011-9346-3

Verhoeven, L., Voeten, M., & Vermeer, A. (2019). Beyond the simple view of early first and second language reading: The impact of lexical quality. *Journal of Neurolinguistics, 50*, 28-36. http://doi.org/10.1016/j.jneuroling.2018.03.002

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