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Dimensionality of Writing Skills in English and Spanish, and the Relations of Language and Cognitive Skills to Written Composition for English-Spanish Emergent Bilingual Children in Grade 1

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Running Head: Writing for English-Spanish Emergent Bilinguals

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and Cognitive Skills to Written Composition for English-Spanish Emergent Bilingual
Children in Grade 1**

Abstract

We examined the relations of language skills (vocabulary, listening comprehension, and oral retell), transcription skills (spelling and handwriting fluency), and domain-general cognitions/executive functions (working memory and attentional control) to writing quality for English-Spanish emergent bilingual children in Grade 1. Data were from a convenience sample of 211 children (57% girls; 82% Hispanic, 9.5% White, 4% Asian American children) who were assessed on written composition, vocabulary, listening comprehension, oral retell, and spelling in English and Spanish; handwriting fluency and working memory in English; and attentional control rated by their teachers. Confirmatory factor analysis results showed that writing quality in English and Spanish in narrative and opinion genres was best described as a unidimensional skill. Structural equation model results showed that English oral language, English spelling, and Spanish spelling skills, but not Spanish oral language skill, were independently related to writing quality, after controlling for gender, English learner status, Hispanic status, and enrollment in dual immersion program. The relations of working memory and attentional control to writing quality were indirect, mediated by oral language and transcription skills. These results are discussed in light of theory and in the context of emergent bilingual children in primary grades.

Keywords: L1 & L2, writing, direct and indirect relations, dimensionality, emergent bilingual

Introduction

Across the world, approximately 66% of children learn to speak more than one language (Marian & Shook, 2012). The US is no exception, and the number of school-aged emergent bilinguals in the US continues to grow rapidly (Byers-Heinlein & Lew-Williams, 2013). Despite the prevalence of bilingual and biliteracy learning, there is a paucity of research on emergent bilingual children's writing acquisition. The vast majority of previous studies on writing acquisition focused on monolingual learners or on writing in only one language, either the societal language or the writer's second language (L2). This represents a significant gap in our understanding, as we have limited knowledge of not only the relations between writing in two languages, but also the skills and knowledge that contribute to bilingual writing. Addressing this gap has important theoretical and practical implications. For example, questions arise about the nature of the relation between a child's first language (L1) and their second language (L2) writing skills. Are L1 written composition skill and L2 written composition skill best considered as related but dissociable skills, or are they better viewed as a single skill? Prior to investigating predictors of the outcome (writing skill), it is crucial to understand the nature of the outcome, including its dimensionality. Another important question is what skills and knowledge predict writing skill in two languages for bilingual individuals. Exploring this question can provide valuable insights. For instance, if transcription skills such as spelling and handwriting fluency/keyboarding in both L1 and L2 independently predict writing quality, this suggests a need for instruction on transcription skills in both languages. To address this gap, in the present study, we investigated the dimensionality of writing in two languages (English and Spanish) for Spanish-English emergent bilinguals in Grade 1 and their language skills, transcription skills,

and domain-general cognitions/executive functions as predictors of writing in L1 (first language) and L2 (second language), informed by theoretical models and empirical evidence, albeit mostly from monolingual students.

Emergent bilinguals or multilinguals are those who acquire more than one language sequentially or simultaneously. This includes individuals with varying levels of proficiency in their target languages. Of multilingual learners, English learners in the US context are a subgroup of emergent bilinguals or multilinguals who are learning English, the societal language, as an additional language and have limited proficiency in it. Note that in this article, we employ the terms L1 and L2. However, we acknowledge that these labels may not be entirely suitable due to the diverse linguistic experiences of multilingual learners. Some individuals are exposed to multiple languages from an early age, making it challenging to definitively categorize one as L1 or L2.

Theoretical and Empirical Background

Theoretical Models of Writing

The ability to compose coherent and clear written texts that communicate an intended message for a given goal and audience is one of the most challenging skills that individuals acquire. Several theoretical models have described the complex processes and skills involved in writing. Writing involves generating ideas and translating them into language, transcribing or encoding translated ideas into written texts by handwriting or keyboarding, and evaluating and revising the written texts for coherence. In the cognitive model of writing, Hayes and Flower (1980) described in detail the iterative and recursive processes of planning, translation, and revision. Other theoretical models have focused on skills and knowledge that contribute to the

writing process (Berninger et al., 2002; Berninger & Winn, 2006; Graham, 2018; Y.-S. G. Kim, 2020). For example, the not-so-simple view of writing (Berninger & Winn, 2006) states that writing requires transcription skills (spelling and handwriting/keyboarding fluency), text generation (translation of ideas into words, sentences, and texts), executive function (attention, goal setting, planning, revising, and self-regulation), and working memory. The direct and indirect effects model of writing (DIEW; Y.-S. G. Kim, 2020; Y.-S. G. Kim & Graham, 2022; Y.-S. G. Kim & Schatschneider, 2017) extended the not-so-simple view of writing by adding and articulating the roles of higher order cognitive skills and regulation (e.g., reasoning, perspective taking, inferencing, goal setting, monitoring, self-reinforcement); background knowledge such as world, topic, and discourse knowledge which includes genre knowledge; and social-emotional aspects such as motivation, attitude, and anxiety in addition to oral language, transcription, and executive functions. Briefly, according to DIEW, higher order cognitions are particularly important for establishing coherence of ideas; background knowledge is important for the idea generation process as well as coherence of ideas; and social-emotional aspects are crucial for engagement and persistence throughout the writing process (see Y.-S. G. Kim & Graham, 2022, for details). A large body of empirical evidence, albeit mostly from monolingual learners, supports the roles of the above-stated skills and knowledge in written composition. For example, robust evidence indicates the roles of spelling and handwriting/keyboarding fluency (e.g., see meta-analyses such as Graham & Santangelo, 2014; Santangelo & Graham, 2016); oral language (e.g., Coker, 2006; Dockrell & Connelly, 2009, 2015; Graham & Perin, 2007; Y.-S. Kim et al., 2011, 2014); working memory (e.g., Kellogg, 2001; Y.-S. G. Kim & Park, 2019; Y.-S. G. Kim & Schatschneider, 2017; H. L. Swanson & Berninger, 1996); and attentional control (e.g., Casas et

al., 2011; Y.-S. G. Kim, 2020; Y.-S. G. Kim & Graham, 2022; Y.-S. G. Kim & Park, 2019; Mayes & Calhoun, 2007; Olive & Kellogg, 2002).

Another unique aspect of DIEW is its articulation of the nature of relations among component skills (i.e., how component skills are related to one another and to writing): The skills and knowledge that contribute to writing have hierarchical, interactive, and dynamic relations. The hierarchical relations hypothesis, which is relevant to the present study, posits that not all skills and knowledge have direct relations to writing, but instead they are hierarchically related such that they have direct *and* indirect relations to writing. Examining indirect relations in addition to direct relations is crucial in order to unpack the pathways by which component skills contribute to writing. For example, working memory is one of the well-recognized cognitive skills in writing (Berninger & Winn, 2006; Kellogg, 2001; Y.-S. G. Kim & Park, 2019). An important question is in regard to the pathways by which it impacts writing—does working memory directly contribute to writing over and above all the other component skills and knowledge, and/or indirectly contribute to writing via the other skills and knowledge (e.g., vocabulary, transcription skills)? According to DIEW, domain-general cognitions or executive functions, such as working memory and attentional control, play a role in and contribute to the writing processes mentioned earlier, such as translation, transcription, and revision, which influences writing outcome (writing quality). As a result, executive functions are indirectly related to writing outcomes, such as writing quality, through other component skills and knowledge, such as oral language and transcription skills, involved in the writing process. Recent studies have supported hierarchical and direct and indirect relations such that working memory and attentional control predicted oral language, transcription, and higher order cognitive skills, which, in turn, predicted written composition skills (Y.-S. G. Kim & Graham, 2022; Y.-S. G.

Kim & Park, 2019; Y.-S. G. Kim & Schatschneider, 2017). Note, however, that these previous studies have primarily focused on monolingual children.

Writing Acquisition for Bilingual Learners

The above-noted theoretical models in principle apply to writing in more than one language. However, bilingual writing acquisition is inherently more complex than monolingual writing as it involves skills and knowledge of more than one language and writing system and their interactions. According to theoretical frameworks and evidence, bilingual writing is influenced by shared resources across languages as well as language-specific knowledge and skills (Cummins, 1981; see below for empirical evidence). The developmental interdependence hypothesis holds that competences developed in one language are used to support learning in new languages as long as target language proficiency reaches a certain threshold level (Cummins, 1979, 1981). While these ideas were broad conceptualizations, the specifics were further elaborated in subsequent work. In particular, Koda (2007) observed that literacy development universally requires an understanding of general mapping principle between “a language and the writing system that encodes the language” (p. 12) whereas mapping details are language-specific constraints. In addition, transfer is the mechanism by which prior literacy experience supports L2 literacy acquisition, and L1 and L2 literacy experience as well as linguistic distance between L1 and L2 impact L2 literacy development. Although Koda’s observation primarily focused on reading acquisition, the key ideas noted here apply to writing development as well. If writing in more than one language draws on shared resources from L1 and L2 as well as language-specific aspects, then L1 writing and L2 writing skills should be related. Indeed, studies have shown that L1 and L2 writing skills are moderately to very strongly

related for German-English learners in Grades 3 and 4 (Steinlen, 2018); Dutch-English learners in Grade 8 (Schoonen et al., 2003); Korean-English learners in Grade 9 (Pae, 2019), Grade 10 (K. J. Kim & Pae, 2021), and Grade 11 (Pae, 2018); and Japanese-English learners in college (Sasaki & Hirose, 1996). Research on emergent bilingual students in elementary grades indicates that their writing development mirrors that of monolingual students (Williams & Lowrance-Faulhaber, 2018). However, emergent bilinguals also leverage the skills and resources available to them across languages, drawing on their distinct bilingual and biliteracy experiences (see Williams & Lowrance-Faulhaber, 2018, for a review). They capitalize on the transfer of skills acquired in one language to another, including phonetic and syntactic aspects (Soltero-Gonzalez et al., 2012; Wolters & Y.-S. G. Kim, 2024).

Many studies with emergent bilinguals focused on *L2 English skills* for English learners and showed that L2 language and transcription skills are important to L2 writing quality. For English learners in Grades 1 and 2, their syntactic construction and transcription skills in English predicted content and organization of writing and overall writing score in English (Harrison et al., 2016). Spelling, handwriting fluency, and vocabulary in English predicted writing quality in English for English learners in Grades 4 and 5, and vocabulary knowledge in English tended to play a greater role for English learners than for English monolingual students (Silverman et al., 2015). Babayigit (2014) similarly found that English learners' verbal skills (composed of working memory, vocabulary, and semantic fluency) and lexical literacy skills (composed of spelling and word reading) in English predicted writing quality in English. Whereas these previous studies investigated the contributions of L2 English skills to L2 English writing, Crosson and colleagues (2012) examined written compositions in L1 for native Spanish speakers in Grades 4 and 5 enrolled in Spanish-English bilingual programs. Their results showed that the

use of specialized academic Spanish vocabulary in written composition predicted writing quality in Spanish. Schoonen and colleagues (2003) also showed that language skills (vocabulary and grammatical knowledge) and orthographic knowledge in L1 predicted writing skill in L1 and that language skills and orthographic knowledge in L2 predicted writing skill in L2.

Despite growing research on bilingual writing, there are important gaps in the extant literature: The majority of previous studies of bilingual learners' writing tended to focus on either English learners where English is used as the societal language or adult learners in the English-as-a-foreign-language context. Many multilingual children in the US, for example, are proficient in the societal language English, and therefore, it is important to work with multilingual learners, including both English learners and non-English learners or those who are not designated as English learners. The second gap is that the majority of extant studies examined individuals' L2 (mostly English) skills, not considering L1 skills, although the theoretical models reviewed above suggest that both L1 and L2 skills and knowledge contribute to L1 and L2 writing. Therefore, L1 and L2 skills should be considered to more fully account for the learning of emergent bilingual children. Although there are a few previous studies that examined relations between L1 *and* L2 skills, this literature base is small. Kormos and Safar (2008) found that phonological short-term memory in L1 was related to writing quality in L2 for Hungarian students in secondary schools. In a recent study, Y.-S. G. Kim and colleagues (2022) reported that higher order cognitive skills (i.e., inference, perspective taking, monitoring) in English and Spanish were moderately related to written composition skills in English and Spanish for English-Spanish emergent bilinguals in Grades 1, 2, and 3. While informative, these studies did not examine the roles of language and transcription skills, which are important in writing according to theoretical models described above.

The third gap that is unique to bilingual writing is the dimensionality of L1 and L2 written composition skills—that is, what is the nature of relations between L1 and L2 writing skills, and are L1 and L2 writing skills best described as a single dimension, as multiple dimensions by language, or as having a bifactor structure? Prior studies suggested that L1 and L2 writing skills are related (e.g., K. J. Kim & Pae, 2021; Pae, 2018, 2019; Schoonen et al., 2003). However, the studies did not explicitly test the dimensionality of these skills; instead, they presumed multidimensionality by language as they modeled L1 and L2 writing skills as separate outcomes. The unidimensionality of L1 and L2 writing suggests that writing in both languages is related to an extent that they can be conceptualized as a single skill. Theoretically, unidimensionality is plausible for those whose L1 and L2 language and transcription skills are similar and therefore, writing skills in L1 and L2 are not likely to have large discrepancies. As noted above, language skills are important contributors to written composition and therefore, a similar level of language proficiency in both languages would be one factor that contributes to the unidimensionality of bilingual writing. Similarly, another factor to consider in the dimensionality of written composition skills is transcription skills. According to the dynamic relations hypothesis of DIEW, transcription skills place a large constraint on writing during the beginning phase of writing development, limiting the contributions of other skills such as oral language and higher order cognitive skills (Y.-S. G. Kim & Graham, 2022). Consequently, for emergent bilingual writers who are still developing transcription skills in L1 and L2 (i.e., those in the beginning phase of writing development), writing in L1 and L2 may be a single dimension due to large constraints of transcription skills regardless of students' varying language proficiency in L1 and L2.

Multidimensionality of bilingual writing by language (e.g., L1 writing quality and L2 writing quality) is also possible, and many prior studies have assumed this. Treating L1 writing and L2 writing as distinct outcomes is not an unreasonable assumption: If oral language skills contribute to writing according to the theoretical models noted above, L1 and L2 writing skills may be dissociable, particularly if there is a sizable difference in L1 and L2 proficiency (Y.-S. G. Kim et al., 2022). Because both L1 and L2 language skills are important to L1 and L2 writing quality, large discrepancies in oral language proficiency between L1 and L2 (e.g., adult foreign language learners who have high proficiency in L1 and low proficiency in L2) would result in differences in writing quality in L1 versus L2.

Another possibility is a bifactor structure featuring a general writing quality construct that encompasses writing quality across languages, along with language-specific constructs for L1 and L2. This structure is theoretically plausible when there is a significant overlap in writing quality but distinct language-specific aspects of writing quality exist. This scenario is likely when language proficiency and transcription skills are similar in L1 and L2, yet writing in each language exhibits unique subdimensions beyond what is captured across languages. For example, languages may have different text organization conventions that are not fully captured in the general writing quality construct.

Understanding the dimensionality of L1 and L2 writing is a prerequisite for identifying contributing skills and their relations to writing. That is, before investigating predictors of the outcome (writing), it is important to understand the nature of the outcome such as its dimensionality. For example, if L1 and L2 writing skills are best described as multidimensional constructs, these multiple dimensions would be included as outcomes in relation to predictors. In contrast, if a single dimensionality best represents L1 and L2 writing, then this would be

included in the investigation of predictors. To our knowledge, the only study that addressed the dimensionality of L1 and L2 writing is a recent study with English-Spanish bilingual children in Grades 1–3, and findings showed that writing in English and Spanish was best described as a unidimensional construct (Y.-S. G. Kim et al., 2022).

Present Study

Building on prior work, we aim to expand our understanding of bilingual writing in a couple of important ways. First, the present study expands prior work by focusing on emergent bilingual learners, including English learners and non-English learners, in primary grades. Second, we measured the language and literacy skills in L1 and L2. As noted above, the majority of previous work on bilingual learners focused on L2 or societal language skills for English learners. Although informative, sole focus on L2 skills for bilingual learners is limiting as it does not recognize their L1 skills and resources. Theory and evidence indicate that bilingual learners draw on both L1 and L2 skills and resources; thus, it is important to examine the contributions of both L1 and L2 language and literacy skills to expand our understanding of bilingual learners' writing. A third way this study expands previous work is by examining the dimensionality of writing skills in English and Spanish for emergent bilingual children.

Lastly, in the present study, we examined direct *and* indirect relations of language, transcription, and executive functioning (working memory and attentional control) skills to writing skills for emergent bilingual learners. These skills were included according to the theoretical models reviewed above. All the previous work with multilingual learners examined only direct relations of predictors to writing outcomes (Babayigit, 2014; Harrison et al., 2016; Kormos & Safar, 2008; Schoonen et al., 2003; Silverman et al., 2015). However, as noted earlier,

DIEW specifies the direct and indirect nature of relations, and previous work on direct and indirect relations has been with monolingual children (Y.-S. G. Kim, 2020; Y.-S. G. Kim & Graham, 2022; Y.-S. G. Kim & Schatschneider, 2017; Y.-S. G. Kim & Park, 2019).

Theoretically, direct and indirect relations are expected to apply to emergent bilingual learners, and the present study empirically examined this.

In the present study, we aimed to address these gaps in the literature by using cross-sectional data from English-Spanish emergent bilingual learners in Grade 1. Children were assessed on language, spelling, and written composition skills in both English and Spanish, and their working memory and handwriting fluency were measured in English. This study was guided by the following two research questions. First, what is the dimensionality of writing quality in English and Spanish for English-Spanish emergent bilingual learners in Grade 1? Is the writing quality of English-Spanish emergent bilingual learners in Grade 1 best described as a unidimensional construct; as two related but dissociable constructs of writing quality in English and Spanish; or as a bifactor construct with a general writing quality construct that reflects writing quality across languages, along with language-specific constructs for English and Spanish? Second, how are executive functions (working memory and attentional control), oral language skills (vocabulary, listening comprehension, and oral retell) and spelling in English and Spanish, and handwriting fluency related to writing quality in English and Spanish for English-Spanish emergent bilingual learners in Grade 1, after accounting for gender, English learner status, Hispanic status, and instructional program (English-Spanish dual immersion vs. structured English immersion program)?

With regard to the first research question, we hypothesized that writing quality in L1 and L2 for beginning writers would be best characterized as a unidimensional skill, consistent with

what was found in a recent study (Y.-S. G. Kim et al., 2022), because of the considerable constraining role of transcription skills in the beginning phase of writing development (see the elaboration above about plausible hypotheses of the dimensionality of L1 and L2 writing). With regard to the second research question, we posited that oral language, spelling, handwriting fluency, working memory, and attentional control would be related to writing quality based on a large body of literature with monolingual writers (see above). If writing quality is best described as a single dimension, then it was hypothesized that language and spelling skills in both English and Spanish would directly relate to the unidimensional writing quality construct because it is posited to reflect both English and Spanish skills. If writing quality is a multidimensional construct by language, then English oral language and spelling skills were hypothesized to be strongly directly related to English writing quality whereas Spanish oral language and spelling skills were posited to be more strongly directly related to Spanish writing quality. Handwriting fluency was posited to be directly related to writing quality regardless of its dimensionality (whether writing quality is unidimensional or multidimensional by language) based on theoretical models (Berninger & Winn, 2006; Y.-S. G. Kim & Graham, 2022) and a large body of empirical evidence from monolingual children (see Santangelo & Graham, 2016 for a meta-analysis). Aligned with DIEW and associated evidence, we hypothesized that working memory and attentional control would be indirectly related to writing quality. In other words, working memory and attentional control would be related to oral language and transcription skills, which, in turn, would be related to writing quality.

Method

Participants

Data were from a convenience sample of 211 emergent bilingual Grade 1 students (57% females and 43% males; $M_{age} = 6.75$, $SD_{age} = .32$) in 15 classrooms in five schools located in the Southwestern US. The students were confirmed as emergent bilinguals (speaking and/or learning English and Spanish) by their teachers, and consent letters in English and Spanish were sent to their parents and guardians. Only children whose parents provided consent were included in the study and participation in the study was voluntary. Child assent was also obtained following the guidelines of human subjects approval obtained from the University of California Irvine Institutional Review Board (HS#2018-4411).

The schools were located in a community where the majority of residents were Hispanic and where Spanish was widely used. Approximately 82% of participating students were Hispanic children, 9.5% were White children, and 4% were Asian American children. Approximately 73% of them were eligible for the free and reduced lunch program, a proxy for poverty status in the US. A total of 62% were classified as English learners (limited English proficiency) according to the district record. Sixty-one percent of students were enrolled in the Spanish-English dual immersion program whereas 39% were in the structured English immersion program. Approximately 5% were receiving speech services and 1% were receiving language impairment services.

Dual immersion program is a bilingual program where students from two different language backgrounds (e.g., monolingual English-speakers, monolingual Spanish-speakers, or bilingual Spanish-English speakers) learn and study in both languages and the language of instruction is both languages. In the structured English immersion program, English is the sole language of instruction with English language instruction embedded for English learners. For those in the Spanish-English dual immersion program, the ratio of Spanish and English

instruction was 90:10. The literacy curriculum in the English immersion program was the Benchmark Advance, and in the dual immersion program, the Benchmark Advance and Benchmark Adelante were used in English and Spanish, respectively. However, information regarding the nature of instruction in the classrooms was beyond the scope of the present study and is unavailable.

Measures

Written composition, oral language skills (vocabulary, listening comprehension, and oral retell), and spelling skills were measured in English and Spanish. Handwriting fluency and working memory were measured in English only, and attentional control was rated by the students' teachers. Due to time constraints encountered while working within the school environment, the research team had a limited window to interact with the children; therefore, the number of measures had to be limited, requiring careful decision-making. This resulted in the decision to measure handwriting fluency and working memory in English only and not in Spanish (see below sections on handwriting fluency and working memory for more details). Unless otherwise noted, children's responses were scored dichotomously. Reliability estimates are from the present sample and are reported in Table 1.

Written Composition

Two writing tasks, one narrative and one opinion, were used in English and Spanish, respectively. These two genres were selected because these genres are expected to be taught across kindergarten to Grade 5 in the Common Core State Standards and the standards in the state where the study was conducted. Although the Common Core State Standards do include the

informative/explanatory genre, it was not included in the present study due to the aforementioned time limitations.

Narrative tasks were from the Test of Early Written Language-Third Edition (TEWL-3; Hresko et al., 2012). For these tasks, children were presented with a series of three illustrations per prompt (the skateboard prompt in English and the soccer prompt in Spanish) and were asked to write a story that would go with the illustrations. The opinion task in English was the Written Essay task of the Wechsler Individual Achievement Test-Third Edition (WIAT-III; Wechsler, 2009). In this task, children were asked to write about their favorite game and three reasons for it. The opinion task in Spanish was adapted from a previous study (Wagner et al., 2011). In this task, children were asked to write about their favorite animal and three reasons for it. Children were given 30 minutes to complete each writing task.

In order to remove any extraneous construct irrelevant variance in scoring due to legibility of handwriting (Graham et al., 2011), children's written compositions were typed up verbatim by Spanish-English bilingual undergraduate research assistants, who were required to achieve a minimum accuracy rate of 98%; the typed copies were then used for scoring and evaluation. The research assistants were closely overseen by a Spanish-English bilingual doctoral student in literacy education and a Spanish-English bilingual project coordinator who had a PhD in education. Any questions research assistants had regarding deciphering children's handwriting were resolved through discussions with the doctoral student, the project coordinator, and the principal investigator of the project, all of whom had extensive experience with young children's writing.

Written compositions can be evaluated in multiple ways focusing on different aspects of writing, but writing quality is most widely examined and is generally accepted as the ultimate

goal of writing (Y.-S. G. Kim & Graham, 2022). In the present study, written compositions in both genres were evaluated in terms of quality of ideas and organization on a scale from 0 (illegible or random strings of letters) to 7 (ideas are coherently and clearly presented in an organized manner), following previous studies (e.g., Hooper et al., 2002; Y.-S. Kim et al., 2015; Y.-S. G. Kim & Graham, 2022; Olinghouse, 2008; Olinghouse & Graham, 2009). Compositions with clear, rich, and detailed ideas with a clear organization such as beginning, middle, and end were rated higher. The rubric is found in Table S1 in Online Supplemental Materials.

Compositions for the TEWL tasks in English and Spanish were also scored following the TEWL guidelines where a child is given a score in each of 20 aspects of the composition (e.g., recognizable words, invented spelling, recognizable plot, character development). Although the TEWL scoring guidelines were originally developed for compositions in English, the same guidelines were applied to compositions in Spanish. A Spanish-English bilingual doctoral student in education trained two Spanish-English bilingual undergraduate students. The doctoral student had extensive experience in coding writing quality in English and Spanish in previous large-scale projects. The training consisted of a series of meetings: The first meeting consisted of going over the rubric and anchor compositions, and practice coding; this was followed by independent practice sessions and associated meetings to discuss scores and any discrepancies.

Although children were asked to write in English or asked to write in Spanish in respective tasks, some children wrote in the nontarget language to a varying degree. For example, in the English writing task, although the majority of a student's text may have been in English, some words were in Spanish. Similarly, in the Spanish writing task, while most of the student's text was in Spanish, some words were in English. This phenomenon of borrowing words from another language has been reported in previous studies of emergent bilinguals in

elementary grades (e.g., Y.-S. G. Kim et al., 2022; Soltero-Gonzalez et al., 2012). The proportion of writing in the nontarget language is reported in Table S2 in Online Supplemental Materials and ranged from a mean of 2% in the Spanish opinion task to 6% in the English narrative task. Few children wrote completely in non-target language. Children’s written compositions, regardless of the language used, were rated on writing quality—given that the rubric was essentially identical for both languages, this did not present an issue for evaluating writing quality. In data analysis, the proportion of writing in nontarget language was initially included as a control variable, but it was consistently not statistically significant over and above the skills included in the statistical models, and therefore, it was not included in the final model shown in the study.

Oral Language

Oral language skills were measured in vocabulary, listening comprehension, and oral retell. Vocabulary knowledge was measured by the Expressive Vocabulary subtask of the Clinical Evaluation of Language Fundamentals-Fourth Edition (CELF-4) in English, and the Vocabulario Expresivo subtask of CELF-4 in Spanish (Semel et al., 2003). The English version of CELF-4 was normed for English-speaking children in the US whereas CELF-4 Spanish was normed for the Spanish monolingual and bilingual population in the US for individuals aged 5 through 21 (Semel et al., 2006). In both tasks, children were asked to name illustrations of objects, people, and actions.

Listening comprehension and oral retell were measured by the Understanding Spoken Paragraphs task of CELF-4 in English (Semel et al., 2003) and its equivalent in Spanish, Entiendo Parrafos (Semel et al., 2006). In these tasks, children heard three stories and were asked

a total of 15 literal and inferential comprehension questions. Before the child was presented with comprehension questions, they were asked to retell the story. Their retell was digitally recorded (i.e., wav file), and transcribed verbatim following the Systematic Analysis of Language Transcripts (SALT; Miller & Iglesias, 2012) guidelines. Then, transcribed versions were used to code the quality of retell, considering the extent to which story structure or grammar elements were included (i.e., characters, setting, initiating and mainline events, problem, and resolution) and ideas were logically sequenced, following previous studies (Barnes et al., 2014; Y.-S. G. Kim & Schatschneider, 2017; Scott & Windsor, 2000; for a review of literature on quality coding, see Gillam & Pearson, 2017). For each of the story grammar elements, maximum possible scores varied depending on the story—for example, some stories included more mainline events than others. The process of establishing reliability and coding retell quality was similar to that for writing quality. The bilingual PhD student in education trained two bilingual undergraduate students (different individuals from those who worked on writing quality) and a project staff member in a series of meetings. The initial meeting consisted of going over the rubric and practicing scoring. This was followed by independent scoring and subsequent meetings to discuss discrepancies.

Spelling

Spelling skills were measured by a dictation task. In English, an experimental spelling task from a previous study was used (Y.-S. G. Kim, 2020). There were 18 words that are developmentally appropriate for primary grade students (e.g., bed, dig, bump, ship). Children heard the target word, a sentence that includes the target word, and the target word again. In

Spanish, there were 15 items (e.g., el, pan, voy, fresa) that were adapted from the Palabras a su Paso (Helman et al., 2013).

Handwriting Fluency

Handwriting fluency was measured by an alphabet writing fluency task in English because the vast majority of alphabet letters in English and Spanish are shared except for ñ. The Alphabet Writing Fluency subtask of WIAT-III (Wechsler, 2009) was used. In this task, children were asked to write alphabet letters within 30 sec. Following WIAT-III, the instructions to students were as follows: “I want you to write as many letters of the alphabet as you can. Write them as quickly as you can. The letter *a* has been done for you. Next to the letter *a*, write other letters you know.” The number of letters was the score. The instructions for the alphabet writing fluency task were provided in English first, then in Spanish as needed.

Working Memory

The Memory for Digit of the Comprehensive Test of Phonological Processing-Second Edition (CTOPP-2) was used. In this task, children were presented with an increasing number of digits and asked to repeat them in correct order. The Digit task, not language-based tasks such as nonword repetition, was selected in order to reduce language demands in the task, and all the children in the study, including English learners, knew digits in English. Nonetheless, the measurement of working memory only in English is a limitation in the study (see the Limitations and Future Directions section).

Attentional Control

The Strengths and Weaknesses of ADHD Symptoms and Normal Behavior (SWAN; J. M. Swanson et al., 2012) was used. SWAN is a behavioral checklist that has 30 items that are related to attentional control and hyperactivity, and each item is rated on a scale of 1 (far below average) to 7 (far above average). Previous studies have demonstrated the validity of SWAN (e.g., Arnett et al., 2013). In this study, the first nine items that capture attentional control (Saez et al., 2012) were used. Teachers of the participating children were asked to complete it.

Covariates

Gender, English learner status, Hispanic status, and instructional program were included as control variables. English learners were those who were identified as having limited English proficiency according to district records. English learners did not include those who were identified as initially fluent or those who were redesignated as English fluent.

Procedures

Children were assessed in quiet spaces in their school by trained English-Spanish bilingual research assistants. Handwriting fluency and written compositions were assessed in a group setting (3-4 children) whereas the other tasks were administered individually. Data were collected in the late fall and winter. Working memory, language, and transcription skills were administered first, and writing tasks were administered last in late winter.

Data Analytic Strategies

Primary data analytic strategies were confirmatory factor analysis and structural equation modeling using Mplus 8.6 (Muthén & Muthén, 1998-2017). The nesting structure within schools was accounted for by using Type = Complex. Although the possible range in the writing quality

score was from 0 to 7, children's actual scores ranged from 0 to 4 (see Table 1), and therefore, diagonally weighted least squares (WLSMV in Mplus) was used as an estimator. Confirmatory factor analysis was conducted in order to examine the dimensionality of writing tasks in English and Spanish. Three alternative models were fitted using all the writing quality variables across the English and Spanish tasks: (a) a unidimensional model (Figure 1a) where all the writing tasks across the languages were hypothesized to reflect a single underlying skill; (b) a multidimensional, two-factor model (Figure 1b) where the writing tasks reflect English writing skill and Spanish writing skill; and (c) a bi-factor model (Figure 1c) where the writing tasks reflect both a general factor across all the tasks and specific factors by language (English and Spanish). In these models, error variances between the two narrative writing scores within each language were allowed to covary because two scores—one that evaluated writing quality using a rubric and the other using TEWL scoring—were obtained from the same written composition.

To address the second research question, we first created latent variables for English and Spanish oral language skills, respectively, using confirmatory factor analysis: For the English oral language latent variable, indicators included CELF-4 Expressive Vocabulary, CELF-4 Understanding Spoken Paragraphs, and English oral retell, and for the Spanish oral language latent variable, indicators included CELF-4 Vocabulario Expresivo, CELF-4 Entiendo Párrafos, and Spanish oral retell. Then, the structural equation model which included the oral language latent variables (Figure 2) was fitted for the writing quality outcome selected (i.e., after the three alternative models in Figure 1 were fitted). Aligned with DIEW, working memory and attentional control were posited to predict English oral language, Spanish oral language, English spelling, Spanish spelling, and handwriting fluency, all of which, in turn, were posited to predict writing quality. To examine whether working memory and attentional control are directly related

to writing quality over and above their indirect relations to it through oral language and transcription skills, their direct paths to writing quality were allowed.

Gender (Female = 1), English learner status (English learner = 1), Hispanic status (Hispanic = 1), and instructional program (English-Spanish dual immersion = 1) were included as control variables. Note that eligibility to the free and reduced lunch program and proportion of writing in nontarget language were not related to any of the outcomes after accounting for the other variables and therefore, were not included in the model reported here.

Results

Descriptive Statistics and Preliminary Analysis

Missingness ranged from 0% in the Digit Span task, SWAN, and vocabulary to 2.80% in English spelling and English oral retell (see Table 1). Little's test showed that the null hypothesis of missing completely at random was rejected: $\chi^2 = 177.05$, $df = 99$, $p < .001$. However, missingness did not differ by any of the demographic variables in the study, such as eligibility to the free and reduced lunch program, gender, racial and ethnic background, or instructional program ($ps \geq .18$). Given the small extent of missingness and no differences by the demographic background variables, data analyses proceeded without imputation.

Descriptive statistics are presented in Table 1. For the normed tasks such as the CELF-4 Vocabulary and Understanding Spoken Paragraphs in English and Spanish and the TEWL score in English, standard scores are reported. Note that although the sample children's average standard scores in the English CELF-4, TEWL, and CTOPP digit span task are reported, these should be interpreted with caution because these were not normed with English-Spanish bilinguals in the US. The distributional properties as examined by skewness and kurtosis were

appropriate. An exception was the English spelling task. However, after winsorizing extreme outliers (greater than 3 IQR), skewness (1.37) and kurtosis (.64) were adequate. Subsequent analysis was conducted using raw scores—for English spelling, winsorized scores were used.

Table 2 displays bivariate correlations between measures. Correlations related to the structural relations hypothesized in Figure 2 were as follows. Writing quality measures within and across languages were moderately to strongly related ($.34 \leq rs \leq .84$). Listening comprehension, oral retell, and vocabulary were weakly to moderately related to writing quality in English ($.12 \leq rs \leq .40$) and Spanish ($.11 \leq rs \leq .40$). Spelling skills were weakly to moderately related to writing quality within each language ($.25 \leq rs \leq .53$). Handwriting fluency and working memory (digit span) were weakly related to writing quality in the two languages ($.09 \leq rs \leq .30$). Attentional control was moderately related to writing quality in English and Spanish ($.31 \leq rs \leq .43$).

Research Question 1: Dimensionality of Written Composition Skills in English and Spanish

Confirmatory factor analysis was conducted by fitting the alternative models shown in Figure 1. The unidimensional model (Figure 1a) had a good fit: $\chi^2(7) = 22.64$, $p = .002$, CFI = .98, RMSEA = .10 [90% CI = .06, .15], and SRMR = .03. Although the RMSEA value may be considered less than ideal, the other indices (CFI and SRMR) together indicate a good fit. The multidimensional, two-factor model by language (English and Spanish; Figure 1b) had a worse fit, $\chi^2(6) = 53.17$, $p < .001$, CFI = .93, RMSEA = .19 [90% CI = .15, .24], and SRMR = .03. The bi-factor model (Figure 1c) did not converge. When DIFFTEST was conducted between the unidimensional model and the two-factor model, results showed no difference ($\Delta\chi^2 = .18$, $\Delta df = 1$, $p = .67$). Therefore, the unidimensional model was chosen as the final model for parsimony.

Standardized loadings of the indicators to writing quality were highly similar to those in Figure 3. Omega for the latent variable was estimated to be .86.

Research Question 2: Relations of Working Memory, Attentional Control, English and Spanish Oral Language, English and Spanish Spelling, and Handwriting Fluency to Writing Quality

Prior to fitting the structural equation model in Figure 2, a confirmatory factor model including only the latent variables (English oral language skill, Spanish oral language skill, and writing quality) and correlations between them was examined. The confirmatory factor model had a great fit to the data: $\chi^2(49) = 73.43, p = .01, CFI = .96, RMSEA = .049$ [90% CI = .02, .07], and SRMR = .06. Standardized loadings of the indicators to the English oral language latent variable and Spanish oral language latent variable were highly similar to those in Figure 3. Correlations between the latent variables were as follows: .54 between writing quality and English oral language skill, .33 between writing quality and Spanish oral language skill, and .35 between English oral language skill and Spanish oral language skill.

When the structural equation model shown in Figure 2 was fit to the data, model fit was excellent: $\chi^2(130) = 163.27, p = .03, CFI = .95, RMSEA = .036$ [90% CI = .013, .052], and SRMR = .075. Figure 3 shows standardized coefficients. The loadings of indicators to latent variables of oral language ranged from .36 to .81 ($ps < .001$) for oral language skill in English and from .72 to .91 ($ps < .001$) for oral language skill in Spanish.

Writing quality was directly predicted by English oral language ($\beta = .47, p = .001$), English spelling ($\beta = .30, p = .04$), and Spanish spelling ($\beta = .31, p = .001$) whereas it was not predicted by Spanish oral language ($\beta = .02, p = .80$) and handwriting fluency ($\beta = .04, p = .63$).

Attentional control was not directly related to writing quality ($\beta = .12, p = .09$) whereas working memory ($\beta = -.15, p = .02$) had a weak suppression effect after accounting for the other variables in the model. In other words, working memory was positively related with writing quality in bivariate correlations (see Table 2), but it was weakly and negatively related to writing quality once the other variables were accounted for. The suppression effect appears to be due to the moderate relations among working memory, English oral language, and writing skills (see Table 2 and Figure 3). When the English oral language latent variable was not in the model, the suppression effect of working memory was no longer present ($\beta = .03, p = .14$).

Working memory predicted English oral language ($\gamma = .45, p < .001$) and Spanish oral language skill ($\gamma = .18, p < .001$), as well as Spanish spelling ($\gamma = .05, p = .01$), but did not independently predict English spelling ($\gamma = .07, p = .11$) or handwriting fluency ($\gamma = .04, p = .54$). Attentional control was weakly to moderately related to English spelling, Spanish spelling, and handwriting fluency ($.22 \leq \gamma s \leq .32, .008 \leq p s \leq .001$), and to English oral language and Spanish oral language skills ($.29 \leq \gamma s \leq .34, p s < .001$). The total indirect effect (standardized regression weight) of working memory on writing quality was $.25 (p < .001)$, and the total indirect effect of attentional control on writing quality was $.32 (p < .001)$. Results for control variables (gender, English learner status, enrollment in dual immersion program, and Hispanic status) are reported in Table S3 in Online Supplemental Materials. The included variables explained 66% of the total variance in writing quality.

Discussion

In this study, we aimed to expand our understanding of the dimensionality of writing quality in English and Spanish and its language, literacy, and cognitive predictors for English-

Spanish emergent bilingual children in primary grades. As noted above, previous studies on emergent bilingual children tended to focus on English learners and their L2 English skills without measuring skills in two languages, and examined direct relations of predictors to writing quality without considering indirect contributions. In addition, the vast majority of previous studies did not examine the dimensionality of written composition skills in two languages. In this study, our sample of emergent bilinguals included both English learners and non-English learners from different instructional environments. We examined the dimensionality of writing skills in Spanish and English for emergent bilingual children in the beginning phase of writing development, and the direct and indirect relations of language, transcription, and cognitive skills to the identified dimensions of writing quality.

Dimensionality of Writing Quality in English and Spanish for English-Spanish Bilinguals in Grade 1

We found that writing quality in English and Spanish in narrative and opinion genres is best described as a unidimensional construct. These results are convergent with a recent finding with Spanish-English emergent bilingual learners in Grades 1, 2, and 3 (Y.-S. G. Kim et al., 2022). They are also aligned with previous findings that L1 and L2 writing skills are related for children (Steinlen, 2018) and adolescents as well as adult bilingual learners (K. J. Kim & Pae, 2021; Pae, 2018; Schoonen et al., 2003), although these previous studies did not examine the dimensionality of writing skills. One potential explanation for the present finding of writing quality as a unidimensional construct across two languages is that the students in the present study had similar proficiencies in L1 and L2 in language- and orthography-specific skills that contribute to writing (Y.-S. G. Kim et al., 2022)—a large discrepancy in proficiency in Spanish

and English oral language skills would result in low correlations between L1 and L2 writing skills. Another plausible explanation for the present findings is that there is a considerable constraining role of transcription skills for writers in the beginning phase of writing development (Berninger & Winn, 2006; Graham et al., 1997; Y.-S. G. Kim & Graham, 2022; Y.-S. G. Kim & Park, 2019). According to the dynamic relations as a function of development of DIEW (Y.-S. G. Kim & Graham, 2022), during the early phases of writing development, one's transcription skills are not yet automated, and this places a heavy demand on working memory and attentional control, creating a bottleneck for the writing process and related skills such as oral language and higher order cognition (e.g., inference-making and perspective-taking). As a result, transcription skills have a substantial impact on writing quality in the early phases of writing development. Children in the present study were in the beginning phase of writing development, and their transcription skills were not yet automatized, which constrains the extent to which language and other skills can contribute to writing quality (Y.-S. G. Kim & Graham, 2022; Y.-S. G. Kim & Park, 2019). Therefore, even if there was a substantial difference in their oral language skills between English and Spanish (which likely results in dissociation between Spanish writing and English writing), their effects would not be fully reflected in their written compositions due to the restrictions placed by transcription skills. In other words, the constraining role of transcription skills might have influenced the relations of L1 and L2 written compositions and consequent dimensionality of writing quality in two languages. Future studies with emergent bilingual children beyond the beginning phase of writing development will be able to investigate this hypothesis.

Relations of Oral Language, Executive Function, and Transcription Skills to Writing Quality

The included language skills (vocabulary, listening comprehension, and oral retell), executive functions (working memory, attentional control), and spelling skills were related to writing quality for Spanish-English emergent bilingual children in the present study. Their roles in writing are largely in line with extant evidence from monolinguals (e.g., Coker, 2006; Graham & Santangelo, 2014; Y.-S. G. Kim, 2020; Y.-S. G. Kim & Schatschneider, 2017; Santangelo & Graham, 2016; H. L. Swanson & Berninger, 1996) and support theoretical models such as the not-so-simple view of writing (Berninger & Winn, 2006), DIEW (Y.-S. G. Kim, 2020; Y.-S. G. Kim & Graham, 2022), and the Writers-Within-Community model (Graham, 2018), all of which specify the roles of oral language, executive functions, and transcription skills in writing. As noted above, the skills and knowledge identified in theoretical models are expected to apply to bilingual learners (e.g., Babayigit, 2014; Y.-S. G. Kim et al., 2022; Silverman et al., 2015). However, for bilingual children, skills in two languages are involved in writing, and the present findings were revealing in this regard. Interestingly, the pattern of L1 and L2 skills to writing quality differed for oral language versus spelling. For oral language skills, English oral language proficiency was independently related to writing quality whereas Spanish oral language proficiency was not after accounting for the other skills in the statistical model. In contrast, both English and Spanish spelling skills made independent contributions to writing quality. The contributions of spelling skills in both languages make sense given that the writing quality construct is composed of writing quality in English and Spanish. According to this logic, oral language skills in both languages should also be related to writing quality, and this was the case in bivariate correlations (see Table 2) and latent correlations reported in the Results section (.54 between writing quality and English oral language skill, and .33 between writing quality and Spanish oral language skill). One potential explanation for the different findings for English and

Spanish oral language skills is the shared variance between English oral language and Spanish oral language: Although Spanish oral language skills are related to writing quality bivariate ($.33$ latent correlation), they are not uniquely related to writing quality due to shared variance with English oral language skills ($.35$ latent correlation; see the Results section and Figure 3). Future work is necessary to replicate the present study and explicate different patterns of results for oral language skills versus spelling skills.

Another theoretical contribution of the study is the indirect contributions of working memory and attentional control to writing quality via language and transcription skills for emergent bilingual learners. As shown in Figure 3, working memory was related to English oral language skill and Spanish spelling skill, which, in turn, were related to writing quality. Attentional control was also positively related to English oral language, English spelling, and Spanish spelling, which, in turn, were related to writing quality. Despite the unexpected weak but statistically significant suppression effect of working memory on writing quality (see the Results section for potential reasons), the overall results are consistent with theoretical models. The roles of working memory and attentional control in writing have been widely recognized in various theoretical models (Berninger & Winn, 2006; Hayes, 1996; Kellogg, 2001; Y.-S. G. Kim, 2020; Y.-S. G. Kim & Graham, 2022) as juggling multiple processes of writing—generating, planning, translating, transcribing thoughts and ideas, and evaluating and revising, which all require working memory and attentional control. In particular, the findings of direct and indirect relations are in line with the hierarchical relations hypothesis of DIEW. According to DIEW (Y.-S. G. Kim, 2020; Y.-S. G. Kim & Schatschneider, 2017), the influence of working memory and attentional control on writing is indirect through other component skills of writing such as oral language, transcription, and higher order cognitive skills because these component skills are used

during the writing process and require cognitive resources such as working memory and attentional control. In the present study, although details of their independent relations to the language and transcription skills differed, working memory and attentional control were related to language and transcription skills, which, in turn, were related to writing quality. These findings are convergent with findings from monolingual students (Y.-S. G. Kim & Graham, 2022; Y.-S. G. Kim & Schatschneider, 2017) and underscore the critical roles of executive functions, working memory and attentional control, in writing not only for monolingual learners but also for bilingual learners.

A somewhat unexpected finding in the present study was the absence of a direct relation of handwriting fluency to writing quality, after accounting for the other variables in the model. This is divergent from previous studies with monolingual children that showed a direct relation of handwriting fluency to writing quality over and above oral language and spelling skills (e.g., Graham et al., 1997; Y.-S. G. Kim & Schatschneider, 2017). What explains the discrepancy between previous studies with monolingual children and the present findings is unclear. Although a couple of previous studies with emergent bilingual learners included handwriting fluency (Harrison et al., 2016; Silverman et al., 2015), the present results cannot be compared with results of those studies because of differences in the nature of the studies (e.g., writing skills in those studies were measured only in L2, differences in statistical models). Also note that the present findings do not indicate that handwriting fluency is not important to writing quality. As shown in Table 2, it was related to writing quality and other skills (e.g., English spelling). What the present results indicate is that handwriting fluency did not explain additional variance after accounting for the other variables in the model. Further replications are necessary to elucidate

the significance of handwriting fluency in relation to writing quality among emergent bilingual learners in the initial phases of their writing development.

The present study was correlational in nature, and therefore, instructional implications are limited. However, a large body of literature on instructional studies with monolingual children showed that instruction on transcription skills (see a meta-analysis by Graham & Santangelo, 2014) and oral language skills (e.g., vocabulary and sentence proficiency; Graham & Perin, 2007; Harris et al., 2023) improves writing skills. Therefore, given the findings of the contributions of oral language and spelling skills to writing quality in this study, it seems reasonable that explicit and systematic instruction on these skills in both languages (English and Spanish) is likely to benefit bilingual beginning writers. Empirical work with emergent bilinguals is needed.

Limitations, Future Directions, and Conclusion

The generalizability of the present findings is limited to a population that is similar to the sample in the study, English-Spanish emergent bilingual learners in the beginning phase of writing development, the majority of whom were of Hispanic heritage and from low socio-economic backgrounds. The sample included both English learners and non-English learners to represent emergent bilingual children in the US school context. However, we acknowledge that the results for these two groups might differ. English learners, by definition, lack proficiency in English and have varying levels of proficiency in L1. In contrast, bilingual and multilingual learners without an English learner designation have proficient English skills (at least meeting the established criteria) in addition to varying levels of proficiency in other languages. Future research that examines these groups separately can provide insight into whether and how the

results are similar or different. Furthermore, future work is certainly needed to expand our understanding of writing development and contributing skills to writing for emergent bilingual learners in different phases of writing development and from different linguistic and socio-economic backgrounds. For example, the present findings, including the dimensionality of writing quality, might differ as a function of developmental phase of writing skills (see the Theoretical and Empirical Background and Discussion sections above).

One limitation of the study is that children's written composition and oral language skills were measured using multiple tasks whereas other constructs were measured using single tasks or in a single language. This was due to the constraint of working in the schools where limited time was available for working with children. For example, attentional control in the present study was measured by using a rating scale. Although the validity of SWAN has been shown in previous studies (Arnett et al., 2013; Y.-S. Kim et al., 2015; Little et al., 2016; Saéz et al., 2012), measuring attentional control using both rating scales and direct measures (e.g., Flanker task) can reveal potential similarities and differences in the relations of different measures of attentional control to language, transcription, and writing skills. In addition, handwriting fluency and working memory in the present study were measured only in English. Although English and Spanish use a highly similar set of Roman alphabet letters, future work can examine handwriting fluency in both L1 and L2 to shed light on whether they make differential contributions to writing.

It is important to note that skills and knowledge beyond those included in the present study are crucial for writing quality (e.g., higher order cognitive skills and regulation; Y.-S. G. Kim et al., 2022; see theoretical models described in the literature review section), and future studies should consider incorporating these additional factors.

Another limitation and related future direction concerns the inclusion of environmental factors. Bilingual children are not a single group; instead, they vary in their language proficiency in both languages and in their home language environments and instructional environments in school. It is well established that children's oral language proficiency, whether monolingual or bilingual, is a function of child characteristics and environmental factors. Environmental factors include home language use as well as formal instruction in school. Therefore, a comprehensive picture of the pathways of influence to writing quality would require information on both language use at home and instructional characteristics (e.g., writing instruction). Although we recognize that the inclusion of environmental factors could provide a richer picture, this was beyond the scope of the present study and future studies are needed.

With regard to instructional environments, children in the present study were drawn from two different instructional environments: Spanish-English dual immersion and English immersion. It is well established that systematic and consistent exposure is key to language development; therefore, differences in instructional environment should influence bilingual children's development of language and writing skills in both languages. In the present study, instructional program was included as a control variable and the sample size for each instructional program was not large enough to examine whether the structural relations are similar or different as a function of instructional environment. Future studies with larger sample sizes for each instructional program can replicate the present study.

Lastly, future studies should examine writing skills and their predictors for emergent multilingual learners of language pairs other than Spanish-English. Languages vary in oral language and written language characteristics. Studies have shown that these features and linguistic distance play a role in bilingual and biliteracy acquisition (Koda, 2007). According to

DIEW (Y.-S. G. Kim & Graham, 2022), the relative contributions of component skills to writing vary as a function of oral language and written language characteristics; therefore, the nature of relations may differ for various language pairs. Future work examining language pairs other than Spanish and English can shed light on this hypothesis.

Taken together, the present findings indicate that the skills specified in theoretical models of writing, such as executive function, oral language, and transcription skills, apply to Spanish-English emergent bilingual children in Grade 1. However, as noted above, bilingual writing is inherently more complex than monolingual writing, involving knowledge and skills in more than one language, and the present study was revealing in this regard. Future work needs to further examine the development of language and cognitive skills in more than one language, and the nature of their relations to bilingual writing skills.

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Table 1
Descriptive Statistics

Variable	<i>n</i>	Reliability*	Mean	<i>SD</i>	Min-Max	Skewness	Kurtosis
English Narrative (TEWL) Quality	210	.95 ^a	2.30	1.27	0-4	-0.48	-0.97
English TEWL Score Total	210	.90 to .99 ^b	15.81	8.67	0-40	0.04	-0.63
English TEWL SS	210	--	79.66	13.02	1-110	0.10	-0.92
English Opinion Quality	208	.94 ^a	1.76	1.10	0-4	0.12	-0.91
English CELF-4 Understanding Spoken Paragraphs	208	.79	6.78	3.38	0-14	-0.37	-0.54
English CELF-4 Understanding Spoken Paragraphs SS	208	--	6.21	3.36	1-14	0.08	-0.88
English CELF-4 Understanding Spoken Paragraphs Retell	205	.97 ^c	11.00	7.95	0-30	0.21	-1.07
English CELF-4 Vocabulary	211	.87	14.85	9.52	0-44	0.56	-0.42
English CELF-4 Vocabulary SS	211	--	5.14	3.24	1-15	0.52	-0.58
English Spelling	205	.92	1.92	3.37	0-18	2.58	6.95
English Alphabet Writing Fluency	206	.95 ^d	7.23	5.65	0-25	1.08	0.72
English Alphabet Writing Fluency SS	206	--	89.56	19.44	49-148	0.35	-0.08
Spanish Narrative (TEWL) Quality	210	.95 ^a	2.10	1.20	0-4	-0.38	-0.96
Spanish TEWL Score Total	210	.90 to .99 ^b	17.20	9.48	0-40	-0.01	-0.76
Spanish Opinion Quality	210	.94 ^a	1.69	1.22	0-4	0.14	-1.19
Spanish CELF-4 Entiendo Parrafos	207	.82	4.79	3.52	0-12	0.08	-1.13
Spanish CELF-4 Entiendo Parrafos SS	206	--	4.45	2.74	1-11	0.26	-0.98
Spanish CELF-4 Entiendo Parrafos Retell	207	.96 ^c	7.36	6.71	0-26	0.54	-0.58
Spanish CELF-4 Vocabulario Expresivo	211	.89	8.18	9.28	0-43	1.44	1.65
Spanish CELF-4 Vocabulario Expresivo SS	211	--	5.89	2.83	0-14	0.54	-0.27
Spanish Spelling	209	.78	2.84	2.54	0-9	0.78	-0.50
CTOPP Digit Span	211	.87	11.69	3.99	0-21	-1.44	2.70
CTOPP Digit Span SS	210	--	6.84	2.89	1-16	-0.12	0.06
Attentional Control (SWAN)	211	.98	25.96	10.88	0-54	0.03	0.24

Note. TEWL = Test of Early Written Language; SS = Standard score; CELF-4 = Clinical Evaluation of Language Fundamentals-Fourth Edition; CTOPP = Comprehensive Test of Phonological Processing; SWAN = Strengths and Weaknesses of ADHD Symptoms and Normal Behavior. Note though that TEWL and CTOPP were not normed for bilingual learners and therefore, standard scores

should be interpreted with caution. *Unless otherwise noted, reliability estimates are based on Cronbach's alpha, and these estimates were identical when calculated using Kuder-Richardson.

^aExact agreement using 100 essays & Cohen's Kappa is .93 for the narrative task and .91 for the opinion task. ^bExact agreement using 100 essays. ^cExact agreement using data from 30 students in English (90 transcripts = 30 students*3 stories) and 40 students in Spanish (120 transcripts = 40 students*3 stories). ^dExact agreement.

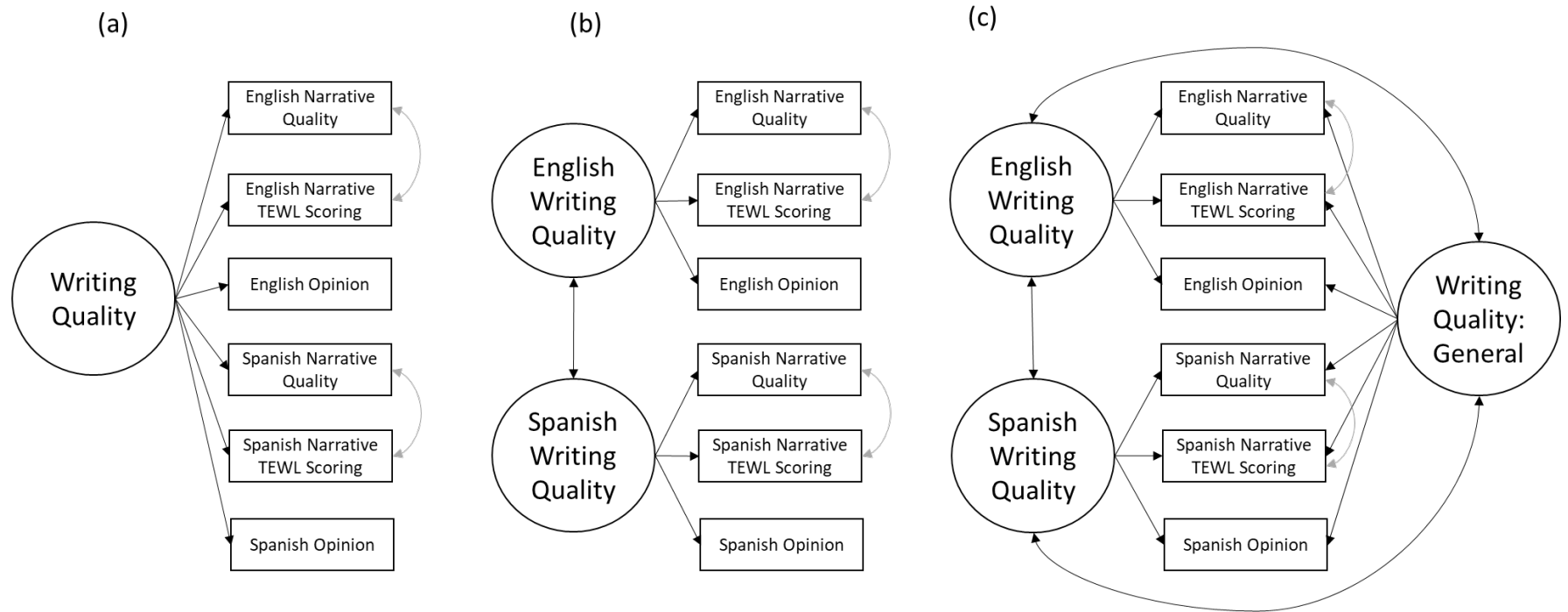
Table 2*Pearson Correlations*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. E TEWL Qual	--															
2. E TEWL Score	0.77	--														
3. E Opinion Qual	0.38	0.40	--													
4. E Listen Comp	0.31	0.36	0.27	--												
5. E Oral Retell	0.12	0.13	0.16	0.41	--											
6. E Vocabulary	0.23	0.40	0.25	0.54	0.20	--										
7. E Spell	0.25	0.47	0.31	0.13	0.01	0.41	--									
8. Handwriting	0.23	0.30	0.24	0.15	0.08	0.33	0.38	--								
9. S TEWL Qual	0.56	0.59	0.34	0.25	0.09	0.29	0.26	0.15	--							
10. S TEWL Score	0.59	0.65	0.37	0.27	0.17	0.32	0.34	0.18	0.84	--						
11. S Opinion Qual	0.45	0.46	0.47	0.23	0.19	0.23	0.22	0.19	0.44	0.55	--					
12. S Listen Comp	0.19	0.21	0.18	0.40	0.22	0.08	-0.02	0.00	0.27	0.33	0.40	--				
13. S Retell	0.13	0.11	0.03	0.32	0.40	0.07	-0.07	0.00	0.11	0.17	0.21	0.64	--			
14. S Vocabulary	0.12	0.10	0.09	0.15	0.13	0.00	-0.04	-0.08	0.25	0.28	0.30	0.59	0.52	--		
15. S Spell	0.31	0.33	0.25	0.25	0.16	0.15	0.11	0.09	0.41	0.53	0.45	0.46	0.31	0.46	--	
16. Digit Span	0.14	0.19	0.24	0.48	0.28	0.35	0.05	0.08	0.09	0.18	0.23	0.24	0.17	0.06	0.15	--
17. Attention (SWAN)	0.31	0.43	0.32	0.29	0.13	0.32	0.32	0.25	0.40	0.40	0.38	0.29	0.20	0.24	0.33	0.14

Note. Coefficients $\leq .13$ are not statistically significant at the .05 level. E = English; S = Spanish; TEWL = Test of Early Written Language; Qual = Quality; Listen Comp = Listening comprehension measured by the Understanding Spoken Paragraphs task of CELF-4 (Clinical Evaluation of Language Fundamentals-Fourth Edition); SWAN = Strengths and Weaknesses of ADHD Symptoms and Normal Behavior.

Figure 1

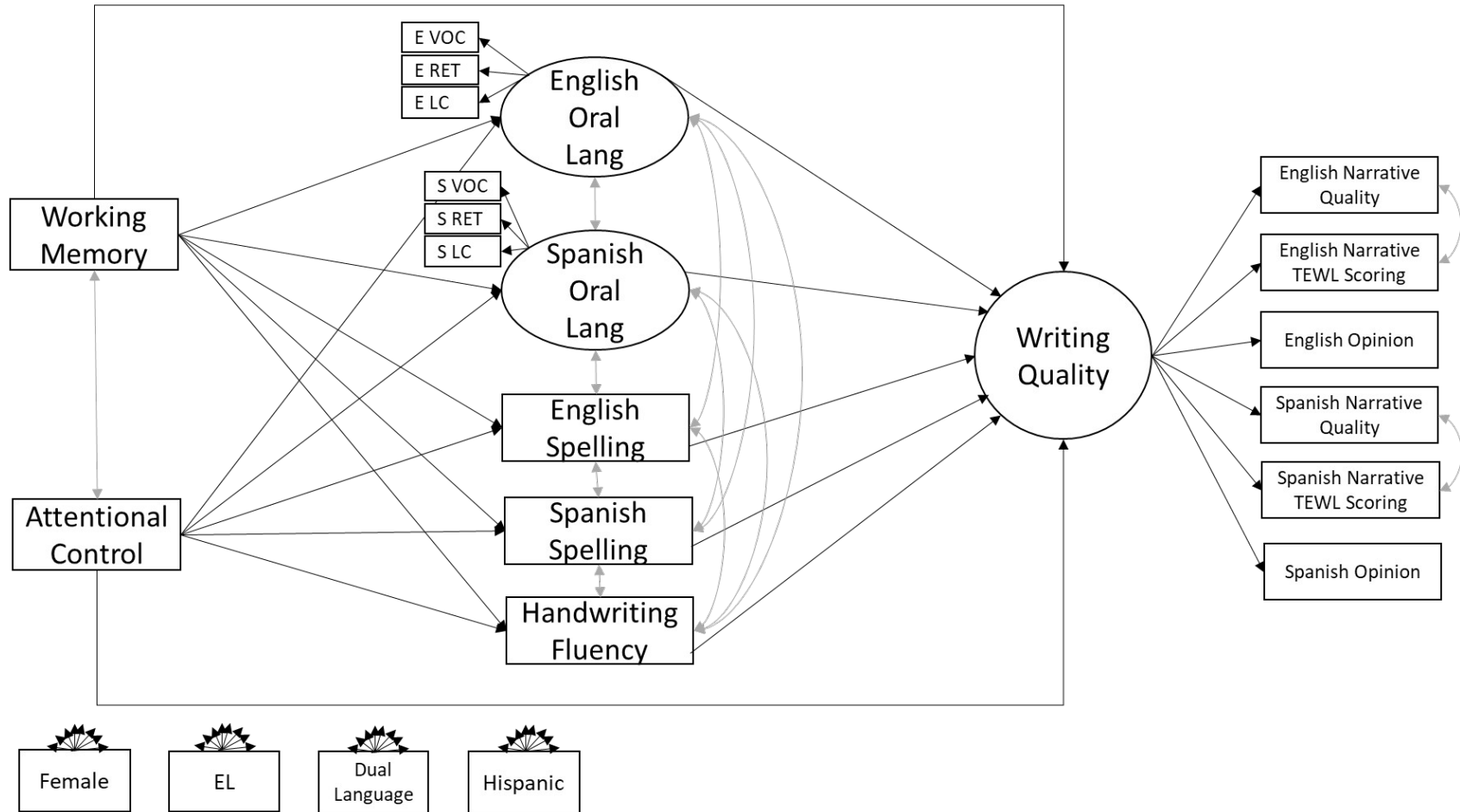
Alternative Confirmatory Factor Models for Written Composition Skills in English and Spanish



Note. TEWL = Test of Early Written Language.

Figure 2

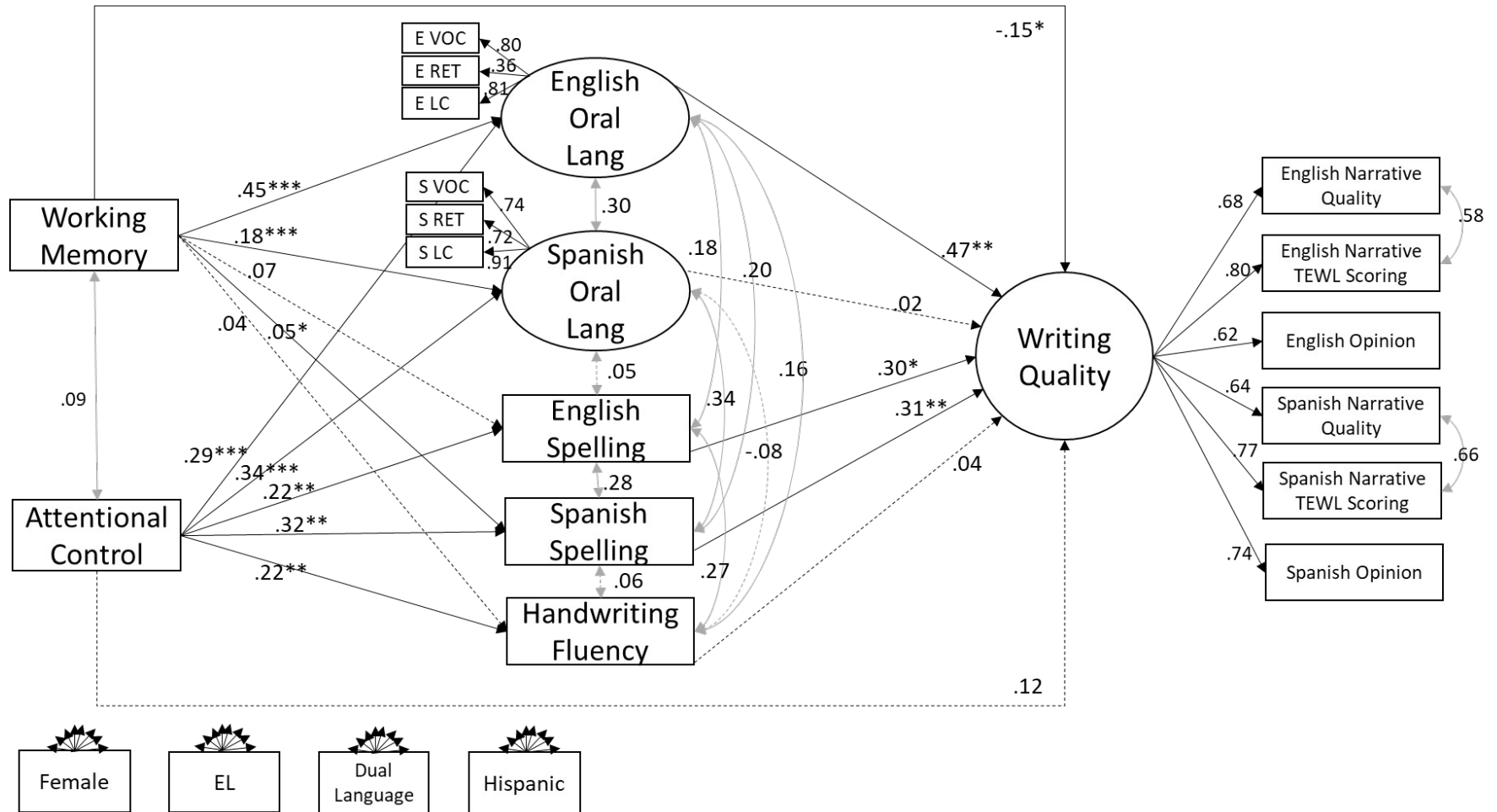
Structural Equation Model That Examines the Relations of Working Memory, Attentional Control, Oral Language, Spelling, and Handwriting Fluency to Writing Quality for Spanish-English Emergent Bilingual Learners



Note. E = English; S = Spanish; VOC = Vocabulary; RET = Oral retell; LC = Listening comprehension; EL = English learner status; TEWL = Test of Early Written Language.

Figure 3

Results of the Structural Equation Model, Showing Standardized Coefficients



Note. E = English; S = Spanish; VOC = Vocabulary; RET = Oral retell; LC = Listening comprehension; EL = English learner status; TEWL = Test of Early Written Language.

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