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Fluency Training for Struggling Readers: Examining the Effects of a Tier-2 Intervention in Third Graders

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Abstract: Tier-2 reading fluency interventions are specifically tailored for struggling readers, addressing their unique needs. The aim of this study was to examine the impact of a Tier-2 reading fluency intervention on reading capabilities and motivation among third-grade students identified as at risk. The intervention employed various strategies, including non-repetitive reading, exploration of challenging words, model reading, eco-reading, assisted reading, and both self- and hetero-assessment of reading proficiency. A two-group randomized controlled trial was employed, comprising an intervention group (N n = 162) and a delayed intervention control group (N = 183). Both groups underwent pre-test and post-test evaluations in reading accuracy and fluency. Additionally, a separate cohort of students without reading difficulties was assessed (N = 225). The intervention resulted in significantly improved word reading accuracy and reading fluency scores in the intervention group compared to the control group. While the gap between the intervention and control groups was slightly reduced, no significant effects on motivation were observed. These findings underscore the relevance of Tier-2 reading fluency interventions in preventing the development of persistent reading difficulties.

Keywords: reading fluency; intervention; randomized controlled trial; Tier-2; elementary school

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1. Introduction

Reading is a fundamental skill for school success as it significantly contributes to performance in all subjects and plays a vital role in fostering social participation and active citizenship [1,2]. However, some students struggle with reading from the earliest years of schooling. The well-known "Matthew effect" [3] suggests that there is a cumulative advantage for children who excel in reading during the early stages of formal learning, while those who face difficulties when learning to read tend to experience an inverse pathway. This effect underscores the need to address the disparity in growth rates among children who start with a disadvantageous educational experience. Early detection and targeted interventions may alter the presumed trajectory of less skilled readers. Achieving reading fluency is crucial for students to comprehend what they read [4,5]. Reading fluency is usually defined as the capacity to read a text quickly, accurately, and with prosody and serves as a vital indicator of students who may be at risk of encountering reading challenges [5,6]. In a multi-tier framework, one of the indicators used in universal screenings to identify these at-risk students is the number of words read correctly per minute [1,7–10]. Multi-tiered systems of support (MTSS) are evidence-based models aimed at preventing learning difficulties by providing varying levels of support based on student performance [11]. MTSS and Response to Intervention (RTI) are similar approaches, although RTI is rooted in special education legislation, focuses on quality instruction and tailored interventions,

and uses student response data for educational decisions, primarily targeting learning disabilities. MTSS, on the other hand, emphasizes general education, aiming to provide proactive instruction and intervention for all students. While both RTI and MTSS involve screening, tiered interventions, and progress monitoring, MTSS has a broader focus on an inclusive, proactive support for the entire student population. The shift from RTI to MTSS represents a move towards an holistic and inclusive education, aiming for the success of all students [11–13]. Although MTSS frameworks are widely adopted in schools [9,12,13], in Portugal, these practices gained recognition in schools in 2018 with the introduction of the Decree-Law 54/2018 [14]. The growth of these service delivery models is fuelled by evidence suggesting that MTSS allows for the early identification of learning and behavioral challenges and timely intervention for students who are at risk for poor learning, mitigating future challenges [15].

Within an MTSS framework, reading difficulties are addressed through three tiers of support, determined by students' reading performance and progress during the school year [6]. High-quality Tier-1 interventions, particularly class-wide interventions, should be available to all students in the regular classroom [13]. However, standard instruction may be sufficient for some students but not for others [16]. If a Tier-1 student does not meet benchmark goals, they should receive supplemental support in small groups. Tier-2 interventions play a pivotal role in providing necessary support for at-risk students [13]. Those students not responding to Tier-2 interventions often require more intensive, regular, and personalized assistance [6,9]. Yet, offering these Tier-3 interventions becomes challenging in resource-limited schools, primarily because Tier-3 interventions typically involve increased intensity and fewer students [17]. Hence, prompt identification of students struggling with reading is essential, along with immediate supplementary reading interventions to bolster their reading skills [6,18]. These interventions should be relatively short, allowing at-risk readers to enhance their reading skills and meet grade-level standards [10].

In their study of the effects of Tier-2 interventions on reading performance, Slavin et al. [19] analyzed 70 studies that focused on supporting struggling elementary school readers. They found that small group interventions had effect sizes between 0.31 and 0.39. Later, Wanzel et al. [10] performed a meta-analysis on Tier-2 reading interventions for grades K-3 and observed moderate, positive impacts of less extensive interventions on various reading abilities. In 2020, Gersten et al. [12] conducted another meta-analysis of 33 studies and found an average effect size of 0.31 in reading fluency.

Research indicates that Tier-2 interventions predominantly target middle elementary grades [9,10,12]. In educational environments, the third grade is emphasized due to the "third-grade reading" concept. Until this stage, the primary goal is not just "learning to read", but achieving reading fluency, which entails seamless recognition of words and effortless comprehension. However, starting from the fourth grade, the focus evolves to "reading to learn". At this transition, fluency becomes indispensable. Students who are not fluent readers by the end of the third grade may find it challenging to understand the content in subsequent grades. Therefore, a lack of reading fluency by the third grade can serve as an early warning sign of potential academic struggles in the future [5,7,8].

Tier-2 interventions tend to emphasize a multi-component approach, blending both code- and meaning-related skills, albeit with significant variability in these approaches [9,10,18]. Although repeated reading is a proven method to improve reading fluency in at-risk readers, its generalization to unfamiliar texts is often limited [5,20]. Some studies have combined repeated reading with other strategies to enhance fluency. For instance, Wu et al. [21] introduced a multi-component reading intervention for children with reading challenges, incorporating re-readings, systematic error correction, grammar, and performance feedback, which resulted in improved outcomes for children. Naveenkumar et al. [8] highlight that effective practice, rather than mere repetition, fosters expertise in orthographic patterns, and improves word recognition and reading fluency. Their systematic review also observed that promoting reading fluency typically involves strategies beyond repeated reading, such as corrective feedback, modeling fluent reading, and adjusting text difficulty progressively.

Regarding intervention duration, the meta-analysis conducted by Wanzek et al. [10] revealed that reading interventions span from 4 to 80 h. Notably, they observed that foundational skills, such as reading fluency, can improve significantly within a relatively brief duration. Tier-2 interventions typically last from 10 to 60 min per session, with three to five sessions held weekly. The number of intervention sessions can vary from 14 to 90 [9,10,12]. Preferably, these interventions are conducted in small groups, as having fewer students allows for more practice and facilitates easier corrective feedback [6]. These groups typically consist of two to seven students [9,10]. Professionals responsible for implementing Tier-2 interventions include various interventionists such as researchers, general and special education teachers, reading specialists, and paraprofessionals. A study by Gersten et al. [12] found no significant difference in reading outcomes based on the interventionist, demonstrating that various professionals can successfully implement Tier-2 interventions. To ensure intervention consistency, especially when multiple professionals are involved, specific procedures like training and creating standard intervention protocols can be adopted [17]. Additionally, tools such as observation quality ratings and checklists can be used [9].

Motivation is a cornerstone of learning [22]. As a multi-component construct, different authors consider the existence of distinct features of reading motivation. In this study, we used the definition proposed by Toste et al. [23] which includes three components: goal orientation (individual approach towards reading and reading performance intentions), beliefs (about individual competence in reading and personal perception about the activity of reading), and disposition (individual's judgments about reading a specific topic). Research has revealed a close relationship between reading fluency and reading motivation [23,24], meaning that students with better reading skills will likely be more motivated to read.

To enhance reading motivation, especially among struggling readers, the implementation of strategies such as behavior-specific praise and consistent encouragement has been found to be effective [17]. Nevo et al. [25] asserted that as students develop reading fluency, their motivation may evolve, primarily because fluency influences their perception of themselves as readers. Supporting this, Kasperski et al. [26] identified a connection between lower self-perception as a reader and slower reading speeds in second and third graders. Furthermore, Vaknin-Nusbaum et al. [27] corroborated these findings regarding self-concept as a reader, providing additional evidence that both low and typical readers consistently valued reading similarly throughout the academic year.

The Present Study

In the early stages of education in Portugal, children having difficulty with reading often receive additional support. However, not all these interventions are based on empirical research. This study aims to assess the impact of a multicomponent reading fluency intervention specifically designed for Grade 3 at-risk readers, using a randomized controlled trial.

2. Materials and Methods

2.1. Participants

A cohort of 1458 third-grade students, from schools that had a collaboration agreement with the research team, underwent word accuracy and reading fluency assessments. All third graders from these schools were assessed at the beginning of the school year. Those scoring below one standard deviation from the mean in reading fluency were identified as at-risk readers. After excluding students who did not meet the word accuracy standard, the study comprised 345 at-risk readers enrolled in 14 state-funded schools across northern (64.2%), central (34.4%), and southern (1.4%) Portugal.

These at-risk readers were then randomly distributed into two main groups, regardless of the school: the intervention group (n = 162 students) and the delayed intervention or control group (n = 183 students). Gender and age distributions were comparable between these groups. The intervention group consisted of 46.1% males and 53.9% females, with

an average age of 7.97 years (SD = 0.49). The delayed intervention group included 45.5% males and 54.5% females, with an average age of 7.94 years (SD = 0.48).

A third comparison group was established, consisting of 225 students who exhibited no reading challenges. These students were randomly selected from the initial database and were assessed during both the pre-test and post-test phases. The average age of this group was 7.84 years (SD = 0.69) with a majority of 55.4% being males.

Statistical analysis revealed no significant differences between the intervention, delayed intervention, and comparison groups in terms of age ($F(2552) = 2.672$, $p = 0.070$) or gender ($\chi^2(2) = 4.916$, $p = 0.086$).

2.2. Measures

Test of Word Reading. We evaluated word reading accuracy in primary school students using the Test of Word Reading [28,29]. This computerized test consists of four equivalent forms, each displaying 30 single test words sequentially. Participants vocalized each word at their own pace while evaluators recorded the accuracy. A total score was then calculated and transformed into an equated score, standardized with a mean of 100 and an SD of 10. For this study, we used forms 2 and 3 for pre-test and post-test, respectively. The test demonstrated good reliability, with coefficients exceeding 0.80 across all forms. As part of the validation process, the test scores were correlated with other reading-related evaluations [28].

"O Rei" Reading Fluency and Accuracy Test. We assessed reading fluency using the "O Rei" reading fluency and accuracy test [30]. In this evaluation, children are required to read aloud a 281-word text within three minutes. The number of words read correctly per minute was calculated as a measure of reading fluency. This test's reliability for the Portuguese population was established in a psychometric study [30]. In this study, test–retest reliability was excellent, calculated to be 0.94. Furthermore, evidence of validity was provided through statistically significant correlation coefficients with teachers' assessments of oral reading fluency [30].

The "Me and Reading" Scale [31]. We evaluated reading motivation using the 20-item "Me and Reading" Scale. This scale comprises items that assess reading motivation across three domains: pleasure from reading (8 items, e.g., "some children believe that reading is a good way to spend time"), self-concept as a reader (7 items, e.g., "some children feel they can read aloud to others), and societal recognition (5 items, e.g., "some children consider it important when a teacher says they read well"). The scale takes approximately 20 min to complete, during which children indicate their level of agreement with each statement by selecting one of four response options. For the purpose of this study, we focused on two of the subscales: pleasure from reading ($\alpha = 0.77$) and self-concept as a reader ($\alpha = 0.76$). The societal recognition subscale was not considered because the internal consistency was found to be low in our study ($\alpha = 0.62$).

2.3. Procedures

The study was approved by the Centro de Investigação em Psicologia para o Desenvolvimento (CIPD/2122/DEED/1). Before initiating the study, necessary consent was obtained from the respective school boards and parents/legal guardians. Coordination with teachers ensured that individual assessments were scheduled without disrupting students' regular activities. Trained psychologists handled data collection, with the pre-test conducted between October and November 2021, and the post-test in May 2022. The pre-test involved a universal screening procedure encompassing all third graders. Struggling readers were identified through an analysis of their reading fluency scores. Those whose scores fell a standard deviation below the mean were flagged as at-risk readers. These pupils were then randomly allocated to either the intervention or the delayed intervention/control group. The intervention spanned from December 2021 to April 2022. Upholding ethical commitments, the delayed intervention group received the same program from May to June

2022. The delayed intervention group received the business-as-usual reading instruction and did not receive any additional services or support during the study.

2.3.1. Intervention Program

The Fluency Training for Struggling Readers evolved from a fluency training intervention initially designed for regular readers as outlined by Cruz et al. [32]. Developed within the context of the COVID-19 pandemic lockdown, it originated from a universal and promotive approach, emphasizing the critical importance of supporting reading skills during this period. Results showcased the intervention's success in strengthening reading accuracy and fluency, with similar efficacy rates for both in-person and remote delivery. However, the initial model did not fully assess its implications for struggling readers. To address this, the authors refined the intervention by reducing the length of the texts utilized in each session and replacing some complex narratives with more straightforward content. Furthermore, the program was expanded to incorporate a preliminary session (session 0) to better engage students, and a concluding session (session 21). This final session aimed not only to evaluate student perceptions and participation but also to celebrate their successes and acknowledge their dedication by awarding certificates for program completion.

This program resulted in a multicomponent reading fluency approach, encompassing techniques like challenging word exploration (focusing on phonological structure and meaning), model reading, eco reading, assisted reading, and both self and hetero assessment of reading abilities. Integrated motivational strategies included praise, effort reinforcement during each reading, timely corrective feedback, and post-assessment goal setting in every session [17,25]. Moreover, the inclusion of self-assessment via audio recordings, allowing students to evaluate facets like text reading accuracy, fluency, and prosody, served as a motivational lever. This strategy was designed to amplify student involvement and heighten their self-awareness regarding performance throughout the program.

The intervention was delivered in small groups (2–4 students), twice a week for 11 weeks (totaling 22 sessions). Each session utilized a different brief text (range = 67–207 words), with increasing complexity over time. The intervention occurred outside the classroom immediately after the pre-test, during school days, in a quiet room, at a schedule determined by the school. Sessions lasted 50–60 min each, resulting in approximately 20 h of intervention per student.

Trained professionals, including psychologists and teachers (both regular and special education teachers), conducted the training sessions. These professionals had undergone a 25 h training program focused on reading fluency. Notably, the teachers and psychologists involved in implementing the intervention did not provide support to other third-grade students (e.g., control group students) during that school year.

The selected texts covered different genres (9 narrative, 4 poetic, 4 informative, and 3 dramatic texts). Each session followed the same structured format: (i) The new text is introduced and the title is read to activate previous knowledge about the content. (ii) Four challenging words are read, followed by the students reading each word, discussing its meaning, and ending with each student reading the four words. (iii) The text is read aloud to the students. (iv) After a modeled quality reading, students are invited to follow along and read the text individually. (v) There is a group discussion about the meaning of the text. (vi) Each student individually reads the text aloud, and the interventionist assists if necessary and provides feedback. (vii) The text is retold orally by the group. (viii) The students perform different reading tasks according to the type of text, such as: "read the text as if you were the TV newsreader"; "read the text as if you were a character from the text"; "sing the text"; and "read the text with different emotions (e.g., as if you were sad, as if you were very happy)". (ix) Each student reads the text individually and records it. (x) Each recording is listened to, and self- and hetero-assessment is performed considering different indicators such as text reading accuracy, text reading fluency, and prosody. (xi) Reading training is done at home until the next session. (xii) The text is re-read by each student

at the beginning of each new session, followed by an analysis of the progress from the last reading.

2.3.2. Fidelity of Implementation

To ensure strict adherence to the intervention's design, the research team provided 25 h of training to the interventionists. Out of this total, ten hours were given before the intervention started, while the remaining 15 h were provided during the program's execution. This approach allowed the team to address any doubts and ensure all implementation requirements were met. The team also provided a structured and standardized protocol that explained each activity and organized session plans. Moreover, a monitoring sheet was given to be completed after each session. This sheet recorded the strategies used, session duration, and the number of attending students. At the conclusion of each session, the reading accuracy, fluency, and prosody of each student were documented (Cruz et al., 2022) [32].

2.4. Statistical Analyses

Data were analyzed using IBM SPSS Statistics 28. For reading fluency, the number of words read correctly per minute was used in the analysis. In this study, the scores ranged between 6 and 137,07 in the pre-test and between 11,67 and 177,47 in the post-test. For word reading, the standardized scores were used in the analysis. These scores have a mean of 100 and an SD of 10. In this study, the scores ranged between 98 and 137 on the pre-test and between 93 and 145 on the post-test. For the motivation subscales, we computed the mean scores within each subscale, so that, in this study, total scores ranged between 1 and 4. Univariate distributions were ensured by examining skewness and kurtosis values. All variables had a skewness below |2| and a kurtosis lower than |9|, suggesting no robust violations to a normal distribution [33].

Next, we compared the intervention group with the delayed intervention (control) group to analyze the effects of the program on reading skills. We performed independent samples *t*-tests to determine whether there were pre-intervention differences in reading fluency, word reading accuracy, and reading motivation. After confirming that the groups were equivalent, we performed a mixed analysis of variance (ANOVA) with a 2 × 2 design, considering the between-subjects effect of the group (intervention vs. delayed intervention) and the within-subjects effect of time (pre-test vs. post-test).

For the mixed ANOVA, we calculated partial Eta squared ($_p\eta^2$) as a measure of effect size. Effect sizes of $_p\eta^2 > 0.14$ indicated a large effect, effect sizes of $_p\eta^2 > 0.06$ indicated a medium effect, and effect sizes of $_p\eta^2 > 0.01$ indicated a small effect [34]. To assess whether the intervention reduced the reading gap between the intervention and the comparison group, we repeated the same set of analyses for these groups.

To determine if a change in fluency and word reading was associated with motivational gains in the at-risk readers (intervention and control groups), we computed a gain score for each variable by subtracting the pre-test scores from the post-test scores. Next, Pearson correlation coefficients between the gains in the different variables were calculated.

3. Results

3.1. Effects of the Intervention Program on Reading Skills

The intervention group and control group did not differ significantly in reading fluency at pre-test, t(321) = 1.381, $p = 0.168$. The mixed ANOVA revealed a significant within-subjects effect of time and between-subjects effect of the group, as well as a significant interaction (Table 1). As shown in Figure 1, the intervention group had significantly higher results in the post-test compared to the control group, although the effect size was low (Table 1).

Table 1. Descriptive statistics and effects for reading fluency.

	N	Pre-Test		Post-Test		Time Effect		Group Effect		Time × Group Effect	
		Mean	SD	Mean	SD	F (df)	$_p\eta^2$	F (df)	$_p\eta^2$	F (df)	$_p\eta^2$
Intervention group	152	34.67	8.22	53.08	15.94	611.06 (1, 321) ***	0.656	5.71 (1, 321) *	0.017	5.37 (1, 321) *	0.016
Delayed intervention (control) group	171	33.32	9.37	48.57	14.98						

Note: SD = standard deviation; *** $p < 0.001$; * $p < 0.05$.

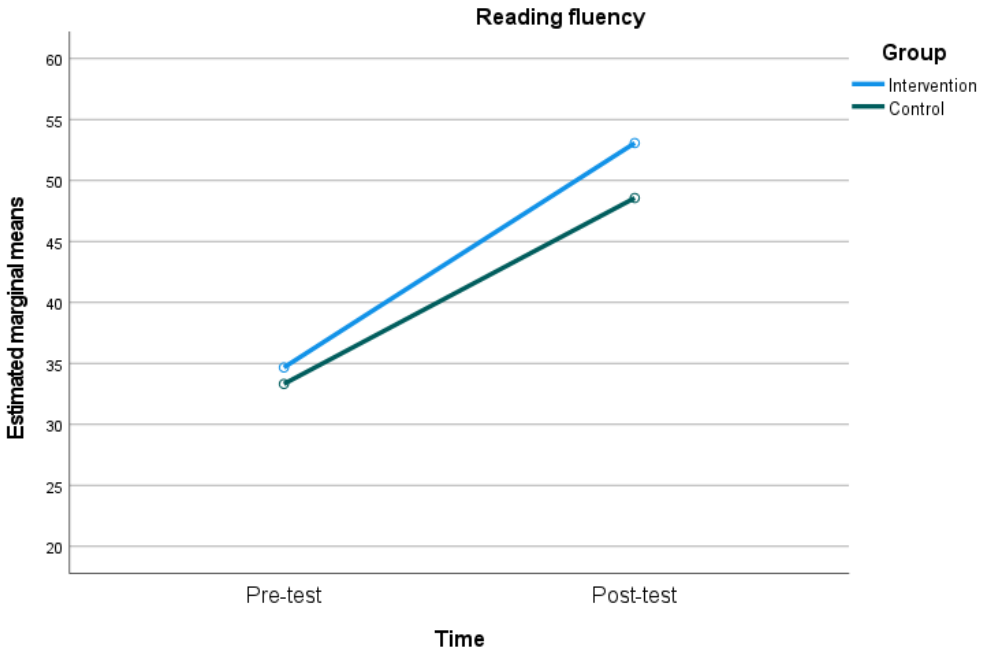


Figure 1. Interaction effect for reading fluency when comparing the intervention and the control group.

The intervention group and control group also did not differ significantly at the pretest in terms of word reading accuracy, t(313) = −0.902, $p = 0.368$. The mixed ANOVA revealed a significant effect of time and a significant interaction between time and group (Table 2). This interaction effect was of medium size.

Table 2. Descriptive statistics and effects for word reading accuracy.

	N	Pre-Test		Post-Test		Time Effect		Group Effect		Time × Group Effect	
		Mean	SD	Mean	SD	F (df)	$_p\eta^2$	F (df)	$_p\eta^2$	F (df)	$_p\eta^2$
Intervention group	150	108.86	5.73	116.03	8.96	155.53 (1, 317) ***	0.329	2.639 (1, 317)	0.008	20.54 (1, 317) ***	0.061
Delayed intervention (control) group	169	109.51	7.22	112.86	8.98						

Note: SD = standard deviation; *** $p < 0.001$.

As shown in Figure 2, the intervention group exhibited a significantly greater improvement in word reading accuracy compared to the control group (Table 2).

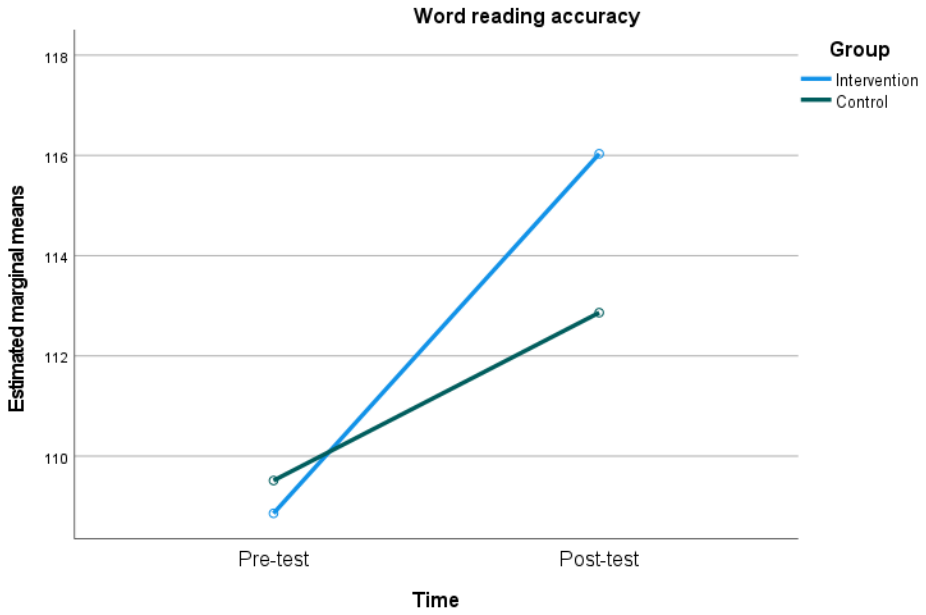


Figure 2. Interaction effect for word reading accuracy when comparing the intervention and the control group.

As anticipated, the intervention group and comparison group (no reading difficulties) differed significantly at the pre-test in reading fluency, $t(323) = -28.36$, $p < 0.001$, and word reading accuracy, $t(385) = -17.05$, $p < 0.001$. Both groups showed significant improvements in reading fluency from the pre-test to the post-test: $F(1, 375) = 417.24$, $p < 0.001$, ${}_{p}\eta^2 = 0.527$. While the intervention group did not reach the same level of fluency as the comparison group at post-test (Figure 3), the rate of improvement for this group was slightly elevated, as indicated by the significant Time × Group interaction, $F(1, 375) = 3.87$, $p = 0.050$, ${}_{p}\eta^2 = 0.010$. At pre-test, the comparison group showed a higher reading fluency, reading on average 41 words per minute than the intervention group. Following the intervention, this difference decreased to 38 words.

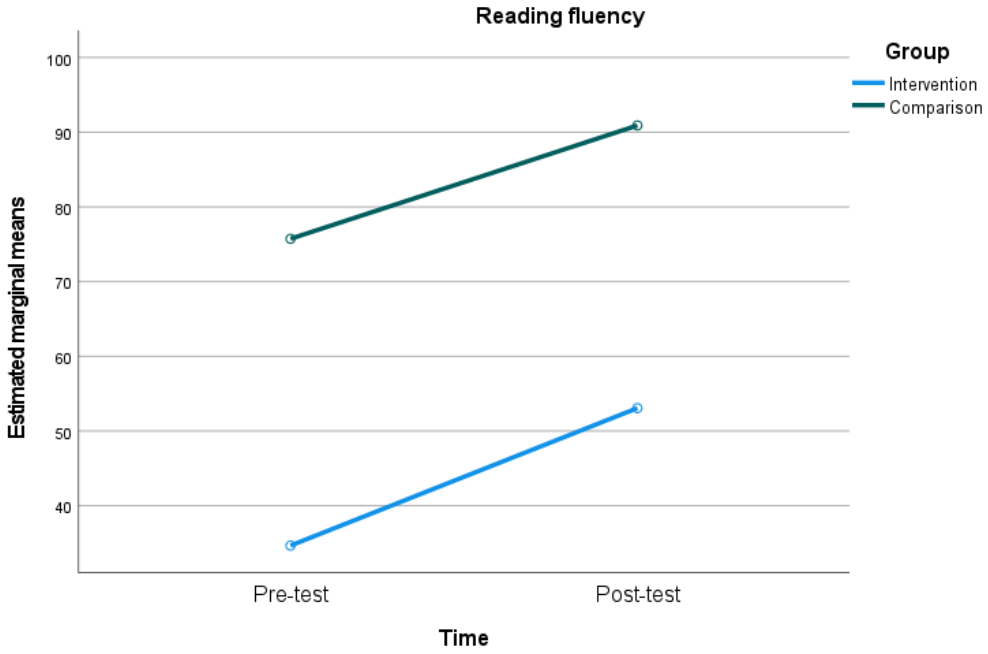


Figure 3. Reading fluency in pre-test and post-test for the intervention and the comparison group.

A similar result was obtained for word reading accuracy (Figure 4). Both groups showed improvement in word reading accuracy over time, $F(1, 372) = 125.71$, $p < 0.001$, ${}_p\eta^2 = 0.25$. However, the intervention group demonstrated a slightly faster rate of improvement relative to the comparison group, as shown by the significant Time × Group interaction, $F(1, 372) = 23.42$, $p < 0.001$, ${}_p\eta^2 = 0.06$.

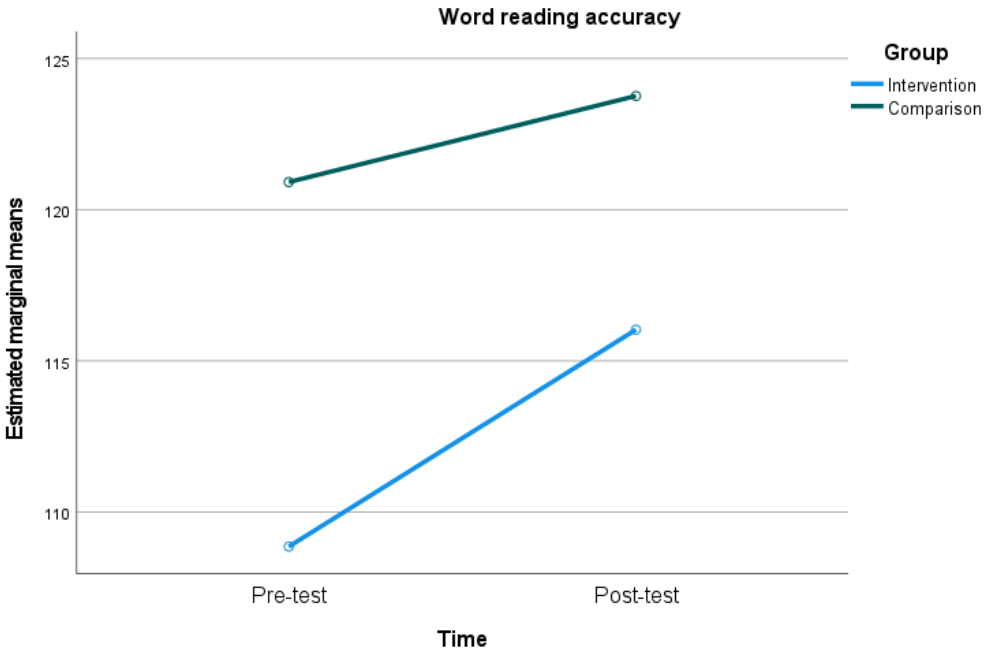


Figure 4. Word reading accuracy in pre-test and post-test for the intervention and the comparison group.

3.2. Effects of the Intervention Program on Reading Motivation

Tables 3 and 4 present the descriptive statistics for the motivation measures in the pre-test and post-test for each group. The intervention group and control group did not differ significantly at the pre-test in terms of reading pleasure, $t(275) = -0.21$, $p = 0.831$, or self-concept as a reader, $t(272) = 1.00$, $p = 0.318$.

Table 3. Descriptive statistics and effects for reading pleasure.

	N	Pre-Test		Post-Test	
		Mean	SD	Mean	SD
Intervention group	137	3.17	0.58	3.21	0.57
Delayed intervention (control) group	140	3.18	0.60	3.17	0.57
Comparison group	212	3.31	0.53	3.27	0.56

Note: SD = standard deviation.

Table 4. Descriptive statistics and effects for self-concept as a reader.

	N	Pre-Test		Post-Test	
		Mean	SD	Mean	SD
Intervention group	134	2.69	0.65	2.80	0.59
Delayed intervention (control) group	140	2.62	0.58	2.67	0.67
Comparison group	213	3.33	0.54	3.26	0.56

Note: SD = standard deviation.

Neither of the two groups of at-risk readers showed significant changes in reading pleasure from pre-test to post-test, $F(1, 275) = 0.146$, $p = 0.703$, $_{p}\eta^2 = 0.001$. The interaction effect Time × Group was also not significant, $F(1, 275) = 0.474$, $p = 0.492$, $_{p}\eta^2 = 0.002$. However, there was a small yet significant effect of time on self-concept as a reader, $F(1, 272) = 3.975$, $p = 0.047$, $_{p}\eta^2 = 0.014$, indicating that students had increased self-concept at post-test regardless of having received or not the intervention. The Time × Group effect was not significant, $F(1, 272) = 0.482$, $p = 0.488$, $_{p}\eta^2 = 0.002$.

When comparing the intervention group and the comparison group (no reading difficulties), these differed significantly at the pre-test both in terms of reading pleasure, $t(347) = -2.380$, $p = 0.018$, and self-concept as a reader, $t(345) = -9.906$, $p < 0.001$, with the comparison group having higher scores in both motivation indicators (Tables 3 and 4). The results of the analysis of variance indicate that none of the groups changed significantly their reading pleasure, as both the effect of time, $F(1, 347) = 0.010$, $p = 0.920$, $_{p}\eta^2 = 0.000$, and the interaction effect Time × Group, $F(1, 347) = 1.699$, $p = 0.193$, $_{p}\eta^2 = 0.005$, were not significant.

However, for self-concept as a reader, there was a significant Time × Group effect, $F(1, 345) = 7.778$, $p = 0.006$, $_{p}\eta^2 = 0.022$. As can be seen in Figure 5, in the post-test, there was a decrease in the gap between the intervention and the comparison groups in terms of their self-concept as readers.

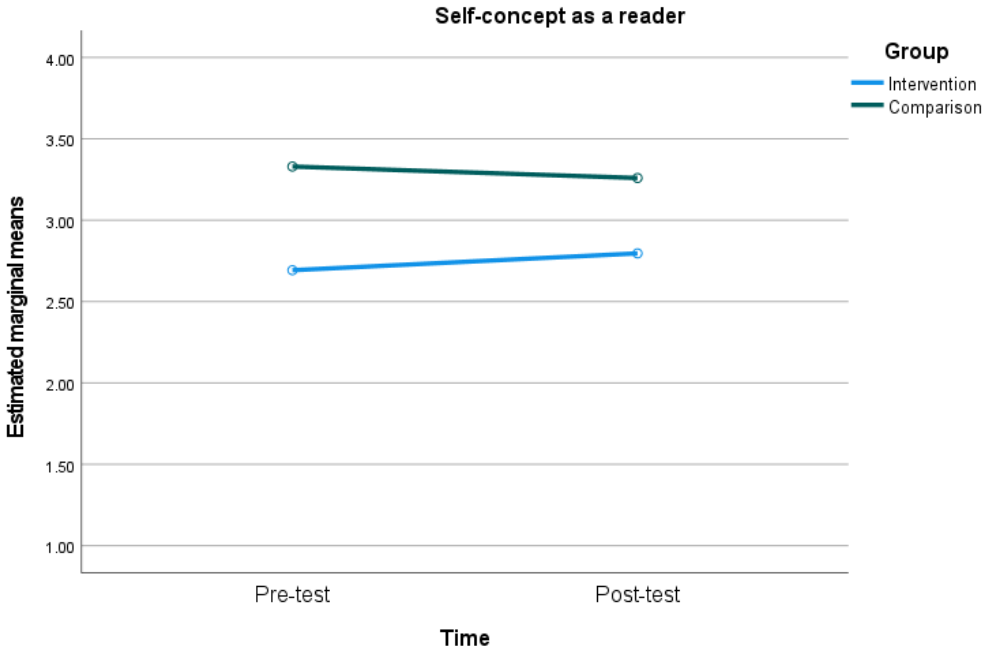


Figure 5. Self-concept as a reader in pre-test and post-test for the intervention and the comparison group.

3.3. Correlation between Gains in Reading and Reading Motivation in the At-Risk Readers

Tables 5 and 6 present the correlation matrix for the gains in reading measures and the motivation dimensions in the intervention and control groups. Within both groups, higher gains in reading fluency were associated with higher gains in word reading accuracy.

In the intervention group, gains in reading pleasure were associated with gains in self-concept as a reader. The remaining correlations were not significant.

Table 5. Correlation between gains in reading and motivation within the intervention group.

		1.	2.	3.	4.
1.	Gain in reading fluency	-	0.542 ***	−0.112	0.021
2.	Gain in word reading accuracy		-	−0.088	0.024
3.	Gain in reading pleasure			-	0.350 ***
4.	Gain in self-concept as a reader				-

Note: *** $p < 0.001$.

Table 6. Correlation between gains in reading and motivation within the delayed intervention (control) group.

		1.	2.	3.	4.
1.	Gain in reading fluency	-	0.254 ***	0.113	0.092
2.	Gain in word reading accuracy		-	0.059	−0.021
3.	Gain in reading pleasure			-	0.128
4.	Gain in self-concept as a reader				-

Note: *** $p < 0.001$.

4. Discussion

The objective of this study was to assess the influence of a multicomponent reading fluency intervention on Grade 3 students identified as at-risk readers, employing a randomized controlled trial approach. The findings reveal a statistically significant improvement in the students' reading skills, specifically in terms of reading fluency and word reading accuracy, when compared to the control group.

Earlier intervention studies conducted by Gersten et al. [12], Truckenmiller and Brehmer [9], Wanzek et al. [10], and Wu et al. [21] have shown that structured training combined with multicomponent methods can significantly improve code-related abilities, such as decoding and reading fluency. The results of this study suggest that the structured intervention program that we developed had a marginal influence on reading fluency and a moderate enhancement in word reading accuracy, which aligns with findings from Slavin et al. [19], Gersten et al. [12], and Wanzek et al. [10]. These results reinforce the importance of promoting foundational skills like word reading accuracy to facilitate the development of more complex skills, such as reading fluency. The observed small effect on reading fluency is consistent with previous research [32,35]. However, it is notably lower than the effect sizes reported by several Tier-2 interventions, which averaged around 0.3 [12,19]. One possible explanation for this modest impact on reading fluency could be the duration and frequency of our intervention (22 sessions, twice a week). It would be beneficial for future research to examine whether more prolonged or more frequent interventions might yield more substantial improvements in reading fluency. While our intervention yielded positive outcomes in reading accuracy, further studies are essential to conclusively determine its efficacy as a Tier-2 intervention for reading fluency. Nevertheless, this research shows that our intervention reduced disparities in word reading accuracy and, to some extent, the gap in fluency between at-risk readers and their typically reading peers. Future research could explore whether extended interventions or more frequent sessions could lead to greater improvements [7,10,12]. Furthermore, attention should be given to the strategies employed in the intervention. Previous research has demonstrated that repetition and re-readings enhance reading fluency in interventions with at-risk readers [21]. In the current intervention, a new text was introduced in each session, resulting in each text being practiced only once. The program could benefit from doubling each session, meaning assigning two sessions for students to engage with each text. This adjustment would facilitate the incorporation of repeated reading of the same text and broaden exposure to unfamiliar texts simultaneously [9,10,18], which would probably foster the efficacy of the intervention.

This study builds on previous research by showing the intervention reduced the disparity between at-risk readers (intervention group) and typical readers (comparison group), both in terms of word reading accuracy and reading fluency. This result highlights the importance of implementing structured interventions for at-risk students to improve their reading abilities and narrow the growth rate differences between average and struggling readers. Specifically, the present study suggests that despite the Matthew effect [3], which proposes that the gap between typical and at-risk readers tends to widen over time, this trend can be mitigated through timely, targeted, and evidence-based interventions.

In terms of reading motivation, the study revealed that none of the groups experienced significant increases in reading pleasure from the pre-test to the post-test. The lack of change in this dimension may be attributed to all groups already scoring highly at the start of the intervention, leading to a possible ceiling effect for this measure. However, concerning the dimension of self-concept, there was a significant main effect of time, indicating that both groups of at-risk readers (intervention and control) increased their self-concept from pre-test to post-test. While the improvement in self-concept was slightly larger for the intervention group, the absence of a significant interaction effect suggested that the change over time for both groups was comparable. Hence, the enhancement of students' self-concept as readers may simply reflect the overall growth observed in both groups, as research shows that these go hand in hand [17,25,27].

The results of this study demonstrate the effectiveness of a 22-session Tier-2 evidence-based intervention in promoting word reading accuracy and reading fluency among at-risk readers. The specific procedures employed, including the intervention's duration, frequency, group size, strategies, and type of interventionist can be replicated in other contexts. Regarding the specific strategies implemented, we found that the multicomponent intervention, which incorporates non-repetitive reading, systematic procedures to tackling challenging words, corrective feedback, praise, exposure to different genres of texts, and opportunities for self- and hetero-assessment, were highly beneficial. These evidence-based tools, when systematically integrated into the intervention routine, significantly enhanced the reading performance of third-grade at-risk readers [9,10,18,21].

The practical implications of this study highlight the importance of practitioners embracing evidence-based practices [13] and considering multicomponent reading fluency interventions to support at-risk readers. Professionals such as psychologists and regular and special education teachers can successfully implement Tier-2 interventions, similar to the one developed in this study. However, ensuring effective implementation requires that interventionists undergo training in evidence-based protocols and fidelity, and have continuous support during the intervention process [9]. This approach may be particularly beneficial in schools with limited resources. This study also emphasizes the potential benefits of incorporating universal screening data to identify students who may benefit from additional support and evidence-based interventions. While it is worth noting that universal screening is not yet a regular procedure in Portugal [14], its implementation could lead to early identification and informed decision-making processes within MTSS frameworks, using a preventive and evidence-based approach [6,11].

Several limitations of this study warrant attention. First, concerning the assessment of intervention fidelity, efforts were made to create a structured manual, a standardized protocol for each session, and a monitoring sheet to be completed by each interventionist. However, the study did not consider other procedures such as direct observation of the implementation or discussion between the interventionists and researchers about its delivery [36,37]. Second, this study focused on examining the immediate impact of the intervention on reading skills at the end of the program. However, it is essential to conduct follow-up studies to test whether the positive impact on reading performance is maintained long term. A third limitation concerns the scale used to measure reading motivation, which relied on self-report responses. Such self-report measures can be influenced by social desirability bias, which could explain to some extent the high scores in reading pleasure in children struggling to master reading skills. In future studies, the assessment of

reading motivation should include complementary methodologies, such as qualitative or behavioral assessments. The absence of a measure of reading comprehension is another limitation of this study, considering that comprehension is the ultimate goal of reading and that it depends on reading fluency mastering [38,39]. Future studies should include this measure in order to assess the effects of the intervention program not only on fluency and motivation, but also on comprehension.

In conclusion, the observed positive effects of the Tier-2 intervention for struggling readers contribute to the existing body of research in reading, particularly on the topic of reading fluency. This study provides further evidence of specific strategies that effectively promote targeted interventions in foundational skills.

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