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Oral Language and Writing Skills in the First Years of Formal Education

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ABSTRACT

Purpose: Research has highlighted the role of children's oral language skills in the production of written text. Most studies have been cross-sectional, with upper elementary or kindergarten samples. The present study investigated (a) the components of written text production in the first years of school entry; and (b) whether early oral language skills were related to writing quality using a longitudinal design and considering the concurrent role of vocabulary, oral narrative, reading comprehension and transcription skills.

Method: Monolingual English-speaking children ($N = 157$; 59% female) were first assessed in their first two years of compulsory education in England ($M_{age\ months} = 63.66$, $SD = 7.14$) on a measure of core oral language (receptive and expressive vocabulary and grammar). A school year later, measures of oral narrative skills, reading comprehension, spelling, handwriting fluency and writing were collected. Measures of writing productivity, accuracy, and quality were obtained.

Results: Three dimensions were identified in the writing samples: productivity, spelling, and quality. Spelling ability, vocabulary, and core oral language predicted productivity, while only spelling ability and handwriting fluency predicted spelling in written compositions. GLM mediation analysis revealed that a longitudinal measure of core oral language directly (and indirectly through reading comprehension) related to later writing quality.

Conclusion: The findings demonstrate that early written compositions can be evaluated for productivity, spelling and quality and confirm the importance of early oral language skills in predicting later writing productivity and quality. Uniquely, reading comprehension was found to have a direct and mediating effect on writing quality.

Introduction

The ability to produce accurate and fluent written text is central to achieving in school (Dinehart, 2014; Fang & Wang, 2011; Rohloff et al., 2022). Yet developing fluent and accurate writing takes time and requires mastering a complex set of contributing skills (Berninger & Swanson, 1994; Mercugliano et al., 2024). Oral language provides a foundation to support children in generating their ideas and arguments to produce written texts (Shanahan & Lonigan, 2010). Increased oral language skills have been associated with better written language proficiency (McCutchen, 1986; Mehta et al., 2005; Wagner et al., 2011), while poorer oral language skills have been found to constrain written text production (Dockrell et al., 2019; Mackie & Dockrell, 2004). To date, isolating the unique contribution

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of oral language in the early stages of learning to write in opaque orthographies, where the generation of text is constrained by transcription skills, has been elusive (McDonald et al., 2024; Seoane et al., 2025). In this study, we examined the role of children's oral language skills overtime and concurrently at the beginning stages of learning to write in English in England.

Early writing

Oral language plays an integral part in text production and, with transcription skills, has been included in models of writing development (Berninger & Amtmann, 2003; Berninger & Winn, 2006; Juel et al., 1986). Ideation in the simple view of writing (Juel et al., 1986), and the text generation component of the not-so-simple view of writing, hypothesize that oral language underpins the translation process (Berninger & Abbott, 2010; Fayol et al., 2012). Generated ideas must be translated into language, selecting appropriate words (vocabulary) and constructing syntactically correct sentences (grammar), before they are transcribed into a written output at the word, sentence and paragraph levels. Consequently, text generation and transcription operate in tandem while composing written texts and thus influence early writing proficiency (Ritchey et al., 2016).

Both text generation and transcription skills compete for available cognitive resources in beginner writers and, until transcription skills are automatized, constrain written compositions (Bourdin & Fayol, 2000; Limpo & Alves, 2013; McCutchen, 2006). Learning to spell in an opaque orthography, such as English, is particularly challenging (see Stainthorp, 2019, for a detailed discussion), as phoneme-grapheme correspondences are less predictable than in shallow orthographies, such as Italian and Spanish (Kemp & Treiman, 2023). Research on English-speaking populations has consistently shown that transcription skills – spelling ability and handwriting fluency – constrain productivity and text quality in early writing development (Graham et al., 1997; Kent & Wanzek, 2016; Kim et al., 2011; Puranik & AlOtaiba, 2012; Ray et al., 2022). By contrast in shallow orthographies where spelling challenges are less evident, oral language skills are more strongly related to writing quality (see, for example, Arfé et al., 2016; Babayiğit & Stainthorp, 2010).

While the simple and not-so-simple view of writing have been interpreted as prioritizing the role of transcription skills in early writing, covariance between transcription and oral language constructs have been reported (Cabell et al., 2022; Rodriguez et al., 2025). Oral language – specifically, vocabulary and grammar – has been found to predict later spelling ability (Cabell et al., 2022; National Early Literacy Panel, 2008), suggesting a close relationship between oral and written language. Further, the Direct and Indirect Effects Model of Writing (DIEW) stresses the need to consider the dynamic relations between oral language, transcription skills, and writing (Kim & Schatschneider, 2017) and data have established the importance of discourse-level oral narrative skills, above spelling, in explaining the writing quality of English-speaking children aged six. Kim and Graham (2022) expanded the DIEW and demonstrated that, for children aged seven and eight, reading comprehension related to writing quality but not writing productivity. Moreover, reading comprehension partially mediated the relations of discourse oral language to writing quality. The current study aims to contribute to our understanding of the contributions of component skills and their interconnected influence on early writing development.

Dimensionality of early writing

Both models of writing development and empirical studies reinforce the view that writing is a multidimensional skill. Considerable variation in how much text children produce when writing is observed in the early school years (Kim et al., 2011; MacKenzie et al., 2015; Puranik & AlOtaiba, 2012), meaning that capturing writing ability can be challenging. Children's written products have been evaluated in various ways and often combine multiple measures to capture the different dimensions that underpin written composition (Wagner et al., 2011). Measures have been designed to capture both productivity and the quality of children's written products. Productivity has been assessed using

various objective measures including the number of words written (Cabell et al., 2022; Kent et al., 2014; Kim et al., 2011), the number of ideas generated (Puranik & AlOtaiba, 2012) and the number of correct word sequences as a measure of grammatical accuracy (Puranik et al., 2024). There have also been different approaches to the assessment of text quality; where both holistic (Kim et al., 2011, 2014) and analytical scoring rubrics (MacKenzie et al., 2015) of the total text produced have been used. This variability in measures of the writing product highlights the importance of a systematic and transparent approach in the selection of measures for different developmental phases (Martin & Dockrell, 2024).

Previous research has used factor analysis to examine dimensionality of early writing. *Productivity* (e.g., number of words or ideas generated; Kim et al., 2011; Puranik et al., 2008; Salas & Caravolas, 2019; Wagner et al., 2011) and *spelling* are two dimensions that have consistently represented children's early ability to produce written text (Kim et al., 2014; named "writing conventions" in; Salas & Caravolas, 2019; "spelling and punctation" in Wagner et al., 2011). *Syntactic accuracy/complexity*, measured using mean length of T-unit and clause density, is another dimension that has been identified in US samples (Kim et al., 2014; Puranik et al., 2008; Wagner et al., 2011), but not supported in UK or Spanish samples (Salas & Caravolas, 2019). Understanding why different factors are identified across studies remains a challenge. Possible explanations include the use of different measures of syntactic complexity, different writing prompts used, or writing time (e.g., 5 minutes used by Salas & Caravolas, 2019; 10-minutes used by Wagner et al., 2011), since the amount of time children have to write impacts text production differentially by age and task (Martin & Dockrell, 2024). *Quality* is the final dimension that has been identified using holistic measures in early writing (Kim et al., 2014; "macro-organization" in Wagner et al., 2011). Exploring the dimensionality of early writing allows for the identification of different components of writing and ultimately targets for teaching and intervention.

Oral language and early writing

Understanding the impacts of oral language may be driven by both the language components assessed and the way in which written texts are evaluated (Dockrell & Connelly, 2021; Martin & Dockrell, 2024). Findings from multiple studies demonstrate that oral language is best conceptualized as a unitary construct in the preschool years (Foorman et al., 2015; Language, Consortium, Reading Research, 2015; Tomblin & Zhang, 2006). However, oral language becomes more differentiated in the early school years (Massonnié et al., 2022), recognizing core language (including vocabulary and grammar), and narrative (discourse) skills as dissociable from the age of five.

Studies examining the concurrent relationships between oral language and writing quality/productivity have found weak relationships between the two, although data from younger writers are rare (see meta-analysis by Kent & Wanzek, 2016). By contrast, longitudinal associations between oral language and written texts produced by five- and six-year-olds have been identified. Kent et al. (2014) found that an early literacy factor (word reading and spelling proficiency in kindergarten) was directly predictive of compositional fluency and narrative writing quality one year later, while oral language skills in kindergarten were found to be directly associated with later writing quality, but not compositional fluency. By corollary direct and indirect longitudinal relationships have also been demonstrated between kindergarten oral language skills (vocabulary and grammatical knowledge) and narrative writing quality three years later (Kim et al., 2015); and direct associations were observed between oral language in grade one and writing quality in grade two (Kim, 2024). While language and early literacy skills have been shown to relate to later writing quality, handwriting fluency in kindergarten has not been associated to writing quality in later years (Kent et al., 2014; Kim et al., 2015). In sum relationships between oral language and written text production have typically been small, although the way in which oral language was measured across development may influence this relationship.

Expressive discourse-level oral language skills (re-telling abilities assessed using an adaptation of the Test of Narrative Language [TNL]) have been reported to have the largest direct effect on writing

quality in US children aged six and seven, followed by spelling, with indirect effects identified for vocabulary, working memory and theory of mind (Kim & Schatschneider, 2017). How children communicate and organize their ideas in written texts in early school years is explained both by variation in literacy (reading and spelling) and oral language skills (Kent et al., 2014; Kim, 2024; Kim & Schatschneider, 2017; Kim et al., 2015); and both aspects need to be considered when exploring early writing. The data also indicate that early handwriting ability has less of an impact on writing beyond initial school years for typically developing children. The relationships between oral language and writing become more evident in English as children progress through schooling (see meta-analysis by Seoane et al., 2025), when transcription skills have become automatic and are less of a constraint on text production (Juel, 1988).

Overall, the evidence speaks to the importance of considering both the oral language measures used and the age at which these skills are studied. The concurrent oral language measures used by the studies reported in Kent and Wanzek's (2016) meta-analysis consisted of measures of vocabulary and grammar and were found to have a weak relationship with writing productivity and quality, while concurrent measures of vocabulary and grammar revealed no relationship with writing in the early years (Kent et al., 2014). Yet these measures of core language (vocabulary and grammar) at school entry do have direct predictive value for later writing quality (Kent et al., 2014; Kim, 2024; Kim et al., 2015). The extent to which this weak effect reflects the measures used requires attention given the evidence capturing the strong effects of concurrent expressive oral narrative (discourse) skills on writing quality (Kim & Schatschneider, 2017). It could be argued that vocabulary and grammar represent just one aspect of idea generation, and that, by contrast, expressive discourse-level skills are underpinned by core language abilities but also require more complex processing of perspective-taking, inference making and text generation (Kim, 2016). Kim et al. (2018a) found that receptive discourse-level oral language skills (listening comprehension tasks from the TNL) did not predict concurrent writing ability, demonstrating that it is the production, as opposed to the comprehension, of oral language which is important for text generation. Arguably, expressive language mirrors more closely the demands of producing a quality written text. Reading comprehension has also been found to partially mediate the relations of discourse oral language skills to writing quality in older children (Kim & Graham, 2022), suggesting reading captures language skills to some extent. Further research is needed to broaden our understanding of the relationship between dimensions of oral language and writing, particularly given the myriad of ways in which written compositions have been evaluated (e.g., text quality using holistic vs. analytical scoring rubrics; productivity, curriculum-based measures, or compositional fluency).

The present study

The present study aimed to advance our understanding of the dimensions of early writing and how component skills underpin these dimensions in the early stages of learning to write. Specifically, we aimed to address the ways in which transcription (spelling and handwriting fluency) and text generation skills (core oral language – vocabulary and grammar – and expressive oral narrative skills) differentially influence writing productivity and quality. A measure of reading comprehension was also taken given that reading and writing share common component skills (Fitzgerald & Shanahan, 2000) and research suggests that early oral language, reading, and writing may be intricately related (Berninger & Abbott, 2010; Kim & Graham, 2022; Kim et al., 2015).

This study offers a novel contribution to understanding early writing in four ways. First, our data allows us to explore whether results based on US samples can be generalized to a UK monolingual English sample. Literacy teaching in England is informed by a national curriculum. In the initial stages of schooling, statutory writing requirements focus on the application of simple spelling rules, producing written sentences after they are composed orally, handwriting, and the introduction of punctuation (Department for Education, 2013). However, in the US, state or school districts decide the focus and approach to teaching (Mullis et al., 2016). Some differences may be expected across countries with

different approaches to literacy curricula. Second, we sought to examine the dimensions of early written compositions to determine the contribution of component skills to different aspects of the written text. Third, we contribute to the small number of studies that have looked at how oral language impacts on writing over time and include measures of both core language (Kent & Wanzek, 2016) and expressive discourse-level oral language skills (Kim & Schatschneider, 2017). Building on previous research, core language (vocabulary and grammar) was assessed as a longitudinal predictor and, given the data indicating that oral language becomes more differentiated in the school years (Massonnié et al., 2022), vocabulary and expressive discourse-level were the concurrent language measures in our sample. Finally, central to the design of the present study was a focus on monolingual, typically developing children. Previous research has reported on heterogeneous samples, including a range of abilities (e.g., Kent et al., 2014 included children with special educational needs and identified language difficulties) and often samples with a significant proportion of second language learners (Kent et al., 2014; Kim et al., 2015; Kim et al., 2018). Research has shown how language difficulties (Mackie & Dockrell, 2004) and first language status impact writing performance (Seoane et al., 2025) and potentially confound the ways in which the relationship between oral language and writing are understood.

The research questions were as follows:

(1) What are the dimensions of written narrative compositions for children at this initial stage of learning to write?
(2) What are the relations between oral language, reading, transcription skills (spelling and handwriting fluency), and written narrative production?
(3) What are the concurrent and longitudinal associations between oral language and the quality of children's early narrative writing? Further, do concurrent measures of reading and transcription skills exhibit a direct effect on writing quality for beginner writers?

Based on previous findings, it was predicted that while there would be substantial variability in the children's written products, three factors would characterize the texts: productivity, spelling, and quality. We aimed to explore the relationship between component skills and productivity and anticipated that productivity would be explained by measures of spelling and handwriting, as per previous research (Kent et al., 2014). Given the multidimensional nature of text quality, GLM mediation analysis was used to examine the direct and indirect effects of oral language and component skills on the quality of children's texts. We anticipated that, in line with the work of Kim and Schatschneider (2017), oral narrative skills (expressive discourse) and spelling ability would directly impact on written text quality, and the impact of core oral language overtime would be mediated by concurrent measures of oral language.

Method

Participants

Participants were part of a larger study that examined oral language skills at school entry. At Time 1, the total sample comprised 250 monolingual English-speaking children from nine state primary schools in London, UK. All children were recruited at this first time-point on the basis that they were monolingual and did not have an identified special educational need. This was confirmed by the school and in the consent process with the parent/caregiver. Of this sample, 126 children were in Reception class (47 boys, 37.3%; M_{age} = 57.9 months, SD = 3.71, range: 49–65) and 124 were in Year 1 (59 boys, 47.6%; M_{age} = 69.07 months, SD = 41.5, range: 61–76).

Only children that participated in the follow-up testing (Time 2) are included in the subsequent reporting. The second timepoint took place in the following academic year (approximately 16–20 months later depending on the school). Three schools did not take part at Time 2,

due to restrictions put in place at the school following the COVID-19 pandemic. The final sample reported here - that is participants who participated at both Time 1 and Time 2 – included 157 children from the remaining six schools. At Time 2, 86 children had transitioned into Year 1 (29 boys, 33.7%; $M_{age\ months} = 71.08$ months, $SD = 4.16$, range: 63–78), and 71 children were in Year 2 (35 boys, 49.3%; $M_{age\ months} = 83.24$ months, $SD = 4.27$, range: 75–91). On average, 17.8% of children in schools in London were eligible for Free School Meals (Time 2: $M_{sample} = 13.22$, $SD = 9.32$), 14.9% were eligible for Special Educational Needs support (Time 2: $M_{sample} = 9.71$, $SD = 1.93$), and 50.1% had English as an Additional Language (Time 2: $M_{sample} = 30.00$, $SD = 12.73$) (Department for Education, 2020). The Income Deprivation Affecting Children Index (IDACI) reflects the proportion of children aged 0 to 15 living in income deprived families. The London IDACI average is 14,410, while our sample taking part in Time 2 was noted as 13,819 ($SD = 6,937$).

Parents/carers completed a demographic questionnaire asking about their education level(s) and household income. This was returned by 76% of parents/caregivers that were involved in Time 2. The majority of these respondents reported completing higher education (46.5% had a degree; 36.6% had a postgraduate degree). The remaining respondents reported having vocational qualifications (4.2%), A-levels (e.g., college level; 7.0%) and GCSEs (e.g., secondary school qualifications; 4.2%). Household income was above £45,200 for 65.71% of respondents. The average disposable income for the financial year ending 2020 in the United Kingdom was £36,900 (O'Neill, 2021). The participating families could be considered to have higher levels of education and income than the average.

There were no significant differences between participants at Time 2 and the original sample: gender, χ^2 (1, $N = 250$) = 1.08, $p = .29$; IDACI, $t(13) = 1.77$, $p = .46$, age, $t(-.82) = .19$, $p = .20$; or core language abilities (measure detailed below: $p = .38$).

Measures

A comprehensive assessment of core oral language skills, which included receptive and expressive vocabulary and grammar knowledge was undertaken at Time 1, followed by an assessment of receptive vocabulary, expressive narrative (discourse-level) skills, reading comprehension, spelling, handwriting fluency and writing ability at Time 2.

Time 1

Core oral language abilities. Three sub-tests from the Clinical Evaluation of Language Fundamentals, 2nd edition (CELF-2; Wiig et al., 2006) were used to assess receptive and expressive vocabulary and grammar. Administration of tasks, discontinue, and scoring rules were all adhered to as per the manual. The *Expressive Vocabulary* subtest required children to look at a picture and respond to a prompt from the examiner (e.g., 'What is this? "What is he doing?") There were 20 trials, with a maximum score of 40. *Receptive Grammar* was assessed using the Sentence Structure subtest, which asked children to point to one picture, out of four possible options, that they felt corresponded to a prompt sentence (maximum score of 22). *Expressive Grammar* was assessed using the Word Structure subtest. Children had to finish a sentence started by the examiner and the grammatical structure of their response was scored as correct/incorrect (maximum score of 24). Raw scores from the three subtests were converted to scaled scores as per the test manual. The sum of the scaled scores was then used to convert to a standard score using the conversion tables in the CELF-2 manual according to the child's age. The manual reports good internal consistency with coefficients ranging from .79 to .97 for the subtests.

Time 2

Receptive vocabulary. The British Picture Vocabulary Scale, 3rd edition (BPVS-3; Dunn et al., 2009) was used to assess children's receptive vocabulary knowledge. Children had to point to a picture (out of four possibilities) which represented the word spoken by the experimenter. The testing procedure

and discontinue rule was followed according to the test manual. The total number of correct responses (raw score) was converted to a standard score (*M* 100, *SD* 15). The BPVS-3 has a reliability of .91.

Expressive oral narrative (discourse-level). The Test of Narrative Language (TNL-2; Gillam & Pearson, 2017) was used to assess children's oral narrative skills. This is the second edition of the test used by Kim (2022). The TNL-2 examines both receptive and expressive skills, only the expressive component is reported here. There are three tasks assessing expressive narrative skills: one was an oral re-tell task (children had to re-tell everything they remembered from a story read by the examiner) and two were generation tasks, which required the child to tell a story in response to a picture prompt. We refer to these measures as expressive oral narrative skills, rather than discourse, given their narrative focus. All tasks were audio-recorded using Audacity software and transcribed verbatim. The audio and transcribed narratives were used to score the stories according to the TNL-2 manual (maximum score was 31 for the oral re-tell, and 27 and 30 for the subsequent generation tasks). A composite score was generated as per the test manual. The TNL-2 demonstrates good internal reliability, with an overall reliability coefficient exceeding .80. Inter-rater reliability was calculated with intra-class correlations for 10% of the written texts. Agreement was high for the oral re-tell total score = .92, and the two story generation tasks = .89 and .90, respectively.

Reading comprehension. The New Group Reading Test assessed children's level of reading comprehension (NGRT; Burge et al., 2010). Children in Year 1 completed the paper version of Test 1, while children in Year 2 completed the paper version of Test 2A. The NGRT requires children to read a series of sentences and select the option that makes sense in the context, as well as read short passages and answer questions related to the text. Responses were scored as per the test manual. The manual reports excellent internal consistency, .90.

Spelling ability. The Helen-Arkell Spelling Test, 2nd edition (HAST-2; Caplan et al., 2012) is a single-word spelling test that was dictated to participating children. The target word was provided in a sentence, and children attempted the spelling of the target word on lined paper. The manual reports an internal reliability of .96. Raw scores were calculated by summing the number of correctly spelled words and converted to standard scores using the test manual (*M* 100, *SD* 15).

Handwriting fluency. Children were instructed to write the alphabet in the correct sequence and in lower case letters (a task also used in previous studies: Kent et al., 2014; Kim et al., 2011). They were given 60 seconds to write as much of the alphabet as possible and told that if they finished writing the entire alphabet they should start again until they were told to stop. They used a pencil and wrote on lined paper. The number of letters written in the correct sequence were calculated as the raw score.

Writing. Children wrote a story in response to the "Aliens" picture prompt from the TNL-2 (Gillam & Pearson, 2017). This is a similar approach to Rodriguez et al. (2025) who used a picture prompt to elucidate a written narrative response for similar aged children. Before starting the writing task, children were shown a different picture and an example story corresponding to the picture ("The Treasure") was read aloud to them, demonstrating the key elements of a narrative story. Children were instructed to listen carefully to the story, as then they would see another picture and be asked to write their own story that went well with the picture. When it was time for the children to start writing their own story they were given the "Aliens" picture and told: *"I'd like you to look at this picture carefully and then write down the story that goes with this picture. Make your story as long and as complete as you can. Remember that stories have a beginning, things that happen in the middle, and an ending. You can start anytime you are ready."* Children were given five minutes to write their story independently (timing also adopted in previous studies with the same age group, e.g., Kent et al., 2014).

Children's written compositions were scored by examining characteristics of the end product and scoring for text quality. The product measures included counting the:

(i) Total word count, which excluded crossed out words and numbers written as digits;
(ii) Number of different words, which was taken from the sample of words used for the total word count value and, therefore, also excluded crossed out words and digits;
(iii) Number of spelling errors, which included misspelt words and any words that were spelt correctly but not the intended version of the word (e.g., writing "to" instead of "too" or "there" instead of "their").
(iv) Correct word sequences (CWS) were calculated using the criteria as per the Curriculum Based Measures of Writing (CBM-W) (Dockrell et al., 2015). The scoring is based upon the grammatical accuracy of two adjacent words in the text. Punctuation and capitalization was taken into account, whereby lack of a capital letter at the beginning of a sentence or randomly capitalized words in the middle sentence would result in an incorrect word sequence. Spelling mistakes were not penalized in this scoring (Dockrell et al., 2015). Reliability coefficients using the CBM-W measures have been reported as above $r = .70$ (Coker & Ritchey, 2010) and adequate concurrent validity (.73) has been reported between CBM-W CWS and overall writing proficiency (Piercy & Dockrell, 2023).

Writing quality was scored using the Writing Analysis Tool (WAT) which was developed to examine free writing samples from Year 1 English-speaking children (MacKenzie et al., 2015; Scull et al., 2020). The WAT is an analytical tool which scores writing across six areas: text structure, sentence structure, vocabulary, spelling, punctuation, and handwriting. Each writing sample was given a score between 1 and 6 (with 6 representing higher proficiency) for each of the six dimensions. The WAT provides illustrative criteria for each competence level (e.g., a score of 1 for sentence structure would be awarded if there was "random words," while a score of 2 would be awarded if the writing "shows an awareness of correct sentence parts including noun/verb agreement, but the meaning may be unclear"). See Scull et al. (2020) for a full breakdown of the scoring criteria. Reliability coefficients for the WAT have been reported as above $r = .74$ (Scull et al., 2020).

Inter-rater reliability was calculated with intra-class correlations for 20% of the written texts. Agreement was high for the product measures: word count = .99; number of different words = .98; number of spelling errors = .99; CWS = .98. Agreement was also high for the writing quality measures: text structure = .92; sentence structure = .92; vocabulary = .85; spelling = .80; punctuation = .82; handwriting = .90.

Procedure

Ethical approval was obtained from UCL Institute of Education and complied with the British Psychological Society Code of Human Research Ethics. Written informed consent was obtained from all parents/carers and children gave verbal assent prior to their inclusion in the study. Time 1 testing took place between late October 2019 and early February 2020, depending on the school, while Time 2 testing took place between June and July 2021. All children were tested during the school day. The language assessments (CELF, BPVS-3, and TNL-2) and the handwriting fluency task (due to the timed nature) were administered to children individually by trained researchers in a quiet room located in the child's school. The literacy assessments (reading comprehension, spelling, and writing task) were administered by their class teacher to the whole class. The literacy assessments were split across two sessions: the first involved administering the writing and spelling task and the second administering the reading comprehension task. The research team prepared a detailed pack of test instructions and associated materials for the literacy assessments. There was the opportunity for class teachers to ask any questions related to the administration of these tasks.

Data analysis

To answer research question one, exploratory factor analysis was conducted using principal component analysis (PCA) to determine the dimensionality of the writing measures. The curriculum-based

measures of total word count, number of different words, number of spelling errors, and correct word sequences (CWS) were entered, in addition to the scores for the six-factors captured in the scoring of text quality (Scull et al., 2020). To answer research question two, which asked about the relations between component skills and writing outcomes, correlational analyses were conducted. Writing component scores from the PCA models were used in the correlational and subsequent analyses. Correlations were then explored further using stepwise linear regression models with a focus on productivity and spelling as the outcome measures using SPSS 30. This approach was taken given the well-documented direct relationship between transcription and productivity (Kent et al., 2014; Kim et al., 2014). Given the literature has consistently evidenced a relationship between transcription skills and writing proficiency (Graham et al., 1997; Puranik & AlOtaiba, 2012; Ray et al., 2022), spelling and handwriting were entered into Step 1 of the regression model, followed by the remaining measures at Step 2. Sample size was determined from effect sizes reported in prior meta-analyses considering the relationship between oral language and writing (Seoane et al., 2025). A sample of 158 was required for a multiple regression with six predictors to detect a medium effect (.34), providing 80% power ($\alpha = .05$). While the present sample was $n = 157$, this was deemed to be sufficient according to Green's (1991) rule-of-thumb which suggests a sample of at least 110 participants is needed to test the coefficients in a regression with six predictors.

Research question three focused on writing quality. Given the multidimensional nature of text quality and that previous research has shown direct and indirect effects of early oral language on subsequent writing quality (Kim et al., 2015), general linear model (GLM) mediation analyses was used to examine these relationships using jamovi 2.7.6.

Results

Children's written text

The findings (means and standard deviations) from the scoring of text quality and product measures are shown in Table 1. All writing measures were normally distributed with large standard deviations observed for the product measures. As can be seen in Table 1, children produced significantly more words than the number of different words produced, $t(15) = 10.65$, $p. < .001$, *Cohen's d* = .85. Children produced many spelling errors, with on average one error for every four words produced (proportion spelling errors: $M = .33$, $SD = .22$).

Examination of the distributions of the writing quality scores revealed variability. Violin plots (see Figure 1) were used to illustrate the distribution of scores across the six dimensions assessed. In all cases, the full range of scores was evident in the sample. As the plots show Vocabulary Diversity, Sentence Structure and Text Structure have the highest median and were positively skewed. By contrast, Spelling in text had the widest spread whereas Punctuation had a bimodal distribution. Overall, the violin plots reveal that Text Structure and Vocabulary Diversity had the highest and most

Table 1. Writing characteristics for the total sample ($N = 157$).

Writing measures	Mean	*SD*
Product measures		
Total word count	45.47	32.95
Number of different words	32.18	18.59
Number of spelling errors	11.04	7.33
Correct word sequences	36.65	32.21
Quality ratings		
Text structure	4.43	1.22
Sentence structure	3.59	0.98
Vocabulary diversity	4.38	0.96
Spelling in text	3.34	1.04
Punctuation used	2.80	1.09
Handwriting legibility	3.57	0.94

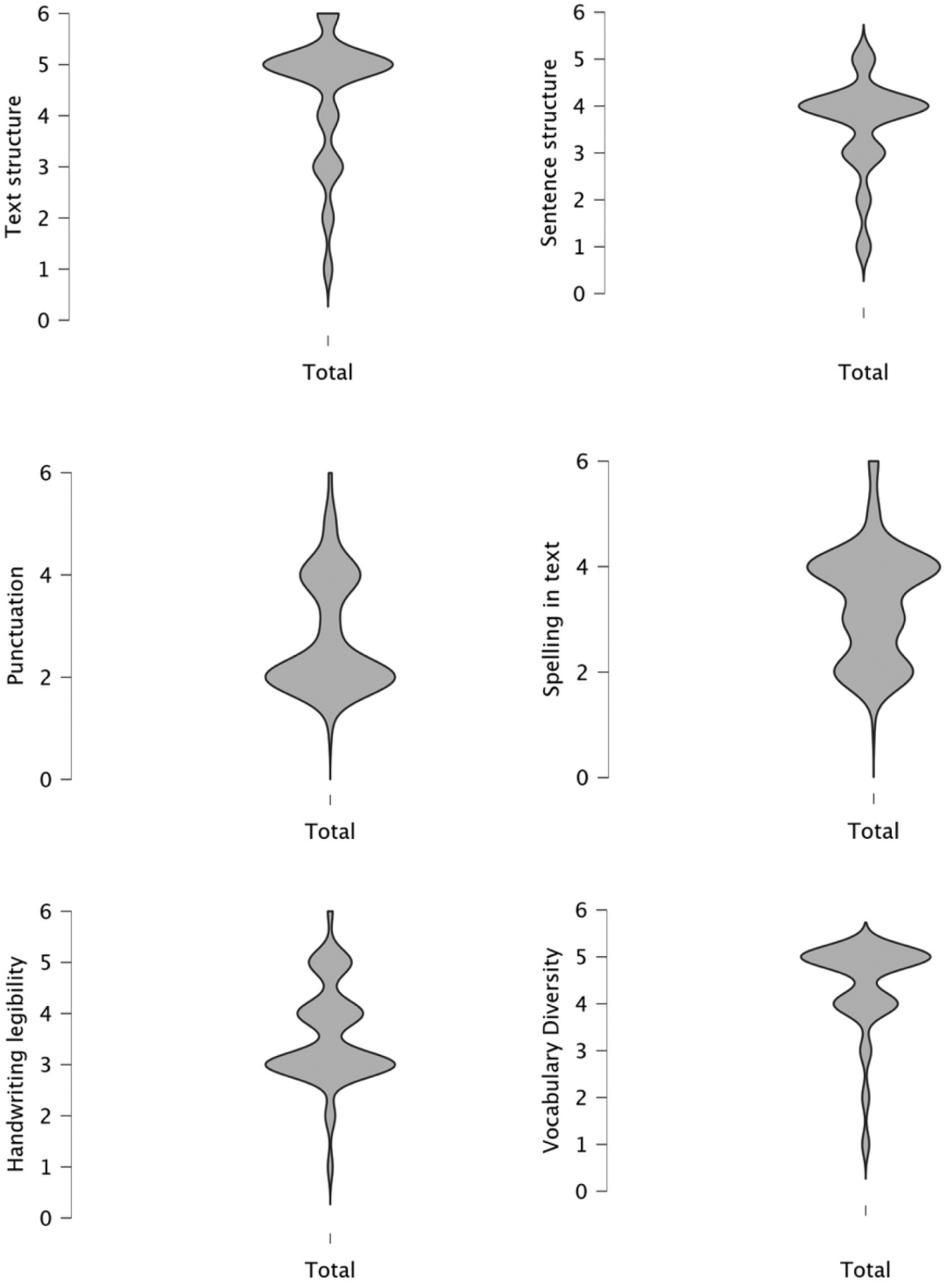

Figure 1. Violin plots for six factors of text quality assessment.

Table 2. Factor loadings for varimax rotation with kaiser normalization three factor solution for 10 items of text production.

	Factor loading		
	Productivity	Quality	Spelling
Total Number of words written	**0.912**	0.331	−0.086
Number of different words	**0.891**	0.372	−0.131
Correct word sequences	**0.891**	0.356	0.068
Number of spelling errors	0.122	0.101	**−0.919**
Text structure	0.386	**0.853**	−0.043
Sentence structure	0.273	**0.856**	0.015
Vocabulary Diversity	0.164	**0.901**	0.041
Spelling in text	0.414	0.502	**0.528**
Punctuation Used	**0.624**	0.052	0.322
Handwriting legibility	0.246	**0.527**	0.475

Table 3. Eigenvalues, percentage of variance and cumulative variance for factors.

Factors	Eigenvalue	Variance accounted for	Cumulative variance
Productivity	5.36	53.57	53.57
Quality	1.46	14.57	68.14
Spelling	1.17	11.73	79.87

consistent scores, suggesting strong overall performance. Punctuation showed the widest spread and the lowest mean, indicating it was a challenge for many students with high variability in this skill. Spelling also had notable variability, while Sentence Structure and Handwriting Legibility showed more consistent, though slightly lower, performance.

To investigate dimensions of early writing, all writing product measures reported in Table 1 were considered. Exploratory factor analysis was conducted using principal component analysis for extraction and varimax rotation with kaiser normalization. The Kaiser-Meyer Olkin measure of sampling adequacy was .821 indicating excellent suitability of the data for data reduction. Bartlett's test of sphericity was significant $x^2 = 1565.26$, $df = 45$, $p < .001$ supporting the factorability of the correlation matrix.

The analysis identified three distinct factors with items loadings of greater than .50. Factor loadings are presented in Table 2 with significant loadings in bold. Eigenvalues and variance accounted for are presented in Table 3. The first factor named *productivity* explained 53.74% of the variance and included all three CBM measures and punctuation used in the text. The second factor named *quality* explained 14.47% of the variance and included assessments of text structure, sentence structure, and vocabulary diversity. The final factor named *spelling* explained 11.73% of the variance and captured stronger spelling skills as captured by the quality rating measure (Scull et al., 2020) with a negative loading for number of spelling errors recorded in the text. Together these three factors explained 79.87% of the variance in the children's written products indicating a strong dimensionality reduction and reflecting a clear underlying structure to texts produced at this point in development.

Relations between component skills and writing

Table 4 presents the raw and standard scores for the independent component skills assessed: core language (Time 1 only), spelling ability, handwriting fluency, reading comprehension, receptive vocabulary, and expressive oral narrative (discourse skills). As the table shows, all scores are within the average range, although spelling scores were significantly poorer than oral language and reading ($F(3, 136) = 106.98$, $p < .0005$, $\eta^2_p = .44$).

Table 4. Means (SD) of standard and raw scores on the independent component skills ($N = 157$)[1].

	Standard Score		Raw Score	
Measure	Mean	*SD*	Mean	*SD*
Core language (CELF)	103.01	12.24	31.47	6.22
Spelling (HAST)	90.82	9.62	24.17	11.38
Handwriting fluency	n/a		11.40	13.12
Reading comprehension (NGRT)	108.97	13.89	30.72	12.51
Vocabulary (BPVS)	103.00	11.9	100	20
Narrative Expressive (TNL)	12.63	2.83	42.05	13.68

Table 5. Correlations between writing factors and independent measures ($N = 157$).

	Quality factor	Productivity factor	Spelling factor	Core language	Vocabulary	Expressive narrative	Reading	Spelling
Quality factor	–							
Productivity factor	–	–						
Spelling factor	–	–	–					
Core language	.31**	.08	.05	–				
Vocabulary	.25**	.33**	.11	.29**	–			
Expressive narrative	.36**	.35**	.06	.36**	.55**	–		
Reading comprehension	.45**	.35**	.28**	.35**	.39**	.35**	–	
Spelling ability	.45**	.55**	.39**	.29**	.45**	.44**	.72**	–
Handwriting fluency	.31**	.42**	.10	.24**	.35**	.39**	.53**	

* $p < .05$; ** $p < .01$.

The relationships between the scores on the language and literacy measures and the writing factors from the PCA models were examined and are shown in Table 5. A full breakdown of correlations for all individual writing measures and standardized spelling ability and handwriting fluency measures can be found in the supplementary material.

Table 5 shows writing *quality* was statistically significantly associated with the predictive measure of core oral language and all concurrent measures, whereas *productivity* was statistically associated with concurrent measures of reading, spelling, handwriting fluency, and expressive oral narrative. By contrast, the *spelling* factor was only associated with the concurrent measure of spelling ability.

Stepwise linear regression analysis was conducted to evaluate the extent to which the independent measures of literacy and oral language predicted the *productivity* dimension of the children's written products. Data were examined for outliers using *z* scores and no outliers (±3 SD) were identified. All Variance Inflation Factor (VIF) results were less than 3 and no collinearity tolerance levels were below .4; as such all variables were included in the regression.

Transcription skills (spelling and handwriting fluency) were entered first, followed by reading comprehension, vocabulary and core oral language. A significant regression was found $F(6) = 14.26$, $p < .001$, adj $R^2 = .37$. Concurrent spelling ability and vocabulary, and Time 1 core oral language, were significant independent predictors in the final model, but reading comprehension, handwriting fluency, and expressive narrative were not. Table 6 presents the results of the final model for productivity.

By corollary stepwise linear regression analysis was conducted to evaluate the extent to which the independent measures of literacy and oral language predicted the *spelling* factor. Data were examined for outliers using *z* scores and no outliers (±3 SD) were identified. VIF results were less than 3 and no collinearity tolerance levels below .4; as such all variables were included in the regression. A significant regression was found but unlike *productivity* no oral language measures were significant in the model. Both handwriting and spelling were significant in the model, $F(6) = 4.57$, $p < .001$, adj$R^2 = .17$. Table 7 presents the results of the final model for spelling.

A mediation analysis was conducted using the general linear model to examine if any impact of core oral language on writing quality was mediated by concurrent measures of language (vocabulary and expressive

Table 6. Regression model examining predictors of productivity dimension ($N = 157$).

Predictor	B	SE B	β	t	*p*
Model 1					
Spelling	0.05	0.01	0.55	6.93	<.001
Handwriting fluency	0.01	0.01	0.08	.94	.340
Model 2					
Spelling	0.04	0.01	0.48	4.16	<.001***
Handwriting fluency	0.01	0.01	0.12	1.51	.320
Expressive narrative	0.01	0.01	0.14	1.67	.098
Vocabulary	0.01	0.01	0.22	2.41	.018*
Core language	−0.03	0.02	−0.20	−2.46	.021*
Reading comprehension	−0.01	0.01	−0.13	−1.26	.210

Note. B = unstandardized coefficient; SE B = standard error of B; β = standardized coefficient.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 7. Regression model examining predictors of the spelling factor ($N = 157$).

Predictor	B	SE B	β	t	*p*
Model 1					
Spelling	0.03	0.007	0.317	3.67	<.001
Handwriting fluency	0.02	0.006	.212	2.46	.015
Model 2					
Spelling	0.03	0.01	.350	2.65	.009**
Handwriting fluency	0.02	0.01	.226	2.47	.015*
Expressive narrative	−0.01	0.01	−0.10	−0.97	.333
Vocabulary	−0.01	0.01	0.01	−0.91	.927
Core language	−0.01	0.01	−0.53	−0.58	.564
Reading comprehension	.002	0.01	0.26	.220	.826

Note. B = unstandardized coefficient; SE B = standard error of B; β = standardized coefficient.
*$p < .05$, **$p < .01$, ***$p < .001$.

narrative), spelling and reading comprehension and writing quality. Data were examined for outliers using *z* scores and four outliers (±3 SD) were identified and subsequently removed. Table 8 presents the results of the mediation analysis demonstrating the longitudinal relationships of core language and concurrent relationships of language, reading comprehension, spelling, and handwriting on writing quality. The final model accounts for 26% of the variance in quality ($F(5, 132) = 9.43$, $p < .001$, adj$R^2 = .26$). As Table 8 shows, core oral language was associated with writing quality both directly ($\beta = 0.16$, $p = .048$) and indirectly through reading comprehension ($\beta = 0.092$, $p = .037$). Core language was also significantly related to spelling ($\beta = 0.2817$, $p. < .001$), reading comprehension ($\beta = 0.3609$, $p. < .001$) vocabulary ($\beta = .2736$ $p. < .001$), and narrative skills ($\beta = .3325$, $p. < .001$), but only reading comprehension was significantly associated with writing quality. (β = 0.2542, $p = .019$) in the model. Figure 2 presents the path model. Handwriting has not been included in the path model as it did not feature significantly in relation to any of the variables, either directly or indirectly.

Discussion

The study aimed to identify the key components of written compositions for monolingual English-speaking children at the initial stage of learning to write and to examine the relations between oral language and literacy measures on writing outcomes. Writing was assessed in children aged five to seven. The cohort was recruited to exclude potential confounds when interpreting the links between oral language and writing. Specifically, we had no participants with identified learning disabilities or who spoke English as an additional language and schools were representative of the state system in England. Given the extant literature we considered the predictive, longitudinal associations, between core oral language (vocabulary and grammar) and later writing ability, as well as concurrent measures of spelling ability, handwriting fluency, reading comprehension, vocabulary, and expressive oral

Table 8. GLM mediation analysis of writing quality including concurrent and predictive measures of language and literacy.

		Estimate	SE	Lower CI	Upper CI	β	z	p
Indirect effects	Core language ⇒ Spelling ⇒ Quality	0.00782	0.00538	−5.81e − 4	0.01929	0.05657	1.452	0.147
	Core language ⇒ Reading comprehension ⇒ Quality	0.01342	0.00625	0.00276	0.03267	0.09715	2.148	0.032
	Core language ⇒ Narrative Expressive ⇒ Quality	0.00423	0.00554	−0.0053	0.01795	0.03061	0.764	0.445
	Core language ⇒ Vocabulary ⇒ Quality	−0.00527	0.00609	−0.01939	0.00534	−0.03811	−0.865	0.387
	Core language ⇒ Handwriting ⇒ Quality	−3.19e-04	0.00194	−0.00494	0.00311	−0.00231	−0.164	0.87
Component								
	Core language ⇒ Spelling	0.51468	0.14786	0.21792	0.75974	0.28698	3.481	<.001
	Spelling ⇒ Quality	0.01519	0.00951	−0.00317	0.03226	0.19713	1.597	0.11
	Core language ⇒ Reading comprehension	0.69512	0.15644	0.38491	0.95973	0.3572	4.443	<.001
	Reading comprehension ⇒ Quality	0.01931	0.00787	0.00282	0.03873	0.27197	2.454	0.014
	Core language ⇒ Narrative Expressive	0.80578	0.14461	0.54217	1.12521	0.43241	5.572	<.001
	Narrative Expressive ⇒ Quality	0.00525	0.00681	−0.00796	0.01981	0.07079	0.771	0.441
	Core language ⇒ Vocabulary	1.1523	0.20152	0.71599	1.54597	0.44156	5.718	<.001
	Vocabulary ⇒ Quality	−0.00457	0.00522	−0.01544	0.00488	−0.08631	−0.875	0.381
	Core language ⇒ Handwriting	0.34708	0.18212	−0.0031	0.70243	0.16186	1.906	0.057
	Handwriting correct ⇒ Quality	−9.18e− 4	0.00558	−0.0097	0.00999	−0.01425	−0.165	0.869
Direct	Core language ⇒ Quality	0.02517	0.01214	0.00518	0.04592	0.18222	2.074	0.038
Total	Core language ⇒ Quality	0.0431	0.01069	0.0195	0.06493	0.32054	4.032	<.001

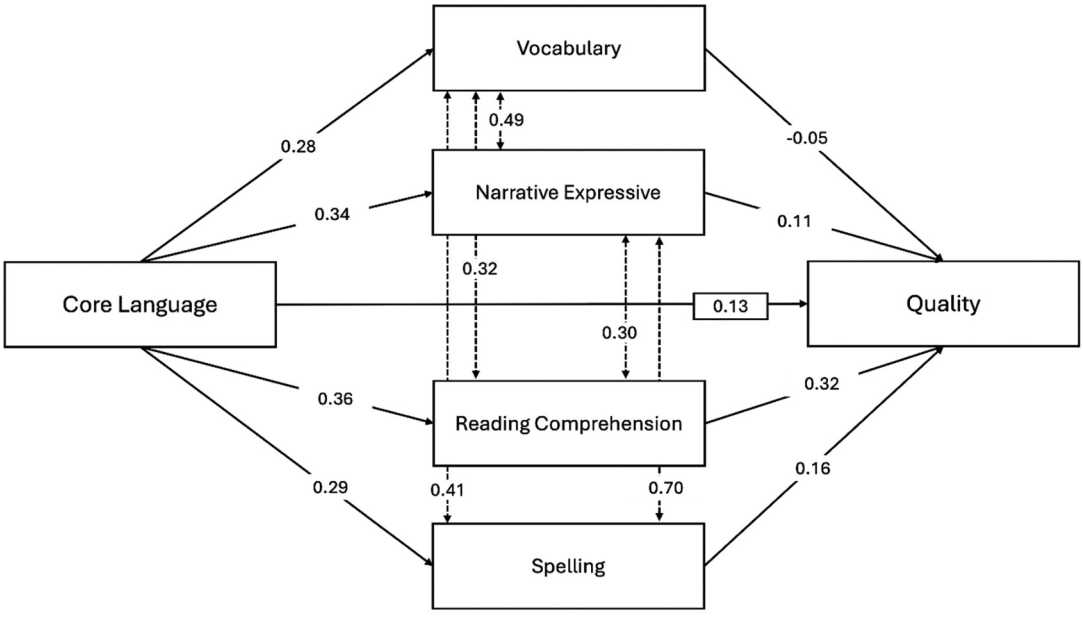

Figure 2. GLM mediation analysis illustrating the relationships among core language, vocabulary, reading comprehension, narrative skills, spelling, and writing quality.

narrative skills, and evaluated their relationship with written compositional skills. We predicted that while there would be substantial variability in the children's written products, three factors would characterize the texts: productivity, spelling, and quality. Further we anticipated that productivity would be explained by measures of spelling and handwriting, whereas the quality of children's texts would be explained by spelling and oral narrative skills (expressive discourse), but the impact of core oral language overtime would be mediated by concurrent measures of oral language.

As predicted, and corroborating previous research that has examined early writing (Puranik & AlOtaiba, 2012), there was substantial variability in children's written products despite recruiting a homogenous sample. The violin plots (Figure 1) highlight the distribution of participants' scores on the WAT and revealed that the strongest overall performance for children in our sample was text structure and vocabulary diversity, yet neither measure is captured by conventional CBM measures (McMaster et al., 2011). Variability was also observed in the product measures (i.e., number of words written), evidenced by large standard deviations. These findings emphasize the complexity of profiling writing competencies at this point in development and that how writing is evaluated will, consequently, be reflected in the dimensions identified and our understanding of writing development.

In line with our predictions, texts were captured by three dimensions: spelling, productivity, and quality – with over 50% of the variance in the PCA accounted for by the productivity dimension. The *spelling* factor (dimension) reflected spelling complexity/accuracy from the WAT and the number of spelling errors children produced in their texts. By contrast, the *productivity* factor (dimension) included the measures of the total number of words, number of different words, correct word sequences and punctuation. As such, our findings support existing research that found productivity and spelling to be dimensions in early writing (Kim et al., 2011; Salas & Caravolas, 2019; Wagner et al., 2011). The data further extend previous work by explicitly capturing *quality* in these young English writers and contribute to the literature given the use of analytical scoring. A significant relationship was observed between measures of text structure, sentence structure, vocabulary diversity and handwriting legibility underpinning the quality dimension. Given the role that quality plays in demonstrating how well a child can communicate meaning, structure arguments, and engage an audience, the presence of these features in the scripts of these early writers, notwithstanding their length, provides a basis for evaluating writing competencies and tracking longitudinal growth.

The contribution of the component skills measured by standardized assessments was examined in relation to the resulting three dimensions (productivity, spelling, and quality). Each dimension was found to be predicted by a different set of component skills. Regression analyses revealed that the *spelling* dimension was predicted by concurrent measures of spelling ability and handwriting fluency. In an opaque orthography, like English, learning to spell can be challenging in the initial school years (Stainthorp, 2019) and it was expected that spelling ability would relate to children's spelling attempts and correctness in independent writing. Our data further align with previous research that has found handwriting skills support the development of orthographic knowledge (Pritchard et al., 2021), confirming a close relationship between transcription skills at this point in development.

As anticipated, the *productivity* dimension was predicted by spelling ability, supporting previous research which found a relationship between concurrent measures of spelling and writing productivity in US samples (Kent et al., 2014; Kim et al., 2015). Concurrent handwriting fluency did not significantly predict productivity in our regression model, but the correlational analysis demonstrated a significant relationship between handwriting and the *productivity* dimension. However, of interest, our data found that core oral language (assessed more than one year earlier) and concurrent vocabulary were further significant predictors of writing productivity in our sample of young writers. A weak relationship between concurrent vocabulary knowledge and writing productivity has been reported in Kent and Wanzek's (2016) meta-analysis, but very few studies have investigated the longitudinal role of oral language in early writing. Previous research has suggested that rate of growth in early oral language skills predict later writing productivity (Cabell et al., 2022). Our findings contribute to the limited literature by highlighting the importance of early language learning opportunities in predicting children's ability to generate written text fluently.

Finally, GLM mediation analysis was used to examine direct and indirect relations between the measured component skills and writing quality. A direct (and indirect via reading comprehension) relationship was found between our longitudinal measure of core oral language and writing quality assessed a school year later. The finding of an independent and direct relationship between a longitudinal measure of core oral language (vocabulary and grammar) and writing quality supports findings in US samples of early primary children (Kent et al., 2014; Kim, 2024; Kim et al., 2015). However, contrary to our predictions, we did not find that concurrent measures of spelling ability and oral narrative skills were related to writing quality in the sample. Rather, our concurrent measure of reading comprehension was found to have a direct relationship with writing quality, and the longitudinal core language measure was related to later spelling, reading comprehension, vocabulary and oral narrative skills, though no other associations to writing quality were significant. Identifying the role of reading comprehension offers new insights into the component skills that support writing quality, particularly for these early writers. After reviewing a recent meta-analysis which found reading comprehension and writing composition to be moderately related (r = .44) (Kim et al., 2024), to the best of our knowledge, our study is the first to report on a measure of reading comprehension in English-speaking children as young as five to seven in relation to writing quality. Our finding extends previous findings of a relationship between reading comprehension and writing quality in US children one year older (Kim & Graham, 2022) and suggest that this relationship may be observed earlier in development. However, while Kim and Graham (2022) found that reading comprehension differentially mediated the relation of oral discourse skills to writing quality, our measure of expressive oral narrative skills did not show the same pattern of results and rather reading comprehension mediated the relation of early core oral language to writing quality. Given that early oral language skills provide a foundation for reading comprehension, our data highlight that these skills work together to support the quality of children's written texts. It is clear from the component analyses that the young children in the current study were developing their ability to generate an independent narrative, and their performance was underpinned by core oral language assessed 16–20 months previously and their ability to comprehend text. It is possible that once expressive narrative skills become more elaborated, and written texts more detailed, a direct relationship would be predicted.

While our findings align with Cabell et al. (2022) emphasizing that early core language skill impacts on subsequent spelling, the lack of a direct effect of spelling to writing quality was surprising given previous findings from studies that have assessed children of a broadly similar age (Kent & Wanzek, 2016; Kim & Schatschneider, 2017). It is, however, noted that our correlational analysis found a significant relationship between spelling ability and quality and we therefore question whether our reading comprehension measure was perhaps more sensitive in representing literacy ability and therefore demonstrated a stronger relation to writing outcomes than spelling in the mediation analysis. Alternatively, given that previous research has often included samples of mixed abilities (Kent & Wanzek, 2016; Kim & Schatschneider, 2017), it is feasible that oral language plays a greater role in contributing to writing quality than spelling in typically developing children with age-appropriate spelling ability compared to mixed abilities. Further research is warranted to comprehensively examine the nuances of early language and literacy profiles in relation to subsequent writing outcomes.

Two implications arise from the current study. Firstly, identifying the three dimensions of early writing (spelling, productivity and quality) can inform which aspects should be taught as well as providing a possible guide for teachers to consider children's performance against and therefore tailor support accordingly. For instance, assessing writing quality helps educators identify specific areas of strengths and needs (e.g., content development vs. coherence), enabling more effective, individualized feedback and intervention. Secondly, the data further support the view that oral language (text generation), reading comprehension and transcription processes are important predictors of early written composition (Berninger & Winn, 2006; Graham et al., 1997). Research exists to suggest that

specific instruction in both spelling and oral language are key in supporting early writing (Galuschka et al., 2020; Graham & Santangelo, 2014; Kirby et al., 2021), but further intervention research is needed to understand whether integrating reading and writing instruction may lead to improvements in writing quality.

Limitations and future directions

While the present findings extend previous research to a new sample with novel conclusions, limitations must be acknowledged. Our data were collected during the end phases of the COVID pandemic, which impacted participant numbers at follow-up and would have reduced children's exposure to teaching and potentially limited oral language exposure. It is recognized that the identified dimensions of early writing are partly driven by the measures collected and, while theoretically and empirically motivated, our investigation of component skills predicting these dimensions could have been even more extensive. Thirty-seven percent of the variance in the productivity regression model was explained by the predictors measured (although a similar value has been reported by Puranik & Al Otaiba, 2012), while only 26% of the quality model and 17% of the spelling model were accounted for. Other unmeasured constructs may account for further variance. Linked to the factor analysis, it was unexpected that punctuation loaded onto the productivity factor (dimension). In our sample, punctuation scores showed the widest spread with a bimodal distribution and had the lowest mean out of all the quality ratings, indicating it was a challenge for many typically developing children learning to write. Performance in this area was scored based on the presence of punctuation features and thus was likely influenced by text length and may explain the link to productivity. However, understanding the way punctuation interacts with the written product across development remains largely under explored in the literature (Ferreiro & Pontecorvo, 1999) and would be an interesting avenue for future research, especially given its explicit focus in the English national curriculum (Department for Education, 2013).

It is also acknowledged that comparing findings across studies is challenging when different writing tasks are used. The current study used a picture prompt and asked children to write for five minutes, while the prompt used by Kent et al. (2014) was more open-ended and required children to write in response to a story prompt, and Kim and Schatschneider (2017) asked children to write for 15 minutes. Consistency of writing prompts, scoring, and the analysis of multiple writing samples to capture stability of writing competencies should be a priority for future research, as should the consideration of different genres to better understand if component skills play a differential relationship for narrative and expository writing (Dockrell & Connelly, 2021). Reporting of curriculum approaches across countries and documenting populations of study would also help to provide population-specific conclusions until data are collected across samples and languages. Future research is also needed to examine longitudinal relations between different language abilities (skills and modalities) and writing outcomes.

The current study demonstrates that early written compositions in monolingual English children can be evaluated for productivity, spelling, and quality. Concurrent transcription skills predicted spelling in text; and spelling ability, vocabulary, and core oral language were predictive of how much children wrote (productivity). Core oral language (assessed a -school year earlier) was a significant aspect of both text productivity and text quality. Moreover, the findings provide new insights into the role of reading comprehension in young writers, as reading comprehension was found to have a direct and mediating role on writing quality. The findings highlight the differential role of transcription skills, reading comprehension and oral language in early writing and that more research is needed to understand if and how supporting these identified component skills may lead to improved writing outcomes.

Note

1. Due to illness data were missing for two students for the NGRT, three students for the TNL, five students for the BPVS, and eight students for the handwriting measure.

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References

Arfé, B., Dockrell, J. E., & De Bernardi, B. (2016). The effect of language specific factors on early written composition: The role of spelling, oral language and text generation skills in a shallow orthography. *Reading and Writing*, *29*, 501–527. https://doi.org/10.1007/s11145-015-9617-5

Babayiğit, S., & Stainthorp, R. (2010). Component processes of early reading, spelling, and narrative writing skills in Turkish: A longitudinal study. *Reading and Writing: An Interdisciplinary Journal*, *23*(5), 539–568. https://doi.org/10.1007/s11145-009-9173-y

Berninger, V. W., & Abbott, R. D. (2010). Discourse-level oral language, oral expression, reading comprehension, and written expression: Related yet unique language systems in grades 1, 3, 5, and 7. *Journal of Educational Psychology*, *102*(3), 635–651. https://doi.org/10.1037/a0019319

Berninger, V. W., & Amtmann, D. (2003). Preventing written expression disabilities through early and continuing assessment and intervention for handwriting and/or spelling problems: Research into practice. In H. L. Swanson, K. R. Harris, & S. Graham (Eds.), *Handbook of learning disabilities* (pp. 345–363). The Guilford Press.

Berninger, V. W., & Swanson, H. L. (1994). Modifying Hayes and Flower's model of skilled writing to explain beginning and developing writing. In E. Butterfield (Ed.), *Children's writing: Toward a process theory of development of skilled writing* (pp. 57–81). JAI.

Berninger, V. W., & Winn, W. D. (2006). Implications of advancements in brain research and technology for writing development, writing instruction, and educational evolution. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 96–114). The Guilford Press.

Bourdin, B., & Fayol, M. (2000). Is graphic activity cognitively costly? A developmental approach. *Reading and Writing: An Interdisciplinary Journal*, *13*(3–4), 183–196. https://doi.org/10.1023/A:1026458102685

Burge, B., Styles, B., Brzyska, B., Cooper, L., Shamsan, Y., Saltini, F., & Twist, L. (2010). Ngrt: New group reading test. Teacher's guide (paper version). GL Assessment Ltd.

Cabell, S. Q., Gerde, H. K., Hwang, H., Bowles, R., Skibbe, L., Piasta, S. B., & Justice, L. M. (2022). Rate of growth of preschool-age children's oral language and decoding skills predicts beginning writing ability. *Early Education and Development*, *33*(7), 1198–1221. https://doi.org/10.1080/10409289.2021.1952390

Caplan, M. Z., Bark, C., & McLean, B. (2012). *Helen Arkell spelling test, second edition*. Helen Arkell Dyslexia Centre.

Department for Education. (2013). English programmes of study: Key stages 1 and 2. *National Curriculum England*. https://assets.publishing.service.gov.uk/media/5a7de93840f0b62305b7f8ee/PRIMARY_national_curriculum_-_English_220714.pdf

Department for Education. (2020). *Statistics: School and pupil numbers*. https://www.gov.uk/government/collections/statistics-school-and-pupil-numbers

Dinehart, L. H. (2014). Handwriting in early childhood education: Current research and future implications. *Journal of Early Childhood Literacy*, *15*(1), 97–118. https://doi.org/10.1177/1468798414522825

Dockrell, J. E., & Connelly, V. (2021). Capturing the challenges in assessing writing: Development and writing dimensions. In T. Limpo & T. Olive (Eds.), *Executive functions and writing* (pp. 103–135). Oxford University Press. https://doi.org/10.1093/oso/9780198863564.003.0005

Dockrell, J. E., Connelly, V., & Arfe, B. (2019). Struggling writers in elementary school: Capturing drivers of performance. *Learning and Instruction*, *60*, 75–84. https://doi.org/10.1016/j.learninstruc.2018.11.009

Dockrell, J. E., Connelly, V., Walter, K., & Critten, S. (2015). Assessing children's writing products: The role of curriculum based measures. *British Educational Research Journal*, *41*(4), 575–595. https://doi.org/10.1002/berj.3162

Dunn, L. M., Dunn, D. M., Sewell, J., Styles, B., Brzyska, B., Shamsan, Y., & Burge, B. (2009). *The British picture vocabulary scale* (Third ed.). GL Assessment.

Fang, Z., & Wang, Z. (2011). Beyond rubrics: Using functional language analysis to evaluate student writing. *Australian Journal of Language and Literacy*, *34*(2), 147–165. https://doi.org/10.1007/BF03651853

Fayol, M., Alamargot, D., & Berninger, V. (2012). *Translation of thought to written text while composing: Advancing theory, knowledge, methods and applications*. Psychology Press.

Ferreiro, E., & Pontecorvo, C. (1999). Managing the written text: The beginning of punctuation in children's writing. *Learning and Instruction*, *9*(6), 543–564. https://doi.org/10.1016/S0959-4752(99)00006-7

Fitzgerald, J., & Shanahan, T. (2000). Reading and writing relations and their development. *Educational Psychologist*, *35* (1), 39–50. https://doi.org/10.1207/S15326985EP3501_5

Foorman, B. R., Herrera, S., Petscher, Y., Mitchell, A., & Truckenmiller, A. (2015). The structure of oral language and reading and their relation to comprehension in kindergarten through grade 2. *Reading and Writing*, *28*(5), 655–681. https://doi.org/10.1007/s11145-015-9544-5

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

Gillam, R. B., & Pearson, N. A. (2017). *Test of narrative language* (2rd ed.). Pro-Ed.

Graham, S., Berninger, V. W., Abbott, R. D., Abbott, S. P., & Whitaker, D. (1997). Role of mechanics in composing of elementary school students: A new methodological approach. *Journal of Educational Psychology*, *89*(1), 170–182. https://doi.org/10.1037/0022-0663.89.1.170

Graham, S., & Santangelo, T. (2014). Does spelling instruction make students better spellers, readers, and writers? A meta-analytic review. *Reading and Writing: An Interdisciplinary Journal*, *27*(9), 1703–1743. https://doi.org/10.1007/s11145-014-9517-0

Green, S. B. (1991). How many subjects does it take to do a regression analysis. *Multivariate Behavioral Research*, *26*(3), 499–510. https://doi.org/10.1207/s15327906mbr2603_7

Juel, C., Griffith, P. L., & Gough, P. B. (1986). Acquisition of literacy: A longitudinal study of children in first and second grade. *Journal of Educational Psychology*, *78*, 243–255. https://doi.org/10.1037/0022-0663.78.4.243

Kemp, N., & Treiman, R. (2023). Early spelling development. In S. Q. Cabell, S. B. Neuman, & N. P. Terry (Eds.), *Handbook on the science of early literacy* (pp. 107–117). Guilford Press.

Kent, S. C., & Wanzek, J. (2016). The relationship between component skills and writing quality and production across developmental levels: A meta-analysis of the last 25 years. *Review of Educational Research*, *86*(2), 570–601. https://doi.org/10.3102/0034654315619491

Kent, S., Wanzek, J., Petscher, Y., Otaiba, A., & Kim, Y. S. (2014). Writing fluency and quality in kindergarten and first grade: The role of attention, reading, transcription, and oral language. *Reading and Writing*, *27*(7), 1163–1188. https://doi.org/10.1007/s11145-013-9480-1

Kim, Y. G., Gatlin, B., Otaiba, A., & Wanzek, J. S. (2018a). Theorization and an empirical investigation of the component-based and developmental text writing fluency construct. *Journal of Learning Disabilities*, *51*(4), 320–335. https://doi.org/10.1177/0022219417712016

Kim, Y.-S., Al Otaiba, S., Folsom, J. S., Greulich, L., & Puranik, C. (2014). Evaluating the dimensionality of first-grade written composition. *Journal of Speech, Language, and Hearing Research*, *57*(1), 199–211. https://doi.org/10.1044/1092-4388(2013/12-0152)

Kim, Y.-S., Al Otaiba, S., Puranik, C., Folsom, J. S., Greulich, L., & Wagner, R. K. (2011). Componential skills of beginning writing: An exploratory study. *Learning and Individual Differences*, *21*, 517–525. https://doi.org/10.1016/j.lindif.2011.06.004

Kim, Y. S., Al Otaiba, S., & Wanzek, J. (2015). Kindergarten predictors of third grade writing. *Learning and Individual Differences*, *37*(850), 27–37. https://doi.org/10.1016/j.lindif.2014.11.009

Kim, Y.-S. G. (2016). Direct and mediated effects of language and cognitive skills on comprehension of oral narrative texts (listening comprehension) for children. *Journal of Experimental Child Psychology*, *141*, 101–120. https://doi.org/10.1016/j.jecp.2015.08.003

Kim, Y.-S. G. (2022). Do written language bursts mediate the relations of language, cognitive, and transcription skills to writing quality? *Written Communication*, *39*(2), 200–227. https://doi.org/10.1177/07410883211068753

Kim, Y.-S. G. (2024). Writing fluency: Its relations with language, cognitive, and transcription skills, and writing quality using longitudinal data from kindergarten to grade 2. *Journal of Educational Psychology*, *116*, 590–607. https://doi.org/10.1037/edu0000841

Kim, Y.-S. G., & Graham, S. (2022). Expanding the direct and indirect effects model of writing (DIEW): Reading-writing relations, and dynamic relations as a function of measurement/dimensions of written composition. *Journal of Educational Psychology*, *114*(2), 215. https://doi.org/10.1037/edu0000564

Kim, Y.-S. G., Park, C., & Park, Y. (2015). Dimensions of discourse-level oral language skills and their relations to reading comprehension and written composition: An exploratory study. *Reading and Writing: An Interdisciplinary Journal*, *28*(5), 633–654. https://doi.org/10.1007/s11145-015-9542-7

Kim, Y.-S. G., Petscher, Y., Wanzek, J., & Al Otabia, S. (2018b). Relations between reading and writing: A longitudinal examination from grades 3 to 6. *Reading and Writing*, *31*(7), 1591–1618. https://doi.org/10.1007/s11145-018-9855-4

Kim, Y.-S. G., & Schatschneider, C. (2017). Expanding the developmental models of writing: A direct and indirect effects model of developmental writing (DIEW). *Journal of Educational Psychology*, *109*(1), 35–50. https://doi.org/10.1037/edu0000129

Kim, Y.-S. G., Wolters, A., & Lee, J. W. (2024). Reading and writing relations are not uniform: They differ by the linguistic grain size, developmental phase, and measurement. *Review of Educational Research*, *94*(3), 311–342. https://doi.org/10.3102/00346543231178830

Kirby, M. S., Spencer, T. D., & Chen, Y. J. I. (2021). Oral narrative instruction improves kindergarten writing. *Reading & Writing Quarterly*, *37*(6), 574–591. https://doi.org/10.1080/10573569.2021.1879696

Language, Consortium, Reading Research. (2015). The dimensionality of language ability in young children. *Child Development*, *86*(6), 1948–1965. https://doi.org/10.1111/cdev.12450

Limpo, T., & Alves, R. A. (2013). Modeling writing development: Contribution of transcription and self-regulation to Portuguese students' text generation quality. *Journal of Educational Psychology*, *105*(2), 401–413. https://doi.org/10.1037/a0031391

MacKenzie, N. M., Scull, J., & Bowles, T. (2015). Change over time: An analysis of texts created by year one students. *Australian Educational Researcher*, *42*(5), 567–593. https://doi.org/10.1007/s13384-015-0189-9

Mackie, C., & Dockrell, J. E. (2004). The nature of written language deficits in children with SLI. *Journal of Speech, Language and Hearing Research*, *47*(6), 1469–1483. https://doi.org/10.1044/1092-4388(2004/109)

Martin, C., & Dockrell, J. E. (2024). Writing productivity development in elementary school: A systematic review. *Assessing Writing*, *60*, 100834. https://doi.org/10.1016/j.asw.2024.100834

Massonnié, J., Llaurado, A., Sumner, E., & Dockrell, J. E. (2022). Oral language at school entry: Dimensionality of speaking and listening skills. *Oxford Review of Education*, *48*(6), 743–766. https://doi.org/10.1080/03054985.2021.2013189

McCutchen, D. (1986). Domain knowledge and linguistic knowledge in the development of writing ability. *Journal of Memory and Language*, *25*(4), 431–444. https://doi.org/10.1016/0749-596X(86)90036-7

McCutchen, D. (2006). Cognitive factors in the development of children's writing. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research* (pp. 115–130). The Guilford Press.

McDonald, R. R., Schaughency, E., Boddie, K., Cameron, T. A., & Carroll, J. L. D. (2024). Contributions of school-entry oral language, early literacy skills, and name writing to writing in the first 2 years of school. *Reading and Writing: An Interdisciplinary Journal*, *37*, 2707–2732. https://doi.org/10.1007/s11145-023-10492-6

McMaster, K. L., Du, X., Yeo, S., Deno, S. L., Parker, D., & Ellis, T. (2011). Curriculum-based measures of beginning writing: Technical features of the slope. *Exceptional Children*, *77*, 185–206. https://doi.org/10.1177/001440291107700203

Mehta, P. D., Foorman, B. R., Branum-Martin, L., & Taylor, W. P. (2005). Literacy as a unidimensional multilevel construct: Validation, sources of influence, and implications in a longitudinal study in grades 1 to 4. *Scientific Studies of Reading*, *9*(2), 85–116. https://doi.org/10.1207/s1532799xssr0902_1

Mercugliano, A., Bigozzi, L., De Cunto, A., Graziani, D., Pecini, C., Usai, M. C., Vecchi, S., & Ruffini, C. (2024). Which childhood predictive indices forecast reading and writing skills in school-age children: A systematic review. *Child Neuropsychology*, *31*(1), 161–196. https://doi.org/10.1080/09297049.2024.2347381

Mullis, I. V. S., Martin, M. O., Goh, S., & Cotter, K. (2016). Timss, 2015 encyclopedia: Education policy and curriculum in mathematics and science. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/timss2015/encyclopedia/

National Early Literacy Panel. (2008). *Developing early literacy: Report of the National Early Literacy Panel*. National Institute for Literacy. http://www.nifl.gov/earlychildhood/NELP/NELPreport.html

O'Neill, J. (2021, January 21). Average household income, UK: Financial year 2020. Office for National Statistics. https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/householddisposableincomeandinequality/financialyear2020#average-household-income-datamovies_l_5d277587e4b02a5a5d57b59e

Piercy, W., & Dockrell, J. E. (2023). Assessing children's writing products using curriculum-based measures of writing (CBM-W). *Educational & Child Psychology*, *40*(1), 44–60. https://doi.org/10.53841/bpsecp.2023.40.1.44

Pritchard, V. E., Malone, S. A., & Hulme, C. (2021). Early handwriting ability predicts the growth of children's spelling, but not reading, skills. *Scientific Studies of Reading*, *25*(4), 304–318. https://doi.org/10.1080/10888438.2020.1778705

Puranik, C., Li, H., & Guo, Y. (2024). The contributions of short-term memory to writing at the sublexical, lexical, and discourse level in beginning writers. *Scientific Studies of Reading*, *28*(5), 564–589. https://doi.org/10.1080/10888438.2024.2365698

Puranik, C. S., & AlOtaiba, S. (2012). Examining the contribution of handwriting and spelling to written expression in kindergarten children. *Reading and Writing*, *25*(7), 1523–1546. https://doi.org/10.1007/s11145-011-9331-x

Puranik, C. S., Lombardino, L. J., & Altmann, L. J. P. (2008). Assessing the microstructure of written language using a retelling paradigm. *American Journal of Speech-Language Pathology*, *17*(2), 107–120. https://doi.org/10.1044/1058-0360(2008/012)

Ray, K., Dally, K., Rowlandson, L., Tam, K. I., & Lane, A. E. (2022). The relationship of handwriting ability and literacy in kindergarten: A systematic review. *Read Writ*, *35*(5), 1119–1155. https://doi.org/10.1007/s11145-021-10224-8

Ritchey, K. D., McMaster, K. L., Al Otaiba, S., Puranik, C. S., Grace Kim, Y. S., Parker, D. C., & Ortiz, M. (2016). Indicators of fluent writing in beginning writers. In K. D. Cummings & Y. Petscher (Eds.), *The fluency construct* (pp. 21–66). Springer.

Rodriguez, C., Jimenez, J. E., & Balade, J. (2025). The impact of oral language and transcription skills on early writing production in kindergarteners: Productivity and quality. *Early Childhood Education Journal*, *53*(4), 1–11. https://doi.org/10.1007/s10643-024-01670-4

Rohloff, R., Tortorelli, L., Gerde, H. K., & Bingham, G. E. (2022). Teaching early writing: Supporting early writers from preschool to elementary school. *Early Childhood Education Journal*, *51*(7), 1227–1239. https://doi.org/10.1007/s10643-022-01365-8

Salas, N., & Caravolas, M. (2019). Dimensionality of early writing in English and Spanish. *Journal of Literacy Research*, *51*(3), 272–292. https://doi.org/10.1177/1086296X19858146

Scull, J., Mackenzie, N. M., & Bowles, T. (2020). Assessing early writing: A six-factor model to inform assessment and teaching. *Educational Research for Policy and Practice*, *19*, 239–259. https://doi.org/10.1007/s10671-020-09257-7

Seoane, R. C., Wang, J., Cao, Y., & Kim, Y.-S. G. (2025). Unpacking the relation between oral language and written composition: A meta-analysis. *Review of Educational Research*, https://doi.org/10.3102/00346543251320359

Shanahan, T., & Lonigan, C. J. (2010). The National Early Literacy Panel: A summary of the process and the report. *Educational Researcher*, *39*(4), 279–285. https://doi.org/10.3102/0013189X10369172

Stainthorp, R. (2019). Spelling: From words in the head to words on the page. In J. Murphy & T. Bennett (Eds.), *The research ED guide to literacy* (pp. 77–92). John Catt Educational Ltd.

Tomblin, J. B., & Zhang, X. (2006). The dimensionality of language ability in school-age children. *Journal of Speech, Language, and Hearing Research*, *49*(6), 1193–1208. https://doi.org/10.1044/1092-4388(2006/086)

Wagner, R. K., Puranik, C. S., Foorman, B., Foster, E., Wilson, L. G., Tschinkel, E., & Kantor, P. T. (2011). Modeling the development of written language. *Reading and Writing*, *24*(2), 203–220. https://doi.org/10.1007/s11145-010-9266-7

Wiig, E. H., Secord, W. A., & Semel, E. (2006). *Clinical evaluation of language fundamentals preschool-second edition*. Harcourt Assessment.