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The relationships between oral narrative, reading, and writing skills in a longitudinal sample of Italian-speaking children: the moderating role of cognitive-lexical skills

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Abstract
Cross-sectional studies have shown the connections between oral language, reading, and writing skills, but there has been limited longitudinal research, especially in primary school. This study examined the relationships between oral narrative, reading, and writing skills in a longitudinal sample of 80 Italian-speaking primary school children (M-age at Time 1 = 8.57 years, SD = .53; 52 boys, 28 girls). The time frame of the study was one and a half years (two school years). Data collection was divided into three time points, T1 at the beginning of the school year, T1bis at the middle of the same school year, and T2 at the beginning of the subsequent school year. Measures collected were: oral narrative competence at T1, cognitive-lexical skills at T1bis, and reading and writing skills at T2. Reading and writing skills were also acquired at T1 as control variables. Moderate mediation models showed oral narrative competence directly predicted reading and spelling accuracy, while the interaction between oral narrative and cognitive-lexical skills significantly influenced outcomes (reading and spelling accuracy). Our findings extend knowledge about oral, reading, and writing domains' longitudinal connections in primary school and specify the important moderating role of cognitive-lexical skills in the relationship between oral language and literacy skills.

Keywords Oral narrative competence · Cognitive-lexical skills · Reading skills · Writing skills · Primary school children · Longitudinal study

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Introduction

The mastery of reading and writing skills during primary school is crucial for children's academic success (Brown et al., 2023). Given the complex nature of mastering these skills, a multitude of influencing factors can play a key role in facilitating and promoting the successful acquisition of reading and writing skills in school-aged children. A wide range of predictors emerge in the early stages of literacy development which make children better equipped to decode and spell accurately (Mercugliano et al., 2024; NELP, 2008; SNLG, 2022), such as oral language skills (e.g., Reed & Lee, 2020) and vocabulary skills (Sun & Yin, 2022). Worldwide there are a variety of writing systems, called alphabetic "orthographies" in which phonemes (sounds) match with a grapheme (symbols or letters) in varying degrees (Conrad, 2016). Each orthography can be set along a continuum ranging from consistent to inconsistent. When the sound-letter matching is inconsistent, orthographies are referred to as opaque or "deep", such as in English, Danish, French, and Portuguese. For example, the correct spelling for the English spoken word /ˈwɪmɪn/ is "women". By contrast, orthographies are referred to as transparent or "shallow" when there is a consistent match between sounds-signs, such as in Italian, Finnish, German, and Spanish. For example, in Italian, the spoken word /àr·te/ is spelled as "arte" (art).

Although several studies (e.g., Kim, 2020) in opaque orthographies like English have investigated the close relationships between oral narrative, lexical, and reading and writing skills throughout the early years of education, this topic needs to be further explored in transparent orthographies like Italian. From what has been explored so far, typically, research on this topic has focused on the English language (Reese et al., 2010; Suggate et al., 2018), a language known for its opaque orthography, characterized by inconsistent correspondence between graphemes and phonemes, leading to multiple ways of pronouncing the same letter combinations and several exceptions to phonetic rules (Mäkinen et al., 2013). The impact of the linguistic and cultural environment on children's narrative development (Gardner-Neblett & Iruka, 2015) and on their acquisition of reading and writing skills (McBride et al., 2022) is evident. Therefore, it becomes necessary to examine oral narrative, lexical, and reading and writing skills in transparent orthographies as well, where the correspondence between graphemes and phonemes is more regular and consistent. This means that once children learn the rules of phoneme-grapheme correspondence in Italian, they can more easily decode new words, reducing the cognitive load during the reading acquisition process compared to English (Babayiğit & Stainthorp, 2010). Italian's transparent orthography presents unique advantages in early literacy acquisition, offering consistent rules for sound-letter correspondence (Borleffs et al., 2019). However, despite this relative consistency, nuances and exceptions exist, necessitating a deeper understanding of Italian orthographic complexities (Burani et al., 2006).

Oral narrative skills and literacy development

Oral narrative competence, the ability to structure and narrate stories, plays a key role in children's literacy development. Research suggests that narrative skills not only reflect wider language abilities but also contribute to the achievement of reading and writing proficiency, particularly but not only in the early years of education (Chang, 2006; Pinto et al., 2015; Zanchi et al., 2019).

The predictive role of preschool oral narrative skills on school-age reading and writing skills

Several studies have demonstrated that preschool children's oral narrative competence significantly predicts later reading and writing abilities in primary school. For example, in an opaque language like English, a 9-year longitudinal study by Babayiğit et al. (2021), a path analysis model indicates that kindergarteners' narrative skills, assessed with recall and sentence length tasks using visual support, contribute directly to reading accuracy assessed in 8th grade. In another study, Griffin et al. (2004) investigated the relationships between English-speaking preschoolers' narrative and expository oral language competence and later reading and writing skills at age 8. Children's oral narrative ability at age 5 predicted reading comprehension and written narrative skills at age 8.

The key predictive role of preschoolers' oral narrative abilities has been confirmed in other types of orthographies. For example, in a transparent language like Finnish, the study by Mäkinen et al. (2018), showed that kindergarteners' oral narrative competence prompted with a picture booklet correlated significantly with word recognition in the 3rd grade. A result in line with findings in Italian orthography showing that oral narrative competence of 5-year-old children in preschool predicted their later written narrative competence assessed in 1st grade (Pinto et al., 2015) and 2nd grade via a mediational effect of orthographic competence (Pinto et al., 2015).

The predictive role of school-age oral narrative skills on school-age reading and writing skills

Although the studies carried out so far have considered the influence of oral narratives in preschool on reading and writing in primary school, few studies have investigated the relationship between oral narrative, reading, and writing skills in school-age children. The results from Reese et al. (2010) showed that 6-year-old English-speaking children's oral narrative abilities, assessed through a story-retelling task, correlated positively with reading ability at this age, but did not predict reading ability 1 year later. However, 7-year-old English-speaking children's narrative quality unambiguously predicted concurrent and future reading skills, even after taking into account receptive vocabulary and early decoding skills. In addition, the key role of oral narrative competence was also confirmed for writing skills. For example, the results by Sénéchal et al. (2018) revealed that oral storytelling dimensions uniquely influenced corresponding written narrative skills in English-speaking children in 4th grade.

For what concerns transparent orthographies, the study by Zanchi et al. (2019), investigated the relationship between oral narrative competence, reading and writing skills in Italian 2nd and 3rd graders. In this cross-sectional study, a correlation was found between macro- and micro-structural indices of narrative competence (recall task) and the production of written text, but no correlations were found with writing accuracy, nor with reading speed and accuracy. Other cross-sectional studies in the Italian language have found a positive association between oral narrative and vocabulary skills (Vettori et al., 2022a), lexical, reading, and spelling skills (Vettori et al., 2023), as well as revealing the contribution of oral narrative textual competence and spelling skills for written narrative textual competence (Vettori et al., 2022b) in school-age monolingual and bilingual language minority children.

Overall, previous research produced controversial results, some indicating the existence of continuity between kindergarten and primary school (e.g., Babayiğit et al., 2021), while others, instead, supported the idea that the link between oral language and literacy changes across primary school years, attenuates or disappears altogether in the early primary school years (e.g., Storch & Whitehurst, 2002), and reappears beyond the second grade with respect to both accuracy and comprehension (Sénéchal & LeFevre, 2002). Other studies have demonstrated that word reading accuracy was significantly associated with spelling performance in typically developing school-age children and their peers with SLI and dyslexia, but not oral language (see, McArthur et al., 2012).

Lexical skills and literacy development

During school years, children increase the number of known words and depth of meanings which is a fundamental step for the subsequent development of reading and writing skills. Studies have demonstrated the association between the number of words known by children and their reading decoding skills (Dulay et al., 2021; Fraser & Conti-Ramsden, 2011; Protopapas et al., 2007), reading comprehension (Protopapas et al., 2007; Richter et al., 2013), and writing skills (Stæhr, 2008; Yüksel, 2015).

Although important, these results need to be further explored by assuming not only the number of known words but also the depth and quality of lexical knowledge. A model developed by Boschi et al. (1992) for Italian language learners assumes that the development of lexical skills is supported by cognitive and language processing. For this reason, the use of the term "cognitive-lexical skills" was assumed in this work to refer to children's ability to understand the depth of meanings of words in different phrasal contexts. Within the wide range of cognitive-lexical skills, some of them include, for example, those involved in categorization, which is based on perceptual and functional properties, or the ability to generate synonyms and antonyms. In previous studies that assumed the same cognitive-lexical construct, the important role of cognitive-lexical skills emerged for writing and spelling skills, as highlighted by Bigozzi and Biggeri (2000) and Incognito et al. (2023) on Italian-speaking monolingual and L2-Italian bilingual-language minority samples (Vettori et al., 2022a). However, while studies in the Italian transparent language have investigated the direct relationships between cognitive-lexical skills and reading and writing skills, few have explored the indirect relationships, particularly their mediation roles, in longitudinal studies. Investigating these indirect relationships, especially those linked to cognitive-lexical skills, is crucial to understanding how narrative skills impact writing and reading proficiency during primary school years.

Rationale

From a review of the literature, significant associations between oral narrative skills and reading and writing skills in preschoolers have emerged as both opaque (Babayiğit et al., 2021) and transparent (Pinto et al., 2015, 2015; Mäkinen et al., 2018) languages. The contribution of oral narrative abilities for reading and writing has also been confirmed in English-speaking children attending primary school (Reese et al., 2010), while studies are scarce in school-aged children speaking a transparent language such as Italian and have largely assumed a cross-sectional research design (e.g., Vettori et al., 2023; Zanchi et al., 2019) rather than longitudinal, which limits our understanding of how oral narrative

abilities develop over time and their longitudinal impact on reading and writing accuracy. Only a few studies have investigated the specific role of oral narratives for reading and writing accuracy in primary school, with some expectations proving cross-sectional results (e.g., Zanchi et al., 2019).

Addressing these gaps, this study aims to investigate the predictive role of Italian-speaking children's oral narrative and cognitive-lexical skills on subsequent orthographic accuracy (writing domain) and decoding accuracy (reading domain) measured one and a half years later in primary school. By focusing on accuracy tasks and employing a longitudinal research design, this study aims to clarify the complex relationship between oral narrative abilities and core literacy skills during the critical phase of primary school education. Additionally, by considering cognitive-lexical skills as potential mediators, the study will offer insights into the mechanisms through which narrative competence impacts literacy development. This approach, using a free narrative task, where children are encouraged to narrate a story from their own imagination, instead of the most used traditional recall or picture-based tasks (e.g., Reese et al., 2010; Zanchi et al., 2019), is expected to capture a more authentic measure of narrative quality, further contributing to our understanding of literacy acquisition (Spinillo & Pinto, 1994).

Aims and hypothesis

The current study seeks to add to our knowledge of reading and writing development, as well as its antecedents, for primary school children, in our case 3rd, 4th, and 5th graders.

Specifically, the aims of this study are the following:

- Aim 1: investigating the relationship between oral narrative competence (measured at Time 1) and reading skills, both speed and accuracy (measured at Time 2), controlling reading skills at Time 1, with the moderating effect of cognitive-lexical skills (measured in an intermediate time) in Italian-speaking primary school children.
- Aim 2: investigating the relationship between oral narrative competence (measured at Time 1) and spelling accuracy skills (measured at Time 2), controlling spelling skills at Time 1, with the moderating effect of cognitive-lexical skills (measured in an intermediate time) in Italian-speaking primary school children.

Regarding Aim 1, we expect that oral narrative skills directly support reading accuracy and speed (reading domain) measured one and a half year later.

Regarding Aim 2, we expect that oral narrative skills directly support spelling accuracy (writing domain) measured one and a half year later.

In both models, we also expected a stronger longitudinal relationship if cognitive-lexical skills were inserted as moderators.

Method

Participants

A total of 80 children from a primary school [M-age (SD) = 8.57 (0.53); $n = 28$ females, $n = 52$ males] participated in this longitudinal study. Of these, at the beginning of the study,

39 students attended the 3rd grade (at Time 2 they were in the 4th grade) and 41 students attended the 4th grade (in the 5th grade at Time 2). The classes were composed of monolingual children (55%) and bilingual language minority (BLM) children (45%). The Italian primary school system consists of a 5-year program for children aged 6 to 10, guided by national curriculum standards set by the Ministry of Education. Reading and writing formal instruction begins in the first year, and generally, the process reaches its full completion at the end of the third grade. The parents provided informed consent for the children to participate in the research. The study followed all the indications of the Declaration of Helsinki (World Medical Association, 2013) and was approved by the Ethical Committee of the University of Florence (Italy).

Research design

This study is a multiple-wave study in which data were collected three times in a period spanning approximately one and a half calendar years, with the same sample: at the first measurement, the children attended the 3rd and 4th grades in primary school, while at the last measurement, they attended the 4th and 5th grades.

The variables measured at Time 1 were oral narrative skills, reading accuracy (number of errors), reading speed, and spelling accuracy (number of errors). Between the first and last measurement, as already done in previous studies (e.g., Hulme et al., 2015; Muter et al., 2004), the children completed a task to measure cognitive-lexical skills (Time 1bis). Finally, the outcome variables: reading accuracy (number of errors), reading speed, and spelling accuracy (number of errors) were measured at Time 2 (Fig. 1).

Measures

First wave of data collection (T1)

Oral narrative skills (narrative structure)

To assess oral narrative skills, an invented story narrative task was used. The children were asked to compose an orally invented story (see, Bigozzi et al., 2016; Pinto et al., 2017), following this prompt: "Would you like to tell me a story?". All stories were transcribed and codified by two independent raters. The story's structure (Spinillo & Pinto, 1994) was coded according to the existence or absence of eleven aspects of the narrative genre (e.g., Labov & Waletzky, 1967), such as title, opening, setting, character

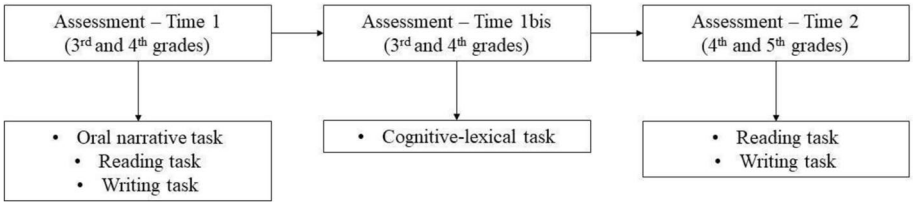

Fig. 1 Graphical representation of the research design

description(s), problem, central event, resolution of the problem, and story ending. Five levels of story structure were identified: no telling (score 0), no story (score 1), sketch story (score 2), incomplete story (score 3), essential story (score 4) and complete story (score 5). The coding of scores was carried out by two independent raters, with 97–99% agreement. Each case of disagreement was discussed and resolved by the two raters.

Reading accuracy (number of errors) and reading speed

Children were tested on their reading accuracy using the MT reading test (Cornoldi et al., 1998), a standardized test that has good psychometric qualities, which was administered by the researcher to each child individually. The child was instructed to read aloud from a text as best he/she could, with the experimenter noting reading time and mistakes.

The "reading accuracy" score was determined by counting the number of mispronounced, omitted, or added syllables made while reading aloud.

The "reading speed" score was determined by calculating the ratio of time that the student takes to read the paragraph (in seconds) and the total number of syllables read. According to the guidelines for the reading test, the Cronbach's alpha coefficient is 0.70.

Spelling accuracy (number of errors)

Spelling accuracy was assessed using a paper-and-pencil text dictation that was standardized for the Italian population (Tressoldi & Cornoldi, 2000). During school hours, children performed the dictation on their own in a group classroom session. Children were required to write down the text after listening to a recorded version of it, as instructed by the authors.

The "spelling accuracy" score was calculated as the ratio of all orthographic errors to all written words (see Pinto et al., 2012). According to the guidelines for the writing test, Cronbach's alpha coefficient is 0.83.

Middle wave of data collection (T1bis)

Cognitive-lexical skills

The "Multidimensional Vocabulary Tasks" (Boschi et al., 1989, 1996), specifically created for the Italian language, were used to evaluate the children's cognitive-lexical skills. By applying the cognitive-linguistic processes of categorization based on perceptual and functional properties and the capacity to create synonyms and antonyms, the task assesses children's ability to define words. Additionally, the task assesses children's ability to define polysemic terms that are commonly used in Italian, such as *bello* (beautiful), *buono* (good), and *grande* (large), which have multiple meanings depending on the phrasal context in which they are used. Following the authors' guidelines, the children were asked to read a short, written text (50–100 words), and answer 20 multiple-choice questions regarding the meaning of some words. Before the test began, a familiarisation reading of the task was conducted. Scores ranged up to 20. Regarding our sample, Cronbach's alpha was 0.78.

Last wave of data collection (T2)

Reading accuracy (number of errors), reading speed, and spelling accuracy (number of errors) were assessed using the same instruments described above in the section "First wave of data collection (T1)".

Data analysis

The main descriptive statistics and bivariate correlations with Pearson's coefficient were computed to test the relationships between the variables measured in all waves.

To test the pattern of the relationship between oral narratives and cognitive-lexical skills and accuracy in reading and writing and reading speed, controlling for linguistic condition, a moderated mediation model was developed as suggested by Hayes (2013, 2018). Through PROCESS, the model identified is no. 15 among the models proposed by Hayes (Fig. 2). Following Hayes's guideline, in this model, X is the independent variable, Y is the dependent variable, M_i is the mediator and V is the moderator.

Based on this model, three separate analyses were performed for (1) reading speed, (2) reading accuracy, and (3) writing accuracy. The model for (1) reading speed included the following variables: reading speed at T2 (Dependent Variable, DV), oral narrative skills at T1 (Independent Variable, IV), reading speed at T1 (mediator), cognitive-lexical skills (moderator), linguistic condition (control). In addition, the model for (2) reading accuracy included the following variables: reading errors at T2 (DV), oral narrative skills at T1 (IV), reading errors at T1 (mediator), cognitive-lexical skills (moderator), and language condition (control). Finally, the model for (3) writing accuracy included the following variables: errors in writing at T2 (DV), oral narrative skills at T1 (IV), errors in writing at T1 (mediator), cognitive-lexical skills (moderator), and linguistic condition (control).

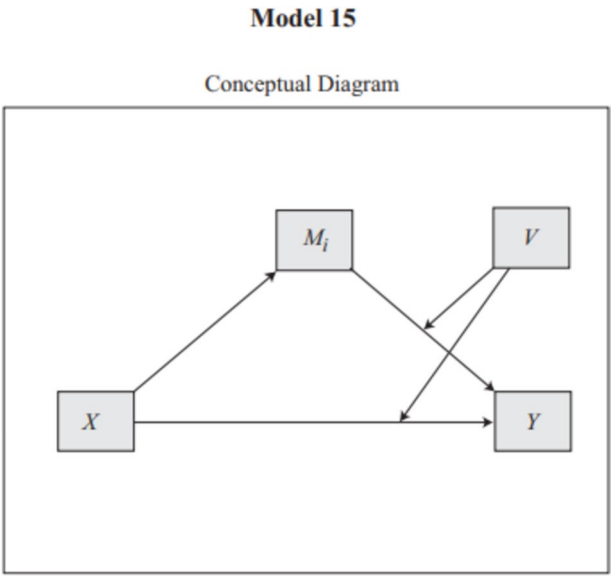

Fig. 2 Model 15: figure extracted from Model templates for PROCESS for SPSS and SAS (Hayes, 2013)

The direct effects and interactions between the variables were calculated. To verify the effect size of the moderated mediational models, Cohen's f^2 was used (Cohen, 2013). As applied by Selya et al. (2012), we used the following formula: $f^2 = (R^2_{AB} - R^2_A)/(1 - R^2_{AB})$, where R^2_{AB} is the proportion of variance explained by all predictors in the model, while R^2_A represents the proportion of variance explained by the predictors in the model without the added variable(s) of interest (e.g., without the moderator or interaction term). Cohen's guidelines for interpreting f^2 are (1) small effect = 0.02; (2) medium effect = 0.15; and (3) large effect = 0.35.

Results

Table 1 shows the main descriptive statistics of the variables considered in T1 and T2.

Table 1. Main descriptive statistics at Time 1 and 1bis (variables: oral narrative skills, reading errors, reading speed, writing errors, and cognitive-lexical skills) and Time 2 (variables: reading errors, reading speed, writing errors, and cognitive-lexical skills).

Table 2 shows the Pearson (r) coefficients of the bivariate correlations to test the relationships between all variables. The results show that oral narrative skills measured at T1 correlate negatively and significantly with the outcome variables: reading errors ($r = -0.30$) and writing errors ($r = -0.33$). Cognitive-lexical skills correlate negatively with errors in reading ($r = -0.45$) and in writing ($r = -0.62$) measured at Time 1 and with the outcome variables (reading errors: $r = -0.37$, writing errors: $r = -0.56$). Finally, the reading and writing errors measured at Time 1 correlate positively with the corresponding variables at Time 2.

Relationship model for reading speed

Overall, results show that the model is statistically significant ($F(5, 37) = 16.02$, $R^2 = 0.68$, $p < 0.001$). However, the statistical significance of individual variables does not emerge. Figure 3 shows the representation of the model in which the dependent variable is the reading speed at T2.

Table 1 Main descriptive statistics of the variables at Time 1 (oral narrative skills, reading errors and writing errors) and Time 2 (cognitive-lexical skills, reading errors and writing errors): means, standard deviations, minimum and maximum, skewness, and kurtosis

		Mean	SD	Minimum	Maximum	Skewness (SE)	Kurtosis (SE)
Time 1	Oral narrative skills	2.94	1.11	1	5	−.1 (.30)	.81 (.58)
	Reading errors	4.67	4.17	0	22	2.08 (.31)	5.43 (.62)
	Writing errors	.19	.16	.01	.65	1.15 (.27)	.45 (.54)
	Reading speed	2.95	.99	.86	5.16	0 (.33)	.15 (.64)
Time 1bis	Cognitive-lexical skills	16.92	1.21	15	19	−.21 (.27)	−.92 (.54)
Time 2	Reading errors	5.96	5.60	0	32	2.34 (.28)	7.28 (.56)
	Writing errors	.12	.19	0	.91	2.17 (.27)	4.16 (.53)
	Reading speed	3.08	.97	1.02	5.38	−.07 (.28)	−.09 (.56)

SD is standard deviation, *SE* is standard error

Table 2 Pearson's coefficients of bivariate correlations

	Oral narrative skills	Cognitive-lexical skills	Reading errors T1	Reading speed T1	Writing errors T1	Reading errors T2	Reading speed T2	Writing errors T2
Oral narrative skills	–	.15	−.09	.01	−.22*	−.30*	.21	−.33*
Cognitive-lexical skills		–	−.45**	.59***	−.62***	−.37**	.61***	−.56***
Reading errors T1			–	−.60***	.67***	.54***	−.50***	.65***
Reading speed T1				–	−.78***	−.53***	.81***	−.68***
Writing errors T1					–	.58**	−.67***	.86***
Reading errors T2						–	−.57***	.56***
Reading speed T2							–	−.67***
Writing errors T2								–

*$p < .05$, **$p < .01$, ***$p < .001$

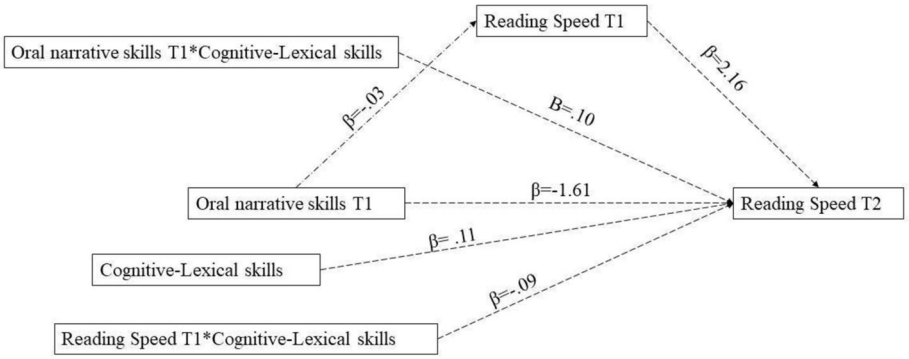

Fig. 3 Representative statistical model of the relationships between oral narrative skills, cognitive lexical skills, and reading speed. *Note. The figure shows the standardised betas for each relationship: dotted lines indicate that there is no significant relationship*

Relationship model for reading accuracy

Overall, the results show that regardless of language condition, the model is statistically significant ($F(6,37) = 5.01$, $R^2 = 0.45$, $p < 0.001$). Cohen's f^2 is 0.23 indicating a medium-to-large effect size.

Specifically, as shown in Table 3 and Fig. 4, oral narratives significantly negatively predict errors in reading ($\beta = -1.80$, $p < 0.05$), meaning that the higher the scores of oral narratives at Time 1 the fewer errors made in reading at Time 2. There is also a predictive effect of reading errors at Time 1 on reading errors at Time 2 ($\beta = 0.60$, $p < 0.05$), but no significant direct effect of cognitive-lexical skills ($\beta = -0.52$, $p = 0.43$). However, there is a significant positive interaction effect between oral narratives at Time 1 and cognitive-lexical skills on reading errors ($\beta = 1.38$, $p < 0.05$). As suggested by Hayes (2013) and others (e.g., Hall & Sammons, 2013), this result shows that the interaction between oral narration and cognitive-lexical skills has a more powerful effect on reading accuracy than the direct effects of each variable individually.

Table 3 Values of the main and interaction effects on reading accuracy at Time 2

	t-value	95% CI-LL	95% CI-UL
Language condition	1.38	−.93	4.97
Oral narrative skills (T1)	−2.56*	−3.22	−.38
Reading errors (T1)	2.59*	.13	1.07
Cognitive-lexical skills (T1bis)	−.73	−1.86	.81
Oral narrative skills (T1)* cognitive-lexical skills (T1bis)	2.27*	.15	2.61
Reading errors (T1)*cognitive-lexical skills (T1bis)	.63	−.21	.35

*$p < .05$, *95% CI-LL* confidence interval-lower limit; *95% CI-UL* confidence interval-upper limit

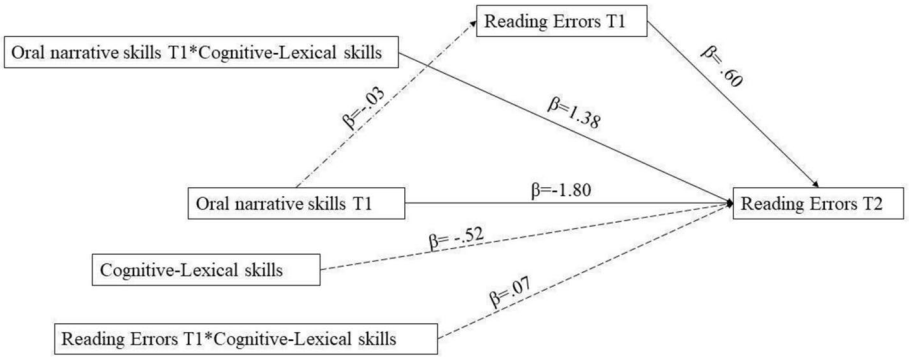

Fig. 4 Representative statistical model of the relationships between oral narrative skills, cognitive lexical skills and reading accuracy. *Note. The figure shows the standardised betas for each relationship: dotted lines indicate that there is no significant relationship, and solid lines indicate that the relationship is significant*

Relationship model for writing accuracy

In general, the results show that regardless of language condition, the model is statistically significant ($F(6,56) = 36.95$, $R^2 = 0.80$, $p < 0.001$). Cohen's f^2 is 0.30 indicating a medium-to-large effect size.

Specifically, as shown in Table 4 and Fig. 5, oral narratives significantly negatively predict errors in writing ($\beta = -0.22$, $p < 0.05$), meaning that the higher the scores of oral narratives at Time 1, the fewer errors in writing at Time 2. There is also a predictive effect of errors in writing at Time 1 on errors in writing at Time 2 ($\beta = 2.40$, $p < 0.01$), but no significant direct effect of cognitive-lexical skills ($\beta = -0.03$, $p = 0.14$). However, there is a significant positive interaction effect between oral narratives at Time 1 and cognitive-lexical skills on writing errors ($\beta = 0.01$, $p < 0.05$). As suggested by Hayes (2013) and others (e.g., Hall & Sammons, 2013), this result shows that the interaction between oral narration and cognitive-lexical skills has a more powerful effect on writing accuracy than the direct effects of each variable individually. The low beta coefficient value is not entirely surprising, since, as Preacher et al. (2007) suggest, the effects of moderating variables on predictor mechanisms are relevant even if small, provided they are statistically significant.

Table 4 Values of the main and interaction effects on Writing accuracy at Time 2

	t-value	95% CI-LL	95% CI-UL
Language condition	1.33	−.01	.06
Oral narrative skills (T1)	−2.34*	−.41	−.03
Writing errors (T1)	2.71**	.63	4.18
Cognitive-lexical skills (T1bis)	−1.51	−.07	.01
Oral narrative skills (T1)* cognitive-lexical skills (T1bis)	2.21*	.01	.03
Writing errors (T1)*cognitive-lexical skills (T1bis)	−1.99	−.22	.00

**$p < .01$, *$p < .05$, *95% CI-LL* confidence interval-lower limit, *95% CI-UL* confidence interval-upper limit

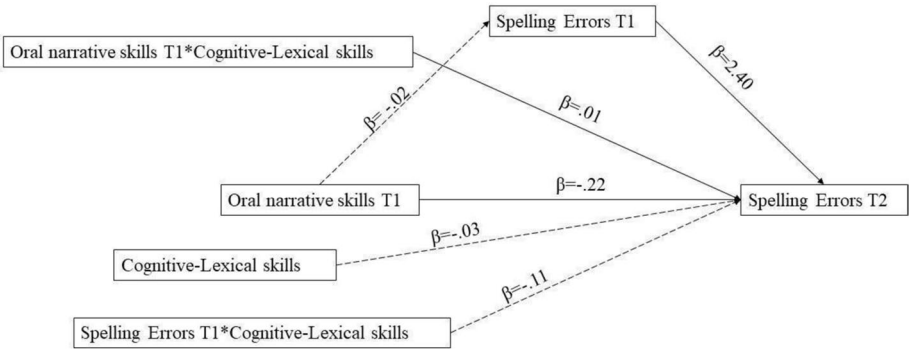

Fig. 5 Representative statistical model of the relationships between oral narrative skills, cognitive lexical skills, and writing accuracy. *Note. The figure shows the standardised betas for each relationship: dotted lines indicate that there is no significant relationship, and solid lines indicate that the relationship is significant*

Discussion

This study provides evidence for the relationships between oral narrative, reading, and writing skills in a longitudinal sample of Italian-speaking children followed over two school years by shedding light on the moderating role of cognitive-lexical skills. Both direct and indirect relationships were studied by assuming the moderating role played by primary school children's cognitive-lexical skills. Our findings significantly extend prior research coming from English-speaking children and opaque orthographies by testing the longitudinal predictive role of different aspects of oral language (i.e., the ability to provide adequate structure to oral narratives, quantity and depth of word knowledge) for children's reading and writing acquisitions in the Italian transparent orthography.

Focusing first on the direct contribution of oral narrative skills measured at Time 1 on reading and writing measured at Time 2, consistent with our hypothesis, we found that 3rd and 4th graders' oral narrative skills directly predicted their reading accuracy (Aim 1) and spelling accuracy (Aim 2) 1 year and a half year later. Previous research had given a complex picture of results, some indicating the existence of continuity between kindergarten and primary school (e.g., Babayiğit et al., 2021), while others, instead, supported the idea that the link between oral language and literacy changes across primary school years, attenuates or disappears altogether in the early primary school years (e.g., Storch & Whitehurst, 2002), and reappears beyond the second grade with respect to both accuracy and comprehension (Sénéchal & LeFevre, 2002). Other studies demonstrated that word reading accuracy was significantly associated with spelling performance in typically developing school-age children and their peers with specific language impairment and dyslexia, but not oral language (see, McArthur et al., 2012). Our study contributes to this debate by highlighting the direct predictive role of oral narrative skills on reading and writing accuracy in Italian-speaking primary school children. Our results show that primary school children with a higher ability to adequately structure narrative through oral language one and a half years later exhibited better performance in reading and spelling accuracy. Our findings confirm the important role of oral narrative skills for reading and writing as emerged in previous studies conducted in opaque languages with primary school children (Babayiğit et al., 2021; Griffin et al., 2004), as well as in transparent languages across the transition between preschool and the

early years of primary school (e.g., Bigozzi et al., 2017; Mäkinen et al., 2018; Pinto et al., 2016; Zanchi et al., 2019).

As pointed out by Reese et al. (2010), by the time children are reading complex storylines, their understanding of individual words and their understanding of larger narrative macrostructures are essential for fluent reading. These higher-order skills are built up from early childhood through home language input (Vettori et al., 2023) and home literacy practices and environment (Bigozzi et al., 2023; Duncan et al., 2020). Interestingly, the study by Reese et al. (2010) showed that in primary school the specific aspect of narrative quality that correlated with reading performance was children's ability to introduce characters and provide temporal, causal, and locational information in their narratives (orientation). Narrative competence also requires the use of conventionalized language and a decontextualized way of thinking associated with the possibility of reasoning at a hypothetical level (Astington & Olson, 1990). Decontextualized language means that the narrator thinks beyond the immediate context to convey meaning through linguistic devices (e.g., syntax, vocabulary) and meta-linguistic aspects (e.g., structure) about abstract events or experiences that are not accessible in the present. This ability to work with conventional rules and meta-linguistic aspects of language might explain the predictive role of oral narrative skills on later reading and spelling accuracy. Spelling, in fact, is a complex skill that relies on knowledge of language-specific sound-to-letter mappings and letter patterns, as well as knowledge of conventional rules.

Differently from previous studies that investigated the predictive role of oral narrative skills assessed via a story recall or narrative length (e.g., Reese et al., 2010), our study provides an innovative view of the link between oral narrative skills and children's reading and spelling ability in primary school by assessing narrative skills via an invented narrative task (see also, Bigozzi and Vettori, 2016; Bigozzi et al., 2017).

No significant relationships emerge between oral narrative skills and reading speed. As emerged in previous studies in the Italian language, to increment speed reading is necessary to adopt specific and targeted interventions. In fact, from a clinical point of view, when a child is practicing an intervention, the result is an improvement in reading accuracy and only later on reading speed (Mc Arthur et al. 2012). Regarding our results different possible explanations could emerge. One can be related to a problem from a statistical point of view. The first step was to ensure that multicollinearity was not an issue among the variables in the model. Specifically, both the tolerance and VIF values were within acceptable limits for indicating non-multicollinearity (Johnston et al., 2018; Kim, 2019). Although we employed the percentile bootstrap correction method, these results suggest that the sample size for these analyses should still be improved for greater robustness (Xu et al., 2024).

A further possible explanation could be related to the fact that since reading and writing have similar processes (see Bigozzi et al., 2016), it is easy to observe that those who make spelling mistakes read slowly. In fact, reading speed is related to spelling correctness in transparent spellings (e.g., Newman et al., 1993). Referring to the Dual-Route Model (Coltheart, 1993), both writing and reading speed require full efficiency of the direct route (full mental representation of the words in the graphemic buffer). In fact, while correctness can also be guaranteed by the process of grapheme-phoneme conversion in a possibly slow reading, speed necessarily requires immediate recognition of the word through its retrieval from the grapheme buffer.

To better understand the relationships between oral narrative, reading, and writing skills in a longitudinal sample of Italian-speaking children, the moderating role of cognitive-lexical skills was investigated. The literature has shown how lexical quality influences reading

comprehension and word decoding skills (e.g., Fraser & Conti-Ramsden, 2011; Protopapas et al., 2007; Richter et al., 2013), explored the connection between lexical competence and reading in primary school children. In accordance with models of word reading (e.g., Strain et al., 1995), which established that oral language influences spelling via semantic-orthographic connections, our results show an additional indirect relationship between oral narrative skills and reading or spelling accuracy via the moderating role of cognitive-lexical skills. Previous research suggests that cognitive-lexical skills affect both reading and writing skills in opaque (e.g., Ouellette & Beers, 2010) and transparent (e.g., Vettori et al., 2022a) languages by adopting a cross-sectional research design. Our results confirm previous findings (e.g., Incognito et al., 2023) about the importance of school-aged children's cognitive-lexical skills that act as moderators.

The ability to invent a story orally implies the ability to select and organize the content by using words properly, in accordance with a comprehensive plan of the oral discourse. Primary school children with a high ability to structure narratives orally and with high cognitive lexical skills may benefit at the written and reading levels due to the ability to manage high-level aspects (e.g., the understanding of the story structure children are reading or listening to) and deep knowledge of word meanings, and this, in turn, may facilitate low-level processes of accurate reading decoding and accurate spelling coding.

Conclusion and implications

In conclusion, this study confirms the direct predictive role of narrative competence in oral productions on reading and writing skills one and a half years later after the first testing, as well as the moderated relationship with cognitive-lexical skills. More specifically, the knowledge children have about the structure of a story, known as story grammar, and deep knowledge of word meanings play a central role in later accuracy in reading and spelling. These findings underscore the importance of promoting oral narrative competence, even in primary school, which not only enhances children's storytelling abilities but also contributes to critical literacy skills.

While teachers and school practitioners recognize the importance of oral language for reading and writing abilities, there are often limited opportunities for children to engage in producing oral narratives within primary school curricula. This study suggests the need for teaching practices focused on oral narratives in school-aged children, which can also allow children to learn new words and meanings. By integrating oral storytelling tasks into day-to-day classroom instruction, educators can create a stronger foundation for literacy development. Previous research intervention has obtained important results indicating narratives as a useful tool to support the development of oral language skills (Pinto et al., 2019a, b).

Limitations and suggestions for further studies

While this study provides valuable insights into the predictive role of oral narrative competence and cognitive-lexical skills in reading and writing development, several limitations should be acknowledged. First, the relatively small sample size may restrict the generalizability of the findings, making it difficult to draw firm conclusions on larger populations. Moreover, although the longitudinal design of the study is a strength, capturing changes over time, it may not fully encompass the complexity of narrative development, which

could evolve significantly beyond the one-and-a-half-year span covered by this research. Another limitation lies in the measurement tools used. While effective, these assessments may not fully capture the intricate dimensions of narrative competence or cognitive-lexical skills. Additionally, this study did not extensively explore how external factors such as cultural background, socioeconomic status, or bilingualism might influence children's narrative and literacy skills.

Given the findings and limitations, it would be useful to replicate this study with a larger sample size, to allow a better generalisability of results and to promote a better understanding of the mechanisms underlying the connections between oral and reading and spelling. Additionally, incorporating other indicators of story quality, such as language of mind or mental state talk, could provide valuable insights into how children's understanding of mental states and perspectives contributes to both oral and written narratives, as well as reading comprehension (e.g., Kim et al., 2021).

Future studies should also explore the role of narrative abilities in relation to other individuals, cognitive (e.g., executive functions), or language (e.g., L1 and/or L2) skills, considering both typical and atypical developmental trajectories.

Moreover, examining contextual factors, such as the home literacy environment and literacy practices, could shed light on how external influences interact with children's narrative and literacy development. Longitudinal research that tracks these variables across different stages of development would be particularly valuable in identifying critical periods for intervention. This comprehensive approach could significantly enrich our understanding of the complex interplay between cognitive, linguistic, and environmental factors in shaping children's literacy outcomes.

Declarations

Competing interests The authors declare that they have no competing interests.

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Current theme of research:

Development of writing skills and literacy abilities in pre-school and school-age children with different linguistic backgrounds, students' learning orientations and the prevention of early school leaving, the relationship between cognitive-linguistic processes and the learning environment.

Most relevant publications in the field of Psychology of Education:

Vettori, G, Di Leonardo, L., Secchi, S., & Bigozzi, L. (2024). The sound of silence. children's own perspectives on their hearing and listening in classrooms with different acoustic conditions. *European Journal of Psychology of education.* Advance online publication. https://doi.org/10.1007/s10212-024-00819-4.

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Current theme of research:

Predictive indices of learning processes, school intervention, and enhancement, reading and writing development.

Most relevant publications in the field of Psychology of Education:

Incognito, O., Mercugliano, A., & Bigozzi, L. (2023). Influence of lexical development on reading and spelling skills: effects of enhancement on second-grade children in primary school. *Children*, *10*(8), 1416. https://doi.org/https://doi.org/10.3390/children10081416.

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Current theme of research:

Specific learning disorders, identification of predictors of developmental dyslexia, explanatory factors of specific spelling learning disorder, the relationship between lexical competence, spelling, and reading comprehension in typical and atypical development, school interventions; teaching and learning processes; and effectiveness of teaching methods.

Most relevant publications in the field of Psychology of Education:

Bigozzi, L., Vettori, G., & Incognito, O. (2023). The role of preschoolers' home literacy environment and emergent literacy skills on later reading and writing skills in primary school: a mediational model. *Frontiers in Psychology, Article 14:1,113,822*.

Vettori, G., Di Leonardo, L., Secchi, S., Astolfi, A., & Bigozzi, L. (2022). Primary school children's verbal working memory performances in classrooms with different acoustic conditions. *Cognitive Development, 64,* Article 101,256.

Bigozzi, L., Tarchi, C., & Pinto, G. (2017). Consistency and stability of Italian children's spelling in dictation versus composition assessments. *Reading & Writing Quarterly*, *33*, 109–122.

Bigozzi, L., Tarchi, C., & Pinto, G. (2016). Spelling across tasks and levels of language in a transparent orthography. *PLoS One, 11,* e0163033.

Pinto, G., Tarchi, C., & Bigozzi, L. (2015). The relationship between oral and written narratives: A three-year longitudinal study of narrative cohesion, coherence, and structure. *British Journal of Educational Psychology, 85*, 551–569.

Bigozzi, L., & Vettori, G. (2016). To tell a story, to write it: developmental patterns of narrative skills from preschool to first grade. *European Journal of Psychology of Education, 31,* 461–477.

Pinto, G., Bigozzi, L., Gamannossi, B. A., & Vezzani, C. (2012). Emergent literacy and early writing skills. *The Journal of genetic psychology, 173*, 330–354.

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Current theme of research:

Development of emergent literacy skills; relationships between emergent literacy skills and formalized literacy skills in monolingual and bilingual children; home literacy environment; students' digital literacy; critical thinking.

Most relevant publications in the field of Psychology of Education:

Incognito, O., & Tarchi, C. (2023). The association between sourcing skills and intertextual integration in lower secondary school students. *European Journal of Psychology of Education*, 1–16.

Incognito, O., Mercugliano, A., & Bigozzi, L. (2023). Influence of lexical development on reading and spelling skills: effects of enhancement on second-grade children in primary school. *Children*, *10*(8), 1416.

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Pinto, G., & Incognito, O. (2022). The relationship between emergent drawing, emergent writing, and visual-motor integration in preschool children. *Infant and Child Development*, *31*(2), e2284.

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