

Academic Language as a Predictor of Reading Comprehension in Monolingual Spanish-Speaking Readers: Evidence From Chilean Early Adolescents

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ABSTRACT

Although literacy achievement has improved in Chile, adolescents' underperformance in reading comprehension is still a serious concern. In English, core academic-language skills (CALS) have been found to significantly predict reading comprehension, even controlling for academic vocabulary knowledge. CALS are high-utility language skills that support reading comprehension across school content areas. Guided by an operational definition of Spanish CALS (S-CALS), three goals drove this study: to develop two psychometrically reliable tests, the S-CALS Instrument and the Spanish Academic Vocabulary (S-AVoc) Test; to explore the dimensionality of core academic-language proficiencies, as measured by these two tests; and to examine the contribution of core academic-language proficiencies to reading comprehension. A cross-sectional sample of 810 Chilean students (grades 4-8) participated in four assessments that measured standardized reading comprehension, word-reading fluency, Spanish academic vocabulary, and S-CALS. Using classical test theory and item response theory analyses, results yielded robust reliability evidence for both instruments. Consistent with prior research, S-CALS and academic vocabulary scores displayed upward trends in higher grades yet considerable within-grade variability. Confirmatory factor analysis revealed that S-CALS and S-AVoc were best conceptualized as part of a higher order construct, the Spanish core academic-language and vocabulary skills (S-CALVS). The aggregated S-CALVS scores predicted reading comprehension, beyond the contribution of grade, school factors, and word-reading fluency. This study advances our scientific understanding of CALS as relevant for adolescent literacy beyond the English language. The high-utility school-relevant language and vocabulary skills offer promising tools to inform and evaluate innovative reading comprehension interventions for Spanish-speaking adolescents.

Over the past decade, Chile's educational system has made major strides in student learning outcomes, but literacy achievement among adolescents continues to be an area of national concern. In the most recent PISA literacy assessments, despite significant improvement over time, Chilean adolescents scored, on average, only at the second-lowest performance level of a 6-point scale (Ministerio de Educación, 2011; OECD, 2014, 2016). Although Chilean students performed, on average, significantly higher than students from other Latin American countries, results were far from optimal. Indeed, in PISA 2012, the Chilean literacy mean (441) was 28 points higher than the Latin American mean but 55 points lower than the OECD average (Agencia de Calidad de la Educación, 2014). Furthermore, serious socioeconomically based inequalities are salient in the PISA literacy results, with Chilean

students from low socioeconomic backgrounds performing significantly worse than more privileged students (Agencia de Calidad de la Educación, 2014). This socioeconomic discrepancy has also been observed across many Latin American countries (Flotts et al., 2016). Collectively, national and international results call for research to better understand the sources of difficulty for adolescents' reading underperformance, with the ultimate goal of more effectively supporting literacy achievement for all adolescents in Chilean classrooms.

Overall, the limited research available has indicated that by midadolescence, Spanish-speaking students typically face no major difficulty in decoding the words from a text, yet they often struggle to comprehend and learn from texts (De Mier, Amado, & Benítez, 2015; De Mier, Borzone, & Cupani, 2012; García, Bustos, & Sánchez, 2015; Ripoll & Aguado, 2014). Reading comprehension continues to be a challenge for students and an urgent concern for educational researchers and practitioners in the region. In other countries and languages, vocabulary knowledge and additional language skills have been shown to play an increasingly important role in predicting reading comprehension starting around fourth grade (Adlof, Perfetti, & Catts, 2011; Barr & Uccelli, 2016; Compton & Pearson, 2016; Connor, 2016; Geva & Farnia, 2012; LaRusso et al., 2016; Uccelli, Barr, et al., 2015; Uccelli & Meneses, 2015; Uccelli, Phillips Galloway, Barr, Meneses, & Dobbs, 2015). In Spanish, however, most studies have focused on decoding and fluency during the early elementary years, with minimal research on the role of language skills in predicting adolescents' text comprehension abilities (García et al., 2015; Mata, Gallego, & Mieres, 2007; Morales, Verhoeven, & van Leeuwe, 2011; Sánchez & García, 2009; Sánchez, García, & Bustos, 2017; Sánchez, González, & García, 2002). The present study examines the contribution of academic vocabulary and additional high-utility cross-disciplinary academic-language skills to reading comprehension in Chilean monolingual Spanish-speaking adolescents (grades 4–8), controlling for grade, school factors, and word-reading fluency. Investigating academic vocabulary and more general academic-language skills has the potential to advance our scientific understanding of predictors of reading comprehension in Spanish, with the ultimate goal of informing the design of innovative reading comprehension interventions.

The Contribution of Core Academic-Language Skills to Reading Comprehension: Prior Research in English

Academic language, also called the language of school texts or the language of science, refers to language forms

and functions used recurrently to support the expression and comprehension of school curricular content and scientific learning. Academic language includes diverse abstract vocabulary, complex structures, logical connectives, and stance markers to support precise, concise, logically organized, and reflective communication (Nagy & Townsend, 2012; Schlepppegrell, 2001; Snow & Uccelli, 2009). These resources, which differ systematically from those typically used and frequently practiced in everyday interactions, have been shown to pose difficulty for adolescents' reading comprehension at school (Fang & Schlepppegrell, 2008; Fang, Schlepppegrell, & Cox, 2006; Hwang, Lawrence, Mo, & Snow, 2015; LaRusso et al., 2016; Uccelli, Barr, et al., 2015; Uccelli & Meneses, 2015).

Beyond its contribution to school reading, becoming proficient in academic language is necessary to master the complex communication skills identified as crucial in today's information-based society. In our current world, complex communication skills (e.g., arguing with precision, analyzing a complex text) are among the most sought-after abilities in higher education and professional circles (Levy & Murnane, 2013). Academic-language skills are also crucial for accessing health, political, and civic information, which is frequently communicated through texts written for public dissemination (LeVine, LeVine, Schnell-Anzola, Rowe, & Dexter, 2012; Levinson, 2012; Shanahan & Shanahan, 2008).

In spite of the centrality of mastering academic language to access educational and adult life opportunities, adolescents today seem not to be adequately or equitably prepared for the language demands of school-relevant text comprehension. Indeed, the hypothesis that drives this study is that later reading comprehension challenges are in large part the result of adolescents' struggles to access academic language. This hypothesis is informed by two sources of research evidence: psychological models of reading comprehension, which highlight the importance of language to predict reading, and ethnographic and linguistic studies, which demonstrate how language learning is inseparable from context. First, the influential simple view of reading (SVR) model conceptualizes reading comprehension as the product of decoding and oral language skills (Gough & Tunmer, 1986; Hoover & Gough, 1990). By now, decoding skills have been delineated (e.g., letter knowledge, alphabetic principle, decoding) and extensively studied in numerous languages, including Spanish (Georgiou, Torppa, Manolitsis, Lyytinen, & Parrila, 2012; Ziegler et al., 2010; Ziegler & Goswami, 2005).

However, the second broad component of the SVR equation, oral language, has remained imprecisely defined (Adlof et al., 2011; Compton & Pearson, 2016; Language and Reading Research Consortium, 2015;

LaRusso et al., 2016). In Spanish, language skills have been only minimally investigated for adolescent readers (García et al., 2015; Mata et al., 2007; Morales et al., 2011; Sánchez et al., 2002, 2017; Sánchez & García, 2009). The second line of evidence comes from ethnographic and functional linguistics research. These studies have revealed that students are enculturated at home into the language of face-to-face interaction, which prepares them well for colloquial interactions in their respective communities. However, for many colloquially fluent students, participating successfully in oral and written academic discourses tends to be challenging if they have not been granted ample opportunities to be socialized into the particular ways of using language for school reading and learning (Cummins, 2008; Heath, 2012; Schleppegrell, 2004; Snow & Uccelli, 2009).

Informed by these prior findings, a new program of research has proposed and investigated the core academic-language skills (CALS) construct to examine the contribution of language skills to reading comprehension during early adolescence (grades 4–8). The CALS construct is defined as “a constellation of the high-utility language skills that correspond to language features that are prevalent in academic discourse across school content areas and that are infrequent in colloquial conversations” (Uccelli, Phillips Galloway, et al., 2015, p. 338). CALS research has offered promising findings; yet, so far, it has been conducted exclusively with U.S. English-speaking students.

As part of the English CALS research program, the English CALS Instrument (CALS-I), an innovative, theoretically grounded, and psychometrically robust instrument, has been administered to more than 7,000 English-speaking students and validated through multiple studies (Uccelli, Barr, et al., 2015; Uccelli, Phillips Galloway, et al., 2015). Guided by linguistic analyses of experts’ academic texts, evidence from adolescent language development, and descriptive evidence of the language demands of U.S. school textbooks and classrooms, the CALS-I comprises eight tasks: unpacking complex words, comprehending complex sentences, connecting ideas, tracking participants, organizing analytic texts, understanding writers’ viewpoints, understanding metalinguistic terms, and identifying academic register. The final selection of items in the English CALS-I was informed by classical test theory, item response theory, and theoretical considerations. A number of cross-sectional and developmental studies have offered robust evidence of reliability (α coefficients of .9) and validity (assessed using various standardized reading comprehension assessments as criteria). Factor analyses support the unidimensionality of the CALS construct (comparative fit index [CFI] = 0.93, Tucker–Lewis index [TLI] = 0.92, root mean square error of

approximation [RMSEA] < 0.05). More important, within- and across-grade individual variability in English CALS has been found to be substantive and predictive of reading comprehension, even after controlling for sociodemographic factors, word-reading fluency, and academic vocabulary knowledge (Barr & Uccelli, 2016; Phillips Galloway, 2016; Uccelli, Barr, et al., 2015; Uccelli, Phillips Galloway, et al., 2015). Furthermore, in recent theoretical models seeking to expand the SVR, CALS—alongside other sociocognitive skills—have been identified as significant contributors to adolescents’ reading comprehension (LaRusso et al., 2016).

A question that emerges from these promising findings is whether the CALS construct would be relevant for languages other than English and educational contexts other than the United States. In this study, we extend this line of research to Spanish, with the ultimate motivation of identifying potentially malleable skills that can later inform research-based Spanish reading comprehension instruction.

Core Academic-Language Proficiency in Spanish: A Still Unexplored Predictor of Chilean Adolescents’ Reading Comprehension

In Chile, recent important research efforts have been addressing early and elementary education (Bravo Valdivieso, Villalón, & Orellana, 2004, 2006; Marchant, Lucchini, & Cuadrado, 2007; Strasser, Larraín, & Lissi, 2013; Treviño, Toledo, & Gempp, 2013). Although these have been important initiatives, extensive research has shown that without support throughout the later years, positive outcomes achieved during elementary school are likely to fade, particularly for vulnerable populations (Biancarosa & Snow, 2006).

Although some reading comprehension research has been conducted with Spanish-speaking early adolescents in Latin America (Canet Juric, Urquijo, Richard’s, & Burin, 2009; De Mier et al., 2012; García et al., 2015; Morales et al., 2011; Thorne et al., 2013), most has focused on early word decoding. Prior research has identified code-based skills, such as reading accuracy and word-reading fluency, as significant predictors of early reading proficiency (Bravo Valdivieso & Escobar, 2014; Bravo Valdivieso et al., 2004, 2006; Guardia, 2014). Reading fluency has also been found to be positively associated with academic achievement in fourth and sixth graders (Marchant et al., 2007). Beyond basic code-level skills, advances have been made in revealing the role of vocabulary

knowledge, comprehension monitoring, and theory of mind, yet so far only with early narrative listening comprehension (Strasser & del Río, 2014; Strasser, del Río, & Larraín, 2013; Strasser, Larraín, & Lissi, 2013). As discussed previously, research has suggested that during the upper elementary and middle school years, decoding skills no longer pose a major challenge to early adolescents (García et al., 2015; Mata et al., 2007; Morales et al., 2011; Sánchez & García, 2009). Given that Spanish has a fairly transparent orthography, the early and relatively easy mastery of code-level skills is not surprising (Ziegler & Goswami, 2005). Yet, in light of the widely documented later struggles with reading comprehension, these findings highlight the need to investigate additional contributors to text comprehension, such as language proficiency.

In this study, we explore for the first time the relevance of the CALS construct for a language other than English by examining cross-disciplinary Spanish academic vocabulary knowledge (S-AVoc) and additional Spanish CALS (S-CALS) as predictors of reading comprehension in monolingual Spanish-speaking adolescents. We opted for measuring academic vocabulary independently because, in contrast to the extensive research on the impact of academic vocabulary on English reading comprehension (Lesaux, Crosson, Kieffer, & Pierce, 2010; Mancilla-Martinez & Lesaux, 2010; Stahl & Nagy, 2006), this contribution has not been investigated in Spanish-speaking adolescents. This decision is supported by recent findings that revealed two distinguishable language constructs associated with reading development in English: vocabulary knowledge and additional areas of language knowledge, including morphology, syntax, and oral comprehension (Connor, 2016). Moreover, one illuminating finding replicated across studies in English is that CALS and academic vocabulary knowledge, despite their high correlation, independently contribute to reading comprehension (Uccelli, Barr, et al., 2015; Uccelli, Phillips Galloway, et al., 2015).

Thus, a subgoal of the present study was to examine whether S-AVoc and S-CALS together—independently or as an aggregated predictor—would explain reading comprehension better than regression models that include only one of these predictors. This study expands our prior CALS research by investigating for the first time the likely hypothesis that academic vocabulary might be distinguishable from CALS yet still part of a common underlying higher order construct of core academic-language proficiencies. Given that no instruments were available to measure either of these constructs, the first step involved proposing operational definitions and developing theoretically and psychometrically robust instruments to measure S-CALS and S-AVoc.

The Current Study

In this study, we first proposed operational definitions of S-CALS and S-AVoc and developed the Spanish CALS Instrument (S-CALS-I; in Spanish, *Evaluación de Lenguaje Académico*) and the Spanish Academic Vocabulary Test (S-AVoc-T). Second, we used item-level confirmatory factor analysis (CFA) to test whether the constellation of S-CALS-I items functioned as a unidimensional construct, as found for the English CALS; then, we examined S-CALS-I and S-AVoc-T together to explore whether these two sets of items might function as a unidimensional construct or possibly as dimensions of a common underlying higher order construct. Finally, we tested our main hypothesis of whether, after controlling for grade, school factors, and word-reading fluency, academic vocabulary knowledge and S-CALS would significantly contribute to reading comprehension in a socioeconomically diverse sample of fourth- to eighth-grade students from urban Santiago, Chile.

Three research questions guided this study:

1. In grades 4–8, do Spanish CALS (S-CALS) or academic vocabulary knowledge (S-AVoc) vary within and across grades and schools?
2. In grades 4–8, based on students' performances in the S-CALS-I items, do the constellation of CALS function as a unitary construct? Based on students' performances in both the S-CALS-I items and the S-AVoc-T items, do the CALS and vocabulary knowledge function as a unitary or higher order construct?
3. Controlling for grade, school factors, and word-reading fluency, do fourth- to eighth-grade students' S-CALS or academic vocabulary knowledge, independently or as an aggregated predictor, contribute to explain the variability in reading comprehension?

S-CALS and Academic Vocabulary: Operational Definitions

In this section, we introduce the proposed operational definitions of S-CALS and S-AVoc and briefly describe the development of each respective assessment. Adopting the English CALS definition, the S-CALS construct is defined as the array of high-utility Spanish skills that correspond to linguistic and discourse resources that are both prevalent in academic discourse across school content areas and infrequent in colloquial interactions (Uccelli, Barr, et al., 2015; Uccelli, Phillips Galloway, et al., 2015). Guided by rigorous psychometric standards (Kane, 2016; Messick, 1989, 1995), the

development of the S-CALS-I for monolingual Spanish speakers in grades 4–8 followed the assessment design blueprint of the English CALS-I. Given the close isomorphism between Spanish and English for the skill sets already included in the English CALS construct, all tasks were hypothesized as relevant for measuring high-utility cross-disciplinary academic Spanish skills. After a review of relevant Spanish research and extensive pilot testing of all tasks and item types, the original eight CALS tasks were maintained with some adaptations. As explained in the Methods section, the target structures tested in the S-CALS-I were selected after systematic consultation with available corpora of Spanish academic discourse and a frequency analysis of Chilean Spanish textbooks across content areas. Next, we briefly review the available research evidence from Spanish that supports the inclusion of each of the eight skill sets/tasks in the S-CALS-I. (For descriptions of S-CALS-I tasks and sample items, see Appendix A.)

Packing and Unpacking Nominalizations

Studies conducted in English have demonstrated that skills in composing and decomposing morphologically derived words are positively associated with reading comprehension (Kieffer & Lesaux, 2007, 2012; Nagy, Berninger, & Abbott, 2006). In Spanish, morphologically derived words, especially nominalizations, also pose difficulties for readers' comprehension of academic texts (Chamorro, Barletta, & Mizuno, 2013; Cinto, 2009; Cuñarro, 2010; García Negroni, Hall, & Marín, 2005; Mizuno & Moss, 2009). A nominalization is the grammatical transformation of a verb or adjective into a noun (e.g., *evaporar* → *evaporación* [evaporate → evaporation], *complejo* → *complejidad* [complex → complexity]). Nominalizations are highly prevalent in Spanish academic writing and in middle school textbooks across content areas (Chamorro et al., 2013; Colombi, 2000; Moss, Barletta, Chamorro, & Mizuno, 2013). As in the CALS-I, this task was inspired by Kieffer's (2009) morphological task, which was an adaptation of Carlisle's (2000) original measure. Preliminary analyses indicated that including both morphological decomposition and morphological derivation items improved the accuracy of the test in differentiating students' performances. Thus, this S-CALS-I task includes both decomposition items (also present in the CALS-I) and derivation items (an item type present only in the S-CALS-I).

Organizing Compact and Complex Sentences

Complex and compact syntactic structures that enable writers to pack dense information for concise communication (e.g., embedded clauses, extended noun

phrases) appear frequently in academic texts both in English (Fang et al., 2006; Fang & Schleppegrell, 2008; Schleppegrell, 2001) and in Spanish (Battaner, Atienza, López-Ferrero, & Pujol, 2009; Colombi, 2000; Soto & Zenteno, 2004; Venegas, 2010). Consistent with research conducted in English, monolingual Spanish readers' syntactic skills have been found to be positively associated with reading comprehension (Mata et al., 2007; Navarro & Rodríguez, 2014). In the English CALS-I, the syntactic skills task was modeled after the widely used Test for Reception of Grammar—version 2 (Bishop, 2003). Given that this test was not available in Spanish, the syntactic skills task was modeled after Navarro and Rodríguez's (2011, 2014) syntax assessment, designed and validated for Spanish-speaking middle schoolers. Items in this S-CALS task test a variety of syntactic structures prevalent in academic texts, such as sentences with extended noun phrases and a single verb predicate, complex sentences with embedded clauses, passive sentences using *se* (e.g., "*Se encontró un tesoro que estaba enterrado en el jardín*" ["A treasure that was buried in the garden was found"]).

Connecting Ideas Logically

Logical connectives are central textual devices that support cohesion in informational school texts. Connectives make explicit the intended conceptual relations between ideas (Álvarez, 2001; Calsamiglia & Tusón, 2002; Halliday & Hasan, 1976). Yet, if academic connectives are unknown, these supposedly helpful signaling devices instead become roadblocks for readers. Early adolescents' individual variability in understanding connectives as cues into how ideas are linked in a text has been shown to be considerable and positively associated with text comprehension in both English (Ben-Anath, 2005; Crosson, Lesaux, & Martiniello, 2008; Maury & Teisserenc, 2005;) and Spanish (García et al., 2015; Sánchez et al., 2002; Sánchez & García, 2009). In addition to the sources consulted for the overall S-CALS-I design, an online Spanish dictionary of discourse markers (Briz, Pons, & Portolés, 2008) informed the selection of connectives to be tested. This S-CALS task includes additive, contrastive, causal, and concessive connectives characteristic of Spanish academic discourse and used frequently in middle school texts across content areas (Álvarez, 2001; Errázuriz, 2012; Martín Zorraquino & Montolío, 1998; Montolío, 2001).

Tracking Participants and Themes

Coreference chains link to the different expressions used throughout a text to refer to the same participant, event, concept, or process and are frequently used in academic texts as a cohesion mechanism. A specific type, conceptual anaphora, is especially frequent in

academic texts in English and Spanish (e.g., “Movable printing technology was invented toward the end of the 15th century, and this invention...”). These noun phrases or pronouns encapsulate an entire clause or even complex sentences mentioned earlier in the text. Not surprisingly, being unskilled at resolving conceptual anaphora makes text comprehension harder (Biber & Conrad, 2009; Flowerdew, 2003). In Spanish, middle school students’ skill in resolving conceptual anaphora has been found to be positively related to reading comprehension (García et al., 2015; Sánchez et al., 2002; Sánchez & García, 2009). Similar to the CALS-I, items in this task were designed using authentic fragments selected from middle school textbooks that were representative of prevalent ways of tracking referents in Spanish academic discourse (González, Cervera, & Miralles, 1998).

Interpreting Writers’ Viewpoints

The capacity to understand markers that convey the writer’s viewpoint or attitude is another skill that we included as supportive of reading comprehension. Among the multiple types of attitudes that writers might convey, such as affectionate, deontic, or epistemic (Berman, Ragnarsdóttir, & Strömqvist, 2002), we focused only on epistemic markers, those that convey a writer’s degree of certainty with respect to a specific claim. Epistemic markers (e.g., *ciertamente* [certainly], *sin lugar a dudas* [undoubtedly]) are common in English (Hyland, 2009; Hyland & Tse, 2004) and Spanish academic texts (De Saeger, 2007; López Ferrero, 2001). Given that, arguably, the main goals of academic discourse are to communicate, construct, or critique scientific knowledge, qualifying the degree of certainty of the facts, scientific findings, or interpretation provided by the writer is central to fully grasp the meaning of academic texts across disciplines.

Prior cross-sectional research has documented a developmental progression in the use of epistemic markers in Spanish-speaking students from the upper elementary to the high school years (Berman, 2005; Berman et al., 2002). Yet, no research has directly examined this skill in relation to reading comprehension in Spanish. Despite this lack of research, we focused on epistemic markers because of their central role and prevalence in academic discourse across disciplines and because, in many instances, text comprehension may indeed depend on understanding these subtle markers (e.g., “Scientists agree that it is extremely likely/unlikely that humans are contributing to global warming”).

Understanding Metalinguistic Terms

Metalinguistic terms are words that refer to discourse or thought processes related to argumentation and text

discussion, such as *citar* (to quote) and *generalización* (generalization; Astington & Olson, 1990; Myhill & Jones, 2015). By naming linguistic and cognitive processes central to text discussion and argumentation in academic contexts, metalinguistic vocabulary makes these processes more visible for students. Despite less research in this domain in Spanish (Camps, 2009; Camps & Milian, 2000; Flórez et al., 2005; Milian & Camps, 2006), we hypothesized that knowledge of these terms would also capture individual variability relevant to explain reading comprehension. Items in this task are very different from those of conventional vocabulary tests. Modeled after the English CALS-I items, in this task, students are presented with two statements and asked to select, from among four options, the correct metalinguistic term that qualifies or labels the second statement in relation to the first (e.g., whether the second statement is an example, a generalization, a quote, or a contradiction).

Organizing Analytic Texts

Following the English CALS-I, we anticipated that skill in organizing the components of analytic texts, more specifically of argumentative texts (e.g., thesis, argument, counterargument, rebuttal, conclusion), would contribute to students’ reading comprehension. Two lines of evidence supported this decision. First, narrative structures are typically mastered by the upper elementary years, but learning how to structure analytic texts is a process that typically continues throughout adolescence (Berman & Ravid, 2009). Second, during the elementary school years, knowledge of narrative structure has been shown to be predictive of narrative text comprehension (Cain & Oakhill, 2006; Perfetti, Landi, & Oakhill, 2005). Analogously, we anticipated that argumentative text organization skills would impact reading comprehension throughout middle school. We focused on argumentative texts because of their prominence in academic discourse, their pedagogical relevance, and their somewhat predictable logical structure (Rex, Thomas, & Engel, 2010; Reznitskaya, Anderson, & Kuo, 2007). In English, narrative text comprehension has shown to be, overall, easier than expository text comprehension (McNamara, Ozuru, & Floyd, 2011). In Spanish, García et al. (2015) showed that understanding expository texts’ macro-organization is positively implicated in upper elementary students’ reading comprehension. Modeled after the English CALS-I, in this task, students are presented with components of an argumentative text (e.g., thesis, argument, conclusion) in random order and asked to sequence these components according to a conventional argumentative text structure.

Identifying Academic Register

This domain captures the capacity to distinguish language that is characteristic of informal face-to-face communication from more academic language typically used in school tasks. Written definitions offer a convenient minimal genre to test academic register awareness. Definitions can be written on a continuum from more colloquial to more academic dictionary-like entries (Benelli, Belacchi, Gini, & Lucangeli, 2006; Kurland & Snow, 1997). Moreover, academic definitions, such as those found in the Oxford English Dictionary or the *Diccionario de la Lengua Española*, display language resources characteristic of the academic register, that is, lexical precision and syntactic complexity. As we did in English, we hypothesized that this domain would be relevant for reading comprehension, based on research on early register awareness and studies linking definitional skills with later reading comprehension (Benelli et al., 2006; Hernández, 2008; Murillo-Rojas, 2014; Snow, 1990). In this task, students are provided with three definitions of a well-known word (e.g., *paraguas* [umbrella]) that have been systematically manipulated to present a range from more to less lexically precise and syntactically concise. Students are then asked to compare the three and select the most academic, dictionary-like definition, one that would be appropriate for an academic dictionary for adults.

In addition to the tasks that correspond to the English CALS-I, in this study, we also designed the S-AVoc-T. Given the unavailability of a cross-disciplinary academic vocabulary test in Spanish, this step was necessary to accomplish our subgoal of testing the potential independent contribution of academic vocabulary and CALS to reading comprehension. Cross-disciplinary academic vocabulary, also called all-purpose academic vocabulary, is high-utility content words (i.e., nouns, verbs, adjectives, adverbs) found frequently in texts across content areas yet rare in adolescents' colloquial interactions (e.g., *patron* [pattern], *sistema* [system]; Hwang et al., 2015; Zeno, Ivens, Millard, & Duvvuri, 1995). The S-AVoc-T was translated and adapted from the Word Generation Academic Vocabulary Test of English academic words (Hwang et al., 2015), which measures the knowledge of cross-disciplinary content words by presenting the target word underlined in a sentence and asking students to select the correct synonym from among four options.

The development of the S-CALS-I and the S-AVoc-T was not a simple translation of the English CALS-I and Word Generation Academic Vocabulary Test items for mere linguistic equivalence. Instead, the functional and cultural relevance and adequacy of each item was taken

into consideration in the initial design and throughout the final testing phase (Peña, 2007).

Methods

Participants

As shown in Table 1, a total of 810 students, similarly distributed across grades 4–8, participated in this study. This cross-sectional sample comprised slightly more females (56%) than males. Participants attended one of three schools with different socioeconomic levels in urban Santiago, Chile. Data on socioeconomic status (SES) and parents' education were not available at the student level, so we used information on mean family income and parental levels of education available through a national agency (Agencia de Calidad de la Educación, 2013). The first was a public school serving students from low socioeconomic backgrounds, whose families had an average monthly salary of US\$350 and whose parents had attained a maximum of eight years of education. The second was a publicly subsidized school serving students from middle income communities, whose families had an average monthly salary of US\$750 and whose parents had attained between 11 and 12 years of education. The third was a private school serving students from high socioeconomic backgrounds, whose families had an average monthly salary of US\$2,000 and whose parents had attained 15 or more years of education (Agencia de Calidad de la Educación,

TABLE 1
Sociodemographic Characteristics of the Study Sample
(*N* = 810)

Characteristic	<i>n</i>	Percentage
<i>Gender</i>		
Female	454	56.0
Male	356	44.0
<i>Grade</i>		
4	163	20.1
5	173	21.4
6	165	20.4
7	155	19.1
8	154	19.0
<i>Socioeconomic status of the school</i>		
High	265	32.7
Medium	281	34.7
Low	264	32.6

2013). The three schools were comparable in size, in student-teacher ratio (mean $[M] = 27$ students per classroom), and in their implementation of similar curricula required to follow national grade-specific standards. This sample reflects the reality of school segregation in the Chilean educational system, in which students from similar SES backgrounds attend the same type of school (Elacqua, 2012; Valenzuela, Bellei, & de los Ríos, 2013).

Written consent to participate in the study was obtained from all participants, their parents, and their teachers. Students were tested at school as part of their regular school day.

Measures

Four group-administered paper-and-pencil assessments were given to participants.

Reading Comprehension

Reading comprehension was assessed using the 30-minute group-administered standardized reading comprehension assessment *Procesos de Lectura* (PROLEC-SE). This assessment covers the age range from 10 to 16 years. Participants silently read two expository texts and answer brief constructed-response questions ($n = 20$) that assess literal comprehension (e.g., “How do Australian aboriginals dress?”) and inferential comprehension (e.g., “Why do Australian aboriginal hunters follow a kangaroo for several days?”). Following the standardized scoring rubric, items are scored as correct (1 point) or incorrect (0 points), with a maximum possible score of 20 points. The Cronbach’s alpha for this measure has been reported as .85 (Cuetos & Ramos, 1997; Ramos & Cuetos, 2011).

Word-Reading Fluency

In the rapid word segmentation task (Elosúa et al., 2012; López-Escribano, Elosúa, Gómez-Veiga, & García-Madruga, 2013), a group-administered word-reading fluency task, participants are asked to identify words in strings of letters that contain three words each with no spaces in between. Students are asked to draw a line between the words. For example, *robleautosalón* (*oakcarhall*) should be parsed as *roble/auto/salón* (*oak/car/hall*). The total score corresponds to the number of correct words identified in 90 seconds. This silent word-reading fluency test was inspired by Bråten, Lie, Andreassen, and Olaussen’s (1999) original test and validated for Spanish readers in Spain. For its application in this study, the task was minimally adapted, with very minor changes required to be appropriate for speakers of Latin American varieties of Spanish. Scores for Chilean students are interpreted in relation to those

obtained for sixth graders from Spain ($M = 59.87$, standard deviation $[SD] = 12.41$, minimum = 32, maximum = 93; Elosúa et al., 2012).

S-CALS

The S-CALS-I is a 60-minute paper-and-pencil, group-administered research instrument designed to measure high-utility cross-disciplinary academic language skills in grades 4–8. As described previously, this assessment was inspired by the English CALS-I, an innovative, theoretically grounded, and psychometrically robust instrument that has been validated through multiple studies (Uccelli, Barr, et al., 2015; Uccelli, Phillips Galloway, et al., 2015). The S-CALS-I entails 53 items across eight tasks: packing and unpacking nominalizations, organizing compact and complex sentences, connecting ideas logically, tracking participants and themes, interpreting writers’ viewpoints, understanding meta-linguistic terms, organizing analytic texts, and identifying academic register. Skills were assessed with a variety of multiple-choice, sort list, and checkbox items, as well as one-word written responses. All items were scored as correct (0 points) or incorrect (1 point), except for the organizing analytic text task (0–3 points), which was rescaled to be the same weight of the other tasks. The total possible score of the final instrument is 53. For ease of interpretation, results are reported as percentage correct scores. (See Appendix A for detailed descriptions of tasks and for item examples.) The Cronbach’s alpha for this measure has been reported as .88.

The development of the S-CALS-I unfolded in three phases. Phase 1 entailed three integrated reviews: a comprehensive review of Spanish textual and developmental linguistics studies to identify whether English CALS skill sets were relevant for Spanish, an extensive review of available corpora of Spanish academic texts (i.e., *Corpus de Referencia del Español Actual*: Real Academia Española, 2014; *El Corpus del Español*: Davies, 2002) to guide the selection of targets to be tested, and a systematic analysis of Chilean school textbooks. The two corpora enabled us to gather valuable evidence of the prevalence of words/structures in Spanish academic discourse. Words/structures selected for the S-CALS-I ranged in frequency from 9% to 25% in the corpora. Because these corpora do not focus on school texts, we conducted the systematic analysis of Chilean school textbooks to verify that the selected language targets were indeed prevalent in school texts. Science, language arts, and social studies textbooks from grades 4–10 were analyzed to verify that a minimum of 20 instances were found across these texts for each target selected for testing.

In phase 2, a multidisciplinary team of linguists, educators, and psychometricians engaged in an iterative

process of item design, pilot testing with small groups of students and teachers, and item refinement. Following the design criteria of the English CALS-I, items were designed to reduce, as much as possible, the demands of decoding, background knowledge, higher order reasoning, and nontarget vocabulary knowledge to more precisely measure the targeted S-CALS.

In phase 3, a pilot battery of the S-CALS-I with a total of 123 items (more than double the items estimated to be needed for the final form) was administered to students in grades 4–8 in two separate sessions (65 minutes each). Guided by classical test theory, item response theory, and theoretical considerations, a final set of 53 items was selected. (See Appendix B for S-CALS-I psychometric information.)

S-AVoc

This group-administered, paper-and-pencil test assesses students' knowledge of cross-disciplinary academic vocabulary (e.g., *system*, *pattern*) with 15 multiple-choice items. For each item, the underlined target word is embedded in a sentence, and students are asked to choose the most appropriate synonym from among four options. The distractors are always an unrelated word, a phonological associate, and a general semantic associate. All items are scored as correct (0 points) or incorrect (1 point), with a total possible score of 15 points. (See Appendix A for a detailed description of the test and an item example.) The Cronbach's alpha for this measure has been reported as .80.

The development of the S-AVoc-T followed the same three-phase design as for the S-CALS-I, starting with the translation and adaptation of the English Word Generation Academic Vocabulary Test (Hwang et al., 2015). In the English version, the target words were selected mainly from the Academic Word List (Coxhead, 2000), which includes vocabulary words found frequently in academic English texts across content areas. A similar list does not exist for Spanish. Yet, given that approximately 70% of words in Coxhead's Academic Word List are English words with a corresponding Spanish cognate (also frequent in academic Spanish), the same list was used as the initial source. The prevalence of the selected words was examined in the Spanish corpora and the Chilean textbooks to confirm their relevance for Spanish. After an iterative process of pilot testing, we conducted classical test theory and item response theory analyses to inform the final selection of items (see Appendix B).

Analytic Plan

Based on Kane's (2016) and Messick's (1989, 1995) psychometric guidelines and the Standards for Educational and Psychological Testing (American Educational Research

Association, American Psychological Association, & National Council on Measurement in Education, 1999), the development of the S-CALS-I and the S-AVoc-T entailed examining the reliability evidence for each instrument, the dimensionality of the internal structure of the S-CALS, followed by that of the S-CALS-I and the S-AVoc-T together, and the tests' validity using a reading comprehension assessment as criterion.

To examine within- and across-grade individual variability, we generated descriptive statistics by grade and gender for all four administered tests: S-CALS-I, S-AVoc-T, word-reading fluency, and reading comprehension. Next, we used CFA to examine unidimensional and higher order factor models using item-level data from the full sample. Items were mapped onto each task (dimension) based on the S-CALS-I test design specifications. CFAs were first conducted to test a unidimensional model with the S-CALS-I items only. Next, we added the S-AVoc-T items to test two models: a unidimensional model with S-CALS-I and S-AVoc-T items and a second higher order model with eight S-CALS-I dimensions (one per task) and S-AVoc-T as a ninth dimension. CFA from the R software (R Development Core Team, 2013) and, more specifically, the lavaan package and the diagonally weighted least square estimator were used. Nonresponse data at the item level were treated as zero because in this type of timed test, which covers a wide developmental range (grades 4–8), nonresponse may be interpreted as the student having an insufficient ability level to perform at the difficulty level of the item. On average, there was 8.5% nonresponse at the item level across the S-CALS-I and the S-AVoc-T. Finally, regression analyses were conducted to examine S-CALS-I and S-AVoc-T scores as predictors of reading comprehension, controlling for school factors, grade, and word-reading fluency.

Results

Variability in S-CALS and Academic Vocabulary (Research Question 1)

Participants' means and standards deviations for the S-CALS, academic vocabulary, word-reading fluency, and reading comprehension scores were generated by grade. As can be seen in Table 2, S-CALS-I scores displayed within- and across-grade variability, showing that the instrument was sensitive to individual variability across the wide span range from fourth to eighth grade. The mean percentage correct S-CALS-I score for the full sample was .54 ($SD = .23$), with grade-specific mean S-CALS-I scores increasing progressively across higher grades. As expected, grade 4 students displayed the lowest S-CALS-I mean ($M = .39$,

TABLE 2

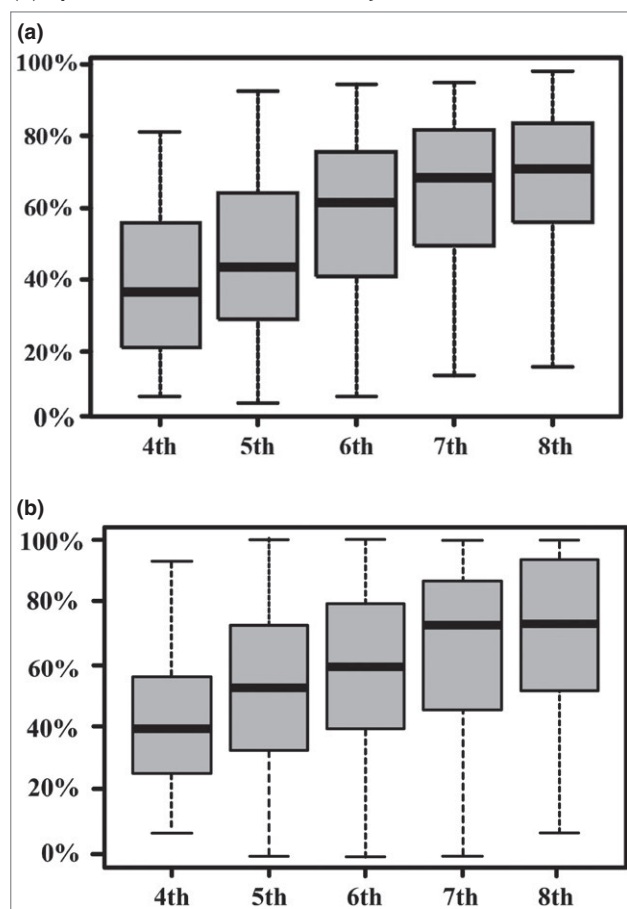
Descriptive Statistics for the Spanish Core Academic-Language Skills Instrument, the Spanish Academic Vocabulary Test, Word-Reading Fluency, and Reading Comprehension Scores by Grade ($N = 810$)

Grade	n	Spanish core academic-language skills		Spanish academic vocabulary		Word-reading fluency		Reading comprehension	
		M	SD	M	SD	M	SD	M	SD
4	163	.39	.19	.43	.19	52.04	28.74	.23	.20
5	173	.46	.21	.50	.22	61.60	31.33	.28	.22
6	165	.58	.22	.58	.24	80.12	51.07	.41	.23
7	155	.63	.22	.65	.23	77.14	37.25	.47	.23
8	154	.68	.19	.70	.22	73.46	34.64	.50	.25
Total	810	.54	.23	.57	.24	68.62	38.76	.38	.25

Note. Spanish core academic-language skills, Spanish academic vocabulary, and reading comprehension are displayed as percentage correct scores; word-reading fluency is expressed as raw scores.

FIGURE 1

Box Plots by Grade ($N = 810$): (a) Spanish Core Academic-Language Skills Instrument Scores and (b) Spanish Academic Vocabulary Test Scores



$SD = .19$), and grade 8 students displayed, on average, the highest S-CALS-I performance ($M = .68$, $SD = .19$). Despite the evident upward developmental trends,

substantive individual variability was detected within each grade, with grade-specific standard deviations ranging from .19 to .22. The across-grade upward trends and the within-grade individual variability can be observed in the S-CALS-I box plots by grade displayed in Figure 1a.

Academic vocabulary knowledge (S-AVoc-T) scores mirrored those of the S-CALS-I. The average percentage correct score for the full sample was .57 ($SD = .24$). Fourth-grade students demonstrated the lowest level of academic vocabulary knowledge ($M = .43$, $SD = .19$), whereas eighth-grade students showed the strongest average performance ($M = .70$, $SD = .22$). Similar to the S-CALS-I results, the S-AVoc-T score box plots in Figure 1b display an average upward progression in higher grades yet also considerable individual variability within each grade.

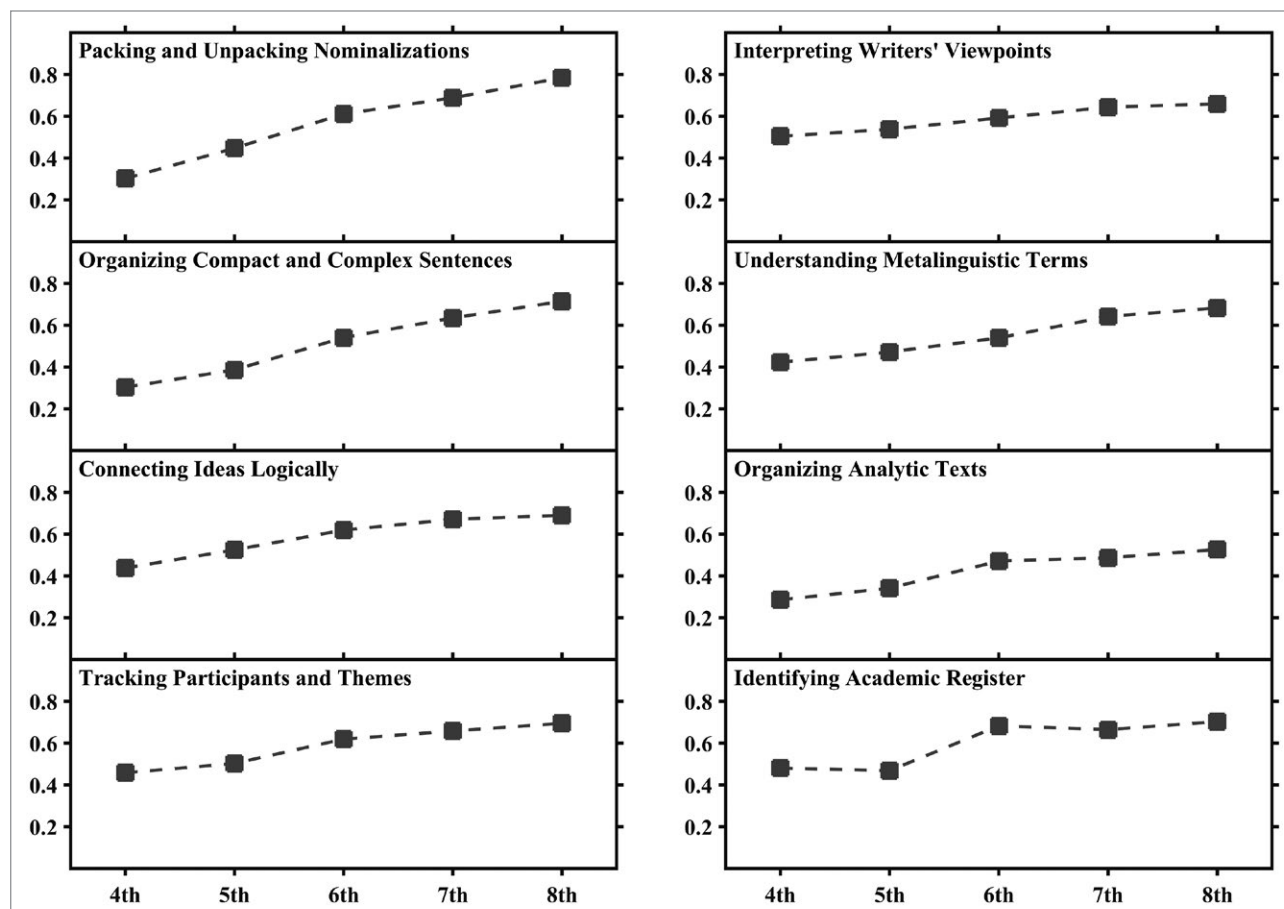
In addition, Figure 2 allows us to observe within- and across-grade performances for each of the S-CALS-I tasks. A similar upward trend in the higher grades was apparent for each task.

When results of the S-CALS-I and of the S-AVoc-T were disaggregated by gender, performances in each test were found to be very similar across gender. In the S-CALS-I, female students displayed a mean percentage correct of .55 ($SD = .22$), whereas males' mean was .54 ($SD = .24$). For S-AVoc-T, female students earned a mean score of .57 ($SD = .23$), and males earned a mean score of .58 ($SD = .25$).

For word-reading fluency, fourth-grade students displayed, on average, the lowest performance (52.04 words correctly read in 90 seconds). Intriguingly, sixth-grade students achieved the highest performance, on average (80.12), which was only slightly better than those of seventh- (77.14) and eighth-grade students (73.46).

FIGURE 2

Mean Percentage Correct Scores for Each Skill of the Spanish Core Academic-Language Skills Instrument by Grade (N = 810)



In reading comprehension, the mean percentage correct score for the full sample was only .38. As expected, fourth-grade students showed the lowest reading comprehension mean score ($M = .23$, $SD = .20$), and eighth-grade students exhibited the highest mean score ($M = 0.50$, $SD = .25$). Still, eighth graders, on average, responded to only half the items correctly, revealing considerable room for further improvement in reading comprehension skills.

S-CALS Dimensionality (Research Question 2)

Pairwise correlational analyses showed that S-CALS-I task-specific scores were significantly and positively correlated with one another and with the S-AVoc-T scores (see Appendix B). Estimates ranged from moderate to high, suggesting that tasks measured interrelated yet distinguishable dimensions. To investigate the dimensionality of the S-CALS construct, as measured by the S-CALS-I, we examined the internal structure of the S-CALS-I scores by fitting the items to a unitary

model. As displayed in Table 3, the S-CALS-I unitary model exhibited good fit indexes, suggesting similarly to the research on English CALS that this is a unidimensional construct.

Next, we examined the additional hypothesis that S-CALS-I scores and S-AVoc-T scores might fit well together as part of a unitary or higher order construct. Hence, we first tested an item-level unidimensional model with S-CALS-I and S-AVoc-T and then a higher order model with eight S-CALS dimensions (one per S-CALS-I task) and a ninth dimension for S-AVoc-T.

As shown in Table 3, both the unidimensional and the higher order CFA models exhibited good fit indexes. Although the improvement of the CFI and TLI of the higher order model may not seem substantial over those of the unidimensional models, the RMSEA indicators of the higher order model and the chi-square test statistics revealed a slightly better fit of the higher order model over the fit of the unidimensional models. Despite the adequate model fit indicators of all three models, results support the better fit of the higher order model.

TABLE 3

Item-Level Confirmatory Factor Analysis Results: Spanish Core Academic-Language Skills Instrument (S-CALS-I) and Spanish Academic Vocabulary Test (S-AVoc-T; $N = 810$)

Model	χ^2	df	χ^2/df	p	Comparative fit index	Tucker–Lewis index	Root mean square error of approximation (90% confidence interval)
Unidimensional (S-CALS-I only)	2,220.51	1,325	1.67	.000	.991	.990	.029 [.027, .031]
Unidimensional (S-CALS-I and S-AVoc-T)	3,297.14	2,210	1.49	.000	.992	.992	.025 [.023, .026]
Nine higher order dimensions (S-CALS-I and S-AVoc-T)	2,334.27	2,201	1.06	.024	.999	.999	.009 [.004, .012]

This higher order model revealed first that, aligned with the design of the eight S-CALS-I tasks, all items mapped perfectly into their corresponding dimension, with each dimension representing one of the eight S-CALS-I tasks. Second, the S-AVoc-T fit into a ninth distinguishable dimension, yet still part of a common underlying higher order factor, which we call the Spanish core academic-language and vocabulary skills (S-CALVS) construct.

In the subsequent regression analyses, first, as an exploratory move, we entered the S-CALS-I and S-AVoc-T scores as independent predictors just to observe in more detail the independent contributions of each to reading comprehension. However, in the final regression model, informed by these CFA results, we added the aggregated S-CALVS scores as the main question predictor.

S-CALS as Predictors of Reading Comprehension (Research Question 3)

To answer the last research question related to the criterion validity of the S-CALS-I, we used regression analyses to examine the relation between S-CALS-I and S-AVoc-T scores and reading comprehension. The baseline model included grade and a dummy variable for school SES/type (i.e., high SES/private; medium SES/subsidized; low SES/public) to control for differences by school. This model also included word-reading fluency scores, entered later to assess its independent contribution to reading comprehension, controlling for grade and school factors.

As expected, model 1 showed that students in higher grades displayed higher reading comprehension scores, controlling for school factors. In line with prior research on Chilean adolescent readers (Agencia de Calidad de la Educación, 2014; Ministerio de Educación, 2011), this first model also showed that in this sample, students in schools with higher SES had significantly higher reading comprehension scores, controlling for grade (see Table 4). More specifically, controlling for grade, students attending the high-SES/private school or the medium-SES/subsidized

school performed significantly better than those attending the low-SES/public school. This model accounted for 38% of the variance in reading comprehension. Next, in model 2, we added word-reading fluency, which also emerged as a significant predictor, controlling for grade and school factors, both of which remained significant. Word-reading fluency accounted only for an additional 0.5% of the variance in reading comprehension.

Models 3a and 3b are offered next as a set of exploratory moves to assess the independent contribution of each of our main question predictors (S-CALS-I and S-AVoc-T) when entered in separate models. In model 3a, we added S-AVoc-T scores. Then, in model 3b, we replaced those with S-CALS-I scores. Later, in our final model 3c, we entered the aggregated S-CALVS. Note that in these three models, the R -square change is reported in relation to model 2.

Results from model 3a show that academic vocabulary knowledge predicts reading comprehension, controlling for grade, school SES/type, and word-reading fluency, contributing to explain an additional 15% of the variance. In model 3b, S-CALS-I scores are also identified as a significant predictor of reading comprehension above and beyond the contribution of grade, school factors, and word-reading fluency. Interestingly, model 3b reveals that the addition of S-CALS results in an R -square increase even larger than that of academic vocabulary. Indeed, S-CALS account for an additional 24% of variance (in comparison with model 2), with this model explaining 62% of the variance in reading comprehension.

In our final model, guided by the CFA results, we added the aggregated S-CALVS scores to model 2. Model 3c shows that S-CALVS was a significant predictor, over and above the contribution of grade, school factors, and word-reading fluency. This final model accounted for 63% of the variance in reading comprehension. Because the coefficients are all in the same standardized units, it is possible to compare these coefficients to assess the relative strength of each predictor. As shown in model 3c, S-CALVS has the largest beta

TABLE 4

Series of Regression Models to Predict Standardized Reading Comprehension by Spanish Core Academic-Language Skills Instrument and Spanish Academic Vocabulary Test Scores, Controlling for Grade, School Socioeconomic Status (SES)/Type, and Word-Reading Fluency

Predictor	Model 1	Model 2	Model 3a	Model 3b	Model 3c
Grade	.37***	.35***	.17***	.06*	.04
High-SES school	.55***	.55***	.19***	.01	-.03
Medium-SES school	.29***	.30***	.11***	.02	-.01
Word-reading fluency		.09**	.04	.00	.00
Academic vocabulary (Spanish Academic Vocabulary Test)			.54***		
Core academic language (Spanish Core Academic-Language Skills Instrument)				.75***	
Spanish core academic-language and vocabulary skills					.79***
Observations	729	729	729	729	729
R^2	.38	.38	.53	.62	.63
ΔR^2		.005*	.15***	.24***	.25***

Note. For each variable, standardized beta coefficients are reported. The R -square changes for models 3a, 3b, and 3c are reported in relation to model 2.

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

coefficient (0.79), indicating that, compared with all other predictors in the model, S-CALVS made the greatest contribution to reading comprehension. Results indicate that a one standard deviation increase in S-CALVS leads to a .79 standard deviation increase in reading comprehension, with all other variables in the model held constant. Deserving special attention is the fact that when the aggregated S-CALVS scores are added to the model, the impact of school factors becomes nonsignificant. Consistent with our prior findings in English, these results suggest that students' cross-disciplinary academic-language performance, as measured by the S-CALS-I plus the S-AVoc-T, may be capturing precisely the language skills that are unequally distributed across socioeconomic lines in this sample. However, more research with specific socioeconomic information at the student level is needed to confirm these findings.

Discussion

This study, to our knowledge, is the first to examine the contribution of word-reading fluency, cross-disciplinary academic vocabulary knowledge, and CALS to reading comprehension in a Latin American sample of monolingual Spanish-speaking early adolescents. To measure academic-language proficiencies, two theoretically robust and psychometrically reliable instruments were developed: the S-CALS-I and the S-AVoc-T. Findings revealed that Spanish academic-language proficiencies

significantly predicted reading comprehension, above and beyond grade, school factors, and word-reading fluency, in a cross-sectional sample of 810 Chilean monolingual Spanish-speaking students attending grades 4–8 in urban Santiago.

Consistent with prior research (Uccelli, Barr, et al., 2015; Uccelli, Phillips Galloway, et al., 2015), results revealed, first, that the S-CALS-I and S-AVoc-T scores were sensitive to individual variability within and across grades. For both S-CALS and S-AVoc, a steady progression in mean scores was evident in higher grades, yet considerable individual variability was salient in every grade, despite the wide range of grades covered. Aligned with prior research on socioeconomically based discrepancies in students' literacy in Chile (Agencia de Calidad de la Educación, 2014; Ministerio de Educación, 2011), results revealed significant differences by school in academic-language and reading proficiencies, such that, controlling for grade, students attending the higher socioeconomic schools performed significantly better than those attending the low-SES school.

Second, expanding our prior research on English CALS, this study used item-level CFA to investigate the internal structure of core academic-language proficiencies, including for the first time both CALS and cross-disciplinary academic vocabulary. Interestingly, students' performances on the S-CALS-I tasks and the S-AVoc-T were best captured as dimensions of a common underlying higher order construct, the S-CALVS. This higher order factor model yielded nine

dimensions, eight of which corresponded exactly to the different S-CALS-I tasks/skill sets and a ninth represented by the academic vocabulary items. It is worth noting that the operational definition of CALS is comprehensive enough to encompass lexical, morphological, syntactic, and discourse skills and knowledge. For the sake of precision, we call this aggregated construct S-CALVS to distinguish it from other CALS research that has not included, or might not include in the future, academic vocabulary knowledge as part of the CALS construct or instrument. The inclusion of cross-disciplinary academic vocabulary knowledge as a ninth skill set aligns well with the proposed definition of the CALS construct. Far from contradicting our prior research, these results complement them and suggest that exploring English cross-disciplinary academic vocabulary and CALS as part of a hypothesized higher order construct might be a promising step also.

Finally, the aggregated S-CALVS construct was found to be a significant predictor of students' reading comprehension, above and beyond the contribution of grade, school factors, and word-reading fluency. Adding S-CALVS to the model with control predictors explained a larger proportion of the variance in reading comprehension than adding only S-AVoc. In this final model, the *R*-square increases, albeit only minimally, in relation to the model with S-CALS only. Given the well-documented role of academic vocabulary knowledge on reading comprehension, though, we interpret these results as highlighting the importance of investigating both S-CALS and S-AVoc, as opposed to only one of these subconstructs, to better understand and, presumably, more efficiently support Spanish-speaking adolescents' reading comprehension.

Theoretically, this study provides evidence to begin to more precisely delineate the vaguely specified language comprehension component of the SVR and other models of reading comprehension for Spanish-speaking adolescents (Hoover & Gough, 1990; Perfetti & Stafura, 2014). This is particularly important given the urgent need of more effectively supporting adolescents' literacy learning across Latin American countries.

S-CALS as Promising to Inform Research in Spanish Reading Comprehension

Two sets of interrelated language-proficiency constructs were operationalized and measured as potential contributors to Spanish reading comprehension: cross-disciplinary academic vocabulary and additional CALS. Consistent with prior findings in English (Hwang et al., 2015; Mancilla-Martinez & Lesaux, 2011; Uccelli, Phillips Galloway, et al., 2015), marked individual differences in cross-disciplinary academic vocabulary

knowledge were found to be an important source of difficulty for text comprehension in this sample. Beyond vocabulary, participants' CALS, often assumed to be known by the upper elementary years, varied substantially across individual participants and were, in turn, predictive of reading comprehension. These results indicate that the texts that Spanish-speaking early adolescents read to learn at school are challenging not only for the technical words (e.g., *photosynthesis*) or general-purpose academic vocabulary (e.g., *process*) but also for the morphological, syntactic, and discourse resources (e.g., connectives, nominalizations, complex sentences, text structures) used to precisely and concisely communicate and organize curricular content in written discourse. Paradoxically, the academic-language resources meant to support precise and clear written communication are often unfamiliar to adolescent readers and, consequently, function instead as major roadblocks for accessing the meaning of texts.

Compared with word-reading fluency, cross-disciplinary academic-language proficiencies emerge as more critical predictors of reading comprehension during early adolescence. It is important to note, however, that word-reading fluency was a significant predictor even in these later grades. That said, the impact of word-reading fluency became not significant once S-CALS, academic vocabulary, or the aggregated S-CALVS were added to the models. These results can be interpreted in light of the most current theoretical models of reading comprehension in which knowledge of word meanings (and presumably language knowledge more broadly) is understood as the crucial interface between word identification and comprehension (Perfetti, 2007; Perfetti & Stafura, 2014). Research in other languages has demonstrated that increasing word-reading speed does not always lead to improved comprehension and that school-relevant language knowledge is what is often challenging for large proportions of adolescent readers (Perfetti, 2007; Uccelli, Phillips Galloway, et al., 2015).

In Spanish, only limited research has pointed to language knowledge as an important component of reading comprehension. Prior evidence from two studies with upper elementary students pointed to vocabulary knowledge as a significant predictor of narrative text comprehension (Morales et al., 2011; Thorne et al., 2013). Morales and colleagues found that word decoding, vocabulary knowledge, reading motivation, and SES directly and positively predicted narrative text comprehension in Peruvian fourth graders. Consistent with our results, in this study, gender was not significant, whereas word decoding and vocabulary were the strongest predictors. Morales et al. found also that child-level SES predicted reading comprehension directly and also indirectly, especially through its

impact on vocabulary knowledge. Beyond vocabulary knowledge, only minimal research has offered evidence of the associations between adolescents' language and reading proficiencies. García and colleagues (2015) showed that skills in resolving conceptual anaphora and understanding of organizational signals (e.g., "Others thought...", "Another group...") positively contributed to literacy performances in monolingual Spanish-speaking middle school readers. These findings further highlight the importance of conceptualizing core academic-language proficiency as a construct that is more inclusive than just academic vocabulary knowledge.

Minimal intervention research in Spanish has focused on expanding adolescents' school-relevant language knowledge as a mechanism to improve reading comprehension. Analogous to the findings in of English vocabulary interventions in the United States (Deshler, Palincsar, Biancarosa, & Nair, 2007; Elleman, Lindo, Morphy, & Compton, 2009), a digital reading intervention focused on improving fifth-grade readers' vocabulary knowledge and reading strategy use in Peru found significant gains in participants' knowledge of taught vocabulary but failed to detect satisfactory gains in comprehension of informational texts (Thorne et al., 2013). Reading interventions might benefit from paying attention to complementary components of academic language beyond vocabulary. These skills seem to be teachable (Jones et al., 2017) and, thus, may boost adolescents' reading comprehension across Spanish-speaking countries.

Finally, one finding was particularly intriguing in our analysis. In our baseline regression model to predict reading comprehension, the impact of school factors was significant, such that participants in higher SES schools performed significantly better, even controlling for grade and word-reading fluency. Yet, the impact of school factors became not significant once academic-language skills were entered as predictors. Because schools differed along many characteristics in this sample, it is not possible to conclude that school variability was only or mostly limited to socioeconomic differences. Differences in SES were the most salient across schools given that they were comparable in size, in student-teacher ratio, and in their implementation of similar curricula required to follow national grade-specific standards. Still, the three schools in this sample differed in their management structures (i.e., public, subsidized, private) and potentially in principals' and teachers' professional preparation and/or practices. That said, in a region affected by deep socioeconomic disparities, this pattern of results, although intriguing, is particularly noteworthy. Given prior research on the impact of SES on vocabulary knowledge and reading (Morales et al., 2011), it is not unlikely that S-CALS may

capture precisely the skills that are most unequally distributed across SES groups. Yet, drawing any definite conclusion on this point is beyond the evidence provided by this study; future research with individual-level socioeconomic data is needed to investigate the role of individual- and school-level SES factors.

In sum, in a region dominated by a focus on early reading and basic skills (Bravo-Valdivieso & Escobar, 2014; Bravo Valdivieso et al., 2004, 2006; Guardia, 2014; Marchant et al., 2007), the present results bring to light not only academic vocabulary knowledge but also the understanding of additional core academic-language resources as essential contributors and potential pressure points to improve midadolescence reading comprehension instruction (Perfetti & Adlof, 2012) toward excellence and equity.

Advancing Our Understanding of the Dimensionality of Core Academic-Language Proficiencies

This study offers initial evidence in support of a common underlying higher order construct that includes both academic vocabulary knowledge and CALS. CFAs suggest that the item-level data were best represented by a nine-dimension higher order model. The higher order model solution is theoretically insightful. First, the nine dimensions are perfectly aligned with the skill sets proposed in the S-CALS-I and with S-AVoc-T as a ninth dimension. Second, results highlight that although distinguishable, all nine dimensions are part of a common underlying construct. We interpret our CFA results as coherent with a view of adolescent language learning not as a process of learning isolated discrete skills but instead as learning registers, that is, constellations of language resources used together and recurrently in particular contexts to achieve specific purposes (Berman & Ravid, 2009; Biber & Conrad, 2009; Uccelli, Barr, et al., 2015). This view implies that teaching isolated language skills would not yield significant gains in reading comprehension. To foster students' text comprehension, morphologically complex words and academic connectives, for instance, would need to be learned together while being put to meaningful use in authentic school-relevant practices (e.g., discussing and constructing meaningful academic texts). Whereas some interventions focused on isolated skills have shown disappointing results (Connor, 2016; Elleman et al., 2009), only future intervention studies will be able to test whether more comprehensive language approaches will indeed yield significant gains.

Our results point to a common underlying factor for cross-disciplinary skills. Academic-language proficiency, however, encompasses a larger set of subconstructs, such as disciplinary language skills (e.g., the

language of history or biology), which are unlikely to be captured by a single common factor. Results should not be extrapolated to include language skills beyond the CALVS construct, as operationalized in this study.

From a sociocultural pragmatics-based framework that understands language learning as inseparable from context, and reading comprehension as learned sociocultural practices, our results indicate that delineating adolescents' language skills on the basis of their relevance for reading academic texts offers a promising path toward understanding school-relevant language and reading relations.

Toward a Cross-Linguistic Model of Midadolescence Reading Comprehension

Overall, the present results are consistent with those found in prior CALS research in English (Uccelli, Barr, et al., 2015) yet also show that adaptations and adjustments made to the tasks to measure academic-language skills in Spanish were needed and suitable for capturing variability in midadolescent students.

Two lines of research are particularly relevant to situate our findings in the larger cross-linguistic research context. First, the minimal contribution of word-reading fluency detected in this study is aligned with cross-linguistic research documenting the earlier mastery of code-based skills in languages with more transparent orthographies, such as Spanish (compared with more opaque orthographies, such as English). Second, our results are consistent with research, from a variety of languages, documenting language skills as increasingly predictive of reading comprehension after the early elementary years, once variability in basic code-based skills (e.g., decoding, word-reading fluency) decreases as readers become automatic fluent decoders (Adlof et al., 2011; Geva & Farnia, 2012; Mancilla-Martinez & Lesaux, 2011; Morales et al., 2011).

Current theoretical models of midadolescence reading comprehension have expanded the SVR model to include academic-language proficiency and other socio-cognitive skills as critical additional contributors of text comprehension during the midadolescent years (Adlof et al., 2011; Farnia & Geva, 2013; LaRusso et al., 2016). Beyond its multicomponential nature, reading comprehension is currently understood also as a socioculturally situated process influenced by the characteristics of a specific text, reader, and activity affecting the nature and outcomes of text comprehension (Kintsch, 2004; RAND Reading Study Group, 2002). In these nuanced and complex models of reading comprehension, however, the role of languages as distinct systems (e.g., Spanish, English, Mandarin) has not yet been explicitly theorized. It is worth noting that in contrast to

extensive cross-linguistic investigations on the acquisition of code-based skills across languages and their respective alphabetic orthographies, cross-linguistic research focused on the language components of reading comprehension has been minimal.

The CALS research raises new questions about the role of academic-language proficiency across different languages. A first set of questions concerns the relevance and nature of the construct; for example, Is the distance between colloquial and academic discourse features in a language sufficient to motivate research on the CALS construct? If so, does the array of skills included in a language-specific CALS construct differ across languages? Whereas the present results reveal a common set of similar skill sets as relevant for text comprehension in both Spanish and English, research still needs to further investigate similarities and differences between these two languages. A second set of more ambitious questions concerns the relative contribution of CALS to reading comprehension across languages and their respective orthographies; for example, How does the relative impact of code-based skills versus language skills on reading comprehension vary within and across languages? We may hypothesize, for instance, that for more transparent orthographies (e.g., Spanish), the impact of academic-language skills might be stronger during midadolescence than for more opaque orthographies. Yet, in light of a multidimensional and situated understanding of reading comprehension (RAND Reading Study Group, 2002), more text, reader, and activity factors need to be taken into account in examining the relative contribution of basic skills and language skills to reading comprehension.

Relatedly, research conducted by Kintsch (2004), McNamara and colleagues (2011), and O'Reilly and McNamara (2007) revealed that readers' characteristics (e.g., background knowledge, comprehension skill) and text factors (more vs. less cohesive texts) interactively impact reading comprehension. As we have argued before, academic-language proficiency can be added as another reader factor to further enrich this line of research (Uccelli, Phillips Galloway, et al., 2015). Furthermore, we argue here for the consideration of language as different systems (e.g., Spanish, English, Mandarin Chinese) as an additional factor that cuts across reader and text. How does the relative impact of language skills vary in the context of both reader and text characteristics across languages? Research on readers with different characteristics (e.g., high vs. low decoding) within the same language, as well as across languages (e.g., with transparent vs. non-transparent orthographies, with different language typologies or academic discourse traditions), has the potential to significantly advance theory building and educational practice not only with monolingual readers cross-linguistically but also with biliterate readers.

Limitations and Areas for Further Research

Certainly, the design of this study limits the conclusions that we can draw in a number of ways. Larger, more diverse, multisite, and longitudinal samples of Spanish speakers are needed to investigate the generalizability of these findings and to examine individual growth trajectories beyond reporting developmental trends. Furthermore, this study offers preliminary evidence to motivate further research on the potential mediating effect of academic language on the relation between SES and reading comprehension. Given the prevalent socioeconomic-based segregation by school in the Chilean educational system (i.e., students with similar SES attend the same type of school; Elacqua, 2012; Valenzuela et al., 2013), future studies need to adopt a sampling strategy that allows for the closer examination of SES (e.g., randomly selecting students from a larger number of schools with the goal of disentangling socioeconomic factors from other various factors) and to collect detailed information at the family and school levels. Furthermore, more comprehensive studies that measure other important areas, such as background knowledge, perspective taking, and motivation, need to be conducted to more accurately investigate the relative contribution of academic language to monolingual Spanish-speaking adolescents' reading comprehension (LaRusso et al., 2016). More research will be also essential to understand the relation between the cross-disciplinary academic-language skills tested here and learning in a particular discipline, such as science, history, or mathematics. Research on the precursors of academic language and on opportunities to learn S-CALS in and outside of school throughout development also needs to be conducted (Uccelli, Demir, Rowe, Goldin-Meadow, & Levine, 2017).

Academic-language research will benefit also from cross-linguistic studies. The proposed S-CALS operational definition and S-CALS instrument are particularly promising in making visible to educators and researchers this array of school-relevant language skills to inform future research and practice. The CALS-I offers an initial entry point for cross-linguistic research examining English CALS and S-CALS across additional samples of monolinguals, as well as Spanish-English bilingual populations. The question of whether this construct is promising also for other languages remains to be explored.

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REFERENCES

- Adlof, S.M., Perfetti, C., & Catts, H. (2011). Developmental changes in reading comprehension: Implications for assessment and instruction. In S.J. Samuels & A.E. Farstrup (Eds.), *What research has to say about reading instruction* (4th ed., pp. 186–214). Newark, DE: International Reading Association.
- Agencia de Calidad de la Educación. (2013). *Metodología de construcción de grupos socioeconómicos: Pruebas SIMCE 2012* [Methodology for the construction of socioeconomic groups: 2012 SIMCE tests]. Santiago, Chile: Departamento de Pruebas Nacionales, División de Evaluación de Logros de Aprendizaje, Agencia de Calidad de la Educación. Retrieved from <http://www.agenciaeducacion.cl/wp-content/uploads/2013/02/Metodologia-de-Construccion-de-Grupos-Socioeconomicos-SIMCE-2012.pdf>
- Agencia de Calidad de la Educación. (2014). *Informe nacional resultados Chile PISA 2012* [National report results Chile PISA 2012]. Santiago, Chile: División de Estudios, Departamento de Estudios Internacionales, Agencia de Calidad de la Educación. Retrieved from http://archivos.agenciaeducacion.cl/Informe_Nacional_Resultados_Chile_PISA_2012.pdf
- Álvarez, G. (2001). *Textos y discursos: Introducción a la lingüística del texto* [Texts and discourses: Introduction to text linguistics]. Concepción, Chile: Universidad de Concepción.
- American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (1999). *Standards for Educational and Psychological Testing*. Washington, DC: American Educational Research Association.
- Astington, J., & Olson, D. (1990). Metacognitive and metalinguistic language: Learning to talk about thought. *Applied Psychology*, 39(1), 77–87. <https://doi.org/10.1111/j.1464-0597.1990.tb01038.x>
- Barr, C.D., & Uccelli, P. (2016). *CALS-I psychometric report*. Unpublished internal report prepared for the Catalyzing Comprehension through Discussion and Debate research project, Strategic Education Research Partnership, Washington, DC.
- Battaner, P., Atienza, E., López-Ferrero, C., & Pujol, M. (2009). Características lingüísticas y discursivas del texto académico [Linguistic and discursive characteristics of academic text]. *Textos: Didáctica de la Lengua y la Literatura*, 50, 47–67.
- Ben-Anath, D. (2005). The role of connectives in text comprehension. *Working Papers in TESOL & Applied Linguistics*, 5(2), 1–27. <https://doi.org/10.7916/D8NP23XX>
- Benelli, B., Belacchi, C., Gini, G., & Lucangeli, D. (2006). 'To define means to say what you know about things': The development of definitional skills as metalinguistic acquisition. *Journal of Child Language*, 33(1), 71–97. <https://doi.org/10.1017/S0305000905007312>
- Berman, R. (2005). Introduction: Developing discourse stance in different text types and languages. *Journal of Pragmatics*, 37(2), 105–124. [https://doi.org/10.1016/S0378-2166\(04\)00189-4](https://doi.org/10.1016/S0378-2166(04)00189-4)
- Berman, R., Ragnarsdóttir, H., & Strömquist, S. (2002). Discourse stance: Written and spoken language. *Written Language and Literacy*, 5(2), 253–287. <https://doi.org/10.1075/wll.5.2.06ber>
- Berman, R., & Ravid, D. (2009). Becoming a literate language user: Oral and written text construction across adolescence. In

- D. Olson & N. Torrance (Eds.), *The Cambridge handbook of literacy* (pp. 92–111). New York, NY: Cambridge University Press.
- Biancarosa, G., & Snow, C.E. (2006). *Reading next: A vision of action and research in middle and high school literacy* (2nd ed.). Washington, DC: Alliance for Excellent Education.
- Biber, D., & Conrad, S. (2009). *Register, genre, and style*. Cambridge, UK: Cambridge University Press.
- Bishop, D.V. (2003). *Test for Reception of Grammar—version 2 (TROG-2)*. Oxford, UK: Pearson.
- Bråten, I., Lie, A., Andreassen, R., & Olaussen, B.S. (1999). Leisure time reading and orthographic processes in word recognition among Norwegian third- and fourth-grade students. *Reading and Writing*, 11(1), 65–88. <https://doi.org/10.1023/A:1007976521114>
- Bravo-Valdivieso, L., & Escobar, J.-P. (2014). How transparent is Spanish orthography? ¿Cuán transparente es nuestra ortografía castellana? *Estudios de Psicología*, 35(3), 442–449. <https://doi.org/10.1080/02109395.2014.965455>
- Bravo Valdivieso, L., Villalón, M., & Orellana, E. (2004). Los procesos cognitivos y el aprendizaje de la lectura inicial: Diferencias cognitivas entre buenos lectores y lectores deficientes [The cognitive processes and the learning of initial reading: Cognitive differences between good and deficient readers]. *Estudios Pedagógicos*, 30, 7–19. <https://doi.org/10.4067/S0718-07052004001000001>
- Bravo Valdivieso, L., Villalón, M., & Orellana, E. (2006). Diferencias en la predictividad de la lectura entre primer año y cuarto año básicos [Differences in the predictability of reading between first grade and fourth grade]. *Psykhe*, 15(1), 3–11. <https://doi.org/10.4067/S0718-22282006000100001>
- Briz, A., Pons, S., & Portolés, J. (Eds.). (2008). *Diccionario de partículas discursivas del español* [Dictionary of discursive particles of Spanish]. Retrieved from <http://www.dpde.es/>
- Cain, K., & Oakhill, J. (2006). Profiles of children with specific reading comprehension difficulties. *British Journal of Educational Psychology*, 76(4), 683–696. <https://doi.org/10.1348/000709905x67610>
- Calsamiglia, H., & Tusón, A. (2002). La textura discursiva [The discursive texture]. In H. Calsamiglia & A. Tusón (Eds.), *Las cosas del decir: Manual de análisis del discurso* [The things of saying: Handbook of discourse analysis] (pp. 217–250). Barcelona, Spain: Ariel.
- Camps, A. (2009). Actividad metalingüística y aprendizaje de la gramática: Hacia un modelo de enseñanza basado en la actividad reflexiva [Metalinguistic activity and learning grammar: Towards a teaching model based on reflexive activity]. *Cultura y Educación*, 21(2), 199–213. <https://doi.org/10.1174/113564009788345853>
- Camps, A., & Milian, M. (2000). Metalinguistic activity in learning to write: An introduction. In A. Camps & M. Milian (Eds.), *Metalinguistic activity in learning to write* (pp. 1–29). Amsterdam, The Netherlands: Amsterdam University Press.
- Canet Juric, L., Urquijo, S., Richard's, M.M., & Burin, D. (2009). Predictores cognitivos de niveles de comprensión lectora mediante análisis discriminante [Cognitive predictors of reading comprehension levels using discriminant analysis]. *International Journal of Psychological Research*, 2(2), 99–111.
- Carlisle, J.F. (2000). Awareness of the structure and meaning of morphologically complex words: Impact on reading. *Reading and Writing*, 12(3), 169–190. <https://doi.org/10.1023/A:1008131926604>
- Chamorro, D., Barletta, N., & Mizuno, J. (2013). El lenguaje para enseñar y aprender las Ciencias Naturales: Un caso de oportunidades perdidas para la formación [The language for teaching and learning natural science: A case of missed opportunities for citizenship education]. *Revista Signos*, 46(81), 3–28. <https://doi.org/10.4067/S0718-09342013000100001>
- Cinto, M.T. (2009). La nominalización: Obstáculo para la comprensión lectora [Nominalization: Obstacle for reading comprehension]. *Educación, Lenguaje y Sociedad*, 6(6), 171–186.
- Colombi, C. (2000). En vías del desarrollo del lenguaje académico en español en hablantes nativos de español en los Estados Unidos [In developing academic language in Spanish in native Spanish speakers in the United States]. In A. Roca (Ed.), *Research on Spanish in the United States: Linguistic issues and challenges* (pp. 296–309). Somerville, MA: Cascadia.
- Compton, D.L., & Pearson, P.D. (2016). Identifying robust variations associated with reading comprehension skill: The search for pressure points. *Journal of Research on Educational Effectiveness*, 9(2), 223–231. <https://doi.org/10.1080/19345747.2016.1149007>
- Connor, C.M.D. (2016). A lattice model of the development of reading comprehension. *Child Development Perspectives*, 10(4), 269–274. <https://doi.org/10.1111/cdep.12200>
- Coxhead, A. (2000). A new academic word list. *TESOL Quarterly*, 34(2), 213–238. <https://doi.org/10.2307/3587951>
- Crosson, A.C., Lesaux, N.K., & Martiniello, M. (2008). Factors that influence comprehension of connectives among language minority children from Spanish-speaking backgrounds. *Applied Psycholinguistics*, 29(4), 603–625. <https://doi.org/10.1017/S0142716408080260>
- Cuetos, F., & Ramos, J.L. (1997). *Batería de evaluación de los procesos lectores en el alumnado del tercer ciclo de educación primaria y educación secundaria obligatoria (PROLEC-SE)* [Evaluation battery of reading processes in students in the third cycle of primary education and compulsory secondary education]. Madrid, Spain: TEA.
- Cummins, J. (2008). BICS and CALP: Empirical and theoretical status of the distinction. In N. Hornberger (Ed.), *Encyclopedia of language and education* (2nd ed., pp. 487–499). New York, NY: Springer.
- Cuñarro, M. (2010). Las nominalizaciones: Reconocimiento, comprensión y estrategias lingüísticas para su definición [Nominalizations: Recognition, understanding and linguistic strategies for their definition]. In V. Castel & Cubo de Severino L. (Eds.), *La renovación de la palabra en el bicentenario de la Argentina: Los colores de la mirada lingüística* [The renewal of the word in the bicentennial of Argentina: The colors of the linguistic gaze] (pp. 413–420). Mendoza, Argentina: Editorial FFyL.
- Davies, M. (2002). *El Corpus del Español* [The Spanish Corpus]. Retrieved from <http://www.corpusdelespanol.org/>
- De Mier, M., Amado, B., & Benítez, M.E. (2015). Dificultades en la comprensión de textos expositivos en niños de los primeros grados de la escuela primaria [Difficulties in the comprehension of expository texts in children in the first grades of primary school]. *Psykhe*, 24(2), 1–13. <https://doi.org/10.7764/psykhe.24.2.708>
- De Mier, M., Borzone, A., & Cupani, M. (2012). La fluidez lectora en los primeros grados: Relación entre habilidades de decodificación, características textuales y comprensión: Un estudio piloto con niños hablantes de español [Reading fluency in the early grades: Relation between decoding skills, textual characteristics and comprehension: A pilot study with Spanish-speaking children]. *Revista Neuropsicología Latinoamericana*, 4(1), 18–33. <https://doi.org/10.5579/rnl.2012.0079>
- De Saeger, B. (2007). Evidencialidad y modalidad epistémica en los verbos de actitud proposicional en español [Evidentiality and epistemic modality in the verbs of propositional attitude in Spanish]. *Interlingüística*, 17, 268–277.
- Deshler, D.D., Palincsar, A.S., Biancarosa, G., & Nair, M. (2007). *Informed choices for struggling adolescent readers*. Newark, DE: International Reading Association.
- Elacqua, G. (2012). The impact of school choice and public policy on segregation: Evidence from Chile. *International Journal of*

- Educational Development*, 32(3), 444–453. <https://doi.org/10.1016/j.ijedudev.2011.08.003>
- Elleman, A.M., Lindo, E.J., Morphy, P., & Compton, D.L. (2009). The impact of vocabulary instruction on passage-level comprehension of school-age children: A meta-analysis. *Journal of Research on Educational Effectiveness*, 2(1), 1–44. <https://doi.org/10.1080/19345740802539200>
- Elosúa, M.-R., García-Madruga, J.-A., Gómez-Veiga, I., López-Escribano, C., Pérez, E., & Orjales, I. (2012). Habilidades lectoras y rendimiento académico en 3º y 6º de primaria: Aspectos evolutivos y educativos [Reading skills and academic performance in grades 3 and 6: Evolutionary and educational aspects]. *Estudios de Psicología*, 33(2), 207–218. <https://doi.org/10.1174/021093912800676411>
- Errázuriz, M.C. (2012). Análisis del uso de los marcadores discursivos en argumentaciones escritas por estudiantes universitarios [Analysis of the use of discursive markers in arguments written by university students]. *Perfiles Educativos*, 34(136), 98–117.
- Fang, Z., & Schleppegrell, M. (2008). *Reading in secondary content areas: A language-based pedagogy*. Ann Arbor: University of Michigan Press.
- Fang, Z., Schleppegrell, M., & Cox, B. (2006). Understanding the language demands of schooling: Nouns in academic registers. *Journal of Literacy Research*, 38(3), 247–273. https://doi.org/10.1207/s15548430jlr3803_1
- Farnia, F., & Geva, E. (2013). Growth and predictors of change in English language learners' reading comprehension. *Journal of Research in Reading*, 36(4), 389–421. <https://doi.org/10.1111/jrir.12003>
- Flórez, R., Torrado, M.C., Arévalo, I., Mesa, C., Mondragón, S., & Pérez, C. (2005). Habilidades metalingüísticas, operaciones metacognitivas y su relación con los niveles de competencia en lectura y escritura: Un estudio exploratorio [Metalinguistic abilities, metacognitive operations and their relation with the levels of competence in reading and writing: An exploratory study]. *Forma y Función*, 18, 15–44.
- Flotts, P., Manzi, J., Jiménez, D., Abarzúa, A., Cayuman, C., & García, M.J. (2016). *Informe de resultados TERCE: Logros de aprendizaje* [TERCE results report: Learning achievements]. Paris, France: Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura; Santiago, Chile: Oficina Regional de Educación para América Latina y el Caribe.
- Flowerdew, L. (2003). A combined corpus and systemic-functional analysis of the problem-solution pattern in a student and professional corpus of technical writing. *TESOL Quarterly*, 37(3), 489–511. <https://doi.org/10.2307/3588401>
- García, J., Bustos, A., & Sánchez, E. (2015). The contribution of knowledge about anaphors, organisational signals and refutations to reading comprehension. *Journal of Research in Reading*, 38(4), 405–427. <https://doi.org/10.1111/1467-9817.12021>
- García Negroni, M., Hall, B., & Marín, M. (2005). Ambigüedad, abstracción y polifonía del discurso académico: Interpretación de las nominalizaciones [Ambiguity, abstraction and polyphony of academic discourse: Interpretation of nominalizations]. *Revista Signos*, 38(57), 49–60. <https://doi.org/10.4067/S0718-09342005000100004>
- Georgiou, G.K., Torppa, M., Manolitsis, G., Lyytinen, H., & Parrila, R. (2012). Longitudinal predictors of reading and spelling across languages varying in orthographic consistency. *Reading and Writing*, 25(2), 321–346. <https://doi.org/10.1007/s11145-010-9271-x>
- Geva, E., & Farnia, F. (2012). Developmental changes in the nature of language proficiency and reading fluency paint a more complex view of reading comprehension in ELL and EL1. *Reading and Writing*, 25(8), 1819–1845. <https://doi.org/10.1007/s11145-011-9333-8>
- González, J., Cervera, T., & Miralles, J.L. (1998). La adquisición de las relaciones anafóricas en castellano: Clases de anáforas y el efecto de la distancia [The acquisition of anaphoric relations in Spanish: Classes of anaphora and the effect of distance]. *Infancia y Aprendizaje*, 21(82), 21–44. <https://doi.org/10.1174/021037098320784844>
- Gough, P.B., & Tunmer, W.E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education*, 7(1), 6–10. <https://doi.org/10.1177/074193258600700104>
- Guardia, P. (2014). Is consonant rhyme important when learning to read in Spanish? ¿Es importante la rima consonante para aprender a leer en el español? *Estudios de Psicología*, 35(3), 567–583. <https://doi.org/10.1080/02109395.2014.965459>
- Halliday, M.A.K., & Hasan, R. (1976). *Cohesion in English*. London, UK: Longman.
- Heath, S.B. (2012). *Words at work and play: Three decades in family and community life*. Cambridge, UK: Cambridge University Press.
- Hernández, M. (2008). El desarrollo de la competencia definicional: Estudio con niños costarricenses [The development of definitional competence: A study with Costa Rican children]. *Revista Internacional de Lingüística Iberoamericana*, 6(1), 7–29.
- Hoover, W.A., & Gough, P.B. (1990). The simple view of reading. *Reading and Writing*, 2(2), 127–160. <https://doi.org/10.1007/BF00401799>
- Hwang, J.K., Lawrence, J.F., Mo, E., & Snow, C.E. (2015). Differential effects of a systematic vocabulary intervention on adolescent language minority students with varying levels of English proficiency. *The International Journal of Bilingualism*, 19(3), 314–332. <https://doi.org/10.1177/1367006914521698>
- Hyland, K. (2009). *Academic discourse*. London, UK: Continuum.
- Hyland, K., & Tse, P. (2004). Metadiscourse in academic writing: A reappraisal. *Applied Linguistics*, 25(2), 156–177. <https://doi.org/10.1093/applin/25.2.156>
- Jones, S.M., LaRusso, M., Kim, J., Kim, H.K., Selman, R., Uccelli, P., ... Snow, C.E. (2017). *Experimental effects of Word Generation on vocabulary, academic language, perspective taking, and reading comprehension in high poverty schools*. Manuscript submitted for publication.
- Kane, M. (2016). Explicating validity. *Assessment in Education: Principles, Policy & Practice*, 23(2), 198–211. <https://doi.org/10.1080/0969594x.2015.1060192>
- Kieffer, M.J. (2009). *The development of morphological awareness and vocabulary knowledge in adolescent language minority learners and their classmates* (Unpublished doctoral dissertation). Harvard University, Cambridge, MA.
- Kieffer, M.J., & Lesaux, N.K. (2007). Breaking down words to build meaning: Morphology, vocabulary, and reading comprehension in the urban classroom. *The Reading Teacher*, 61(2), 134–144. <https://doi.org/10.1598/RT.61.2.3>
- Kieffer, M.J., & Lesaux, N.K. (2012). Development of morphological awareness and vocabulary knowledge in Spanish-speaking language minority learners: A parallel process latent growth curve model. *Applied Psycholinguistics*, 33(1), 23–54. <https://doi.org/10.1017/S0142716411000099>
- Kintsch, W. (2004). The construction-integration model of text comprehension and its implications for instruction. In R.B. Ruddell & N.J. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 1270–1328). Newark, DE: International Reading Association.
- Kurland, B.F., & Snow, C.E. (1997). Longitudinal measurement of growth in definitional skill. *Journal of Child Language*, 24(3), 603–625. <https://doi.org/10.1017/S0305000997003243>
- Language and Reading Research Consortium. (2015). Learning to read: Should we keep things simple? *Reading Research Quarterly*, 50(2), 151–169. <https://doi.org/10.1002/rrq.99>

- LaRusso, M., Kim, H.Y., Selman, R., Uccelli, P., Dawson, T., Jones, S., ... Snow, C. (2016). Contributions of academic language, perspective taking, and complex reasoning to deep reading comprehension. *Journal of Research on Educational Effectiveness*, 9(2), 201–222. <https://doi.org/10.1080/19345747.2015.1116035>
- Lesaux, N.K., Crosson, A.C., Kieffer, M.J., & Pierce, M. (2010). Uneven profiles: Language minority learners' word reading, vocabulary, and reading comprehension skills. *Journal of Applied Developmental Psychology*, 31(6), 475–483. <https://doi.org/10.1016/j.appdev.2010.09.004>
- LeVine, R.A., LeVine, S., Schnell-Anzola, B., Rowe, M., & Dexter, E. (2012). *Literacy and mothering: How women's schooling changes the lives of the world's children*. New York, NY: Oxford University Press.
- Levinson, M. (2012). *No citizen left behind*. Cambridge, MA: Harvard University Press.
- Levy, F., & Murnane, R.J. (2013). *Dancing with robots: Human skills for computerized work*. Washington, DC: Third Way. Retrieved from <http://www.thirdway.org/report/dancing-with-robots-human-skills-for-computerized-work>
- López-Escribano, C., Elosúa, M., Gómez-Veiga, I., & García-Madruga, J. (2013). A predictive study of reading comprehension in third-grade Spanish students. *Psicothema*, 25(2), 199–205. <https://doi.org/10.7334/psicothema2012.175>
- López Ferrero, C. (2001). Personas del discurso y despersonalización [Persons of the discourse and depersonalization]. In G. Vázquez (Ed.), *Actividades para la escritura académica* [Activities for academic writing] (pp. 57–66). Madrid, Spain: Edinumen.
- Mancilla-Martínez, J., & Lesaux, N.K. (2010). Predictors of reading comprehension for struggling readers: The case of Spanish speaking language minority learners. *Journal of Educational Psychology*, 102(3), 701–711. <https://doi.org/10.1037/a0019135>
- Mancilla-Martínez, J., & Lesaux, N.K. (2011). The gap between Spanish speakers' word reading and word knowledge: A longitudinal study. *Child Development*, 82(5), 1544–1560. <https://doi.org/10.1111/j.1467-8624.2011.01633.x>
- Marchant, T., Lucchini, G., & Cuadrado, B. (2007). ¿Por qué leer bien es importante? Asociación del dominio lector con otros aprendizajes [Why is reading well so important? Association between reading mastery and other learning processes]. *Psykhé*, 16(2), 3–16. <https://doi.org/10.4067/S0718-22282007000200001>
- Martín Zorraquino, M.A., & Montolío, M. (1998). *Los marcadores del discurso: Teoría y análisis* [Discourse markers: Theory and analysis]. Madrid, Spain: Arco/Libros.
- Mata, S., Gallego, J., & Mieres, C. (2007). Habilidades lingüísticas y comprensión lectora: Una investigación empírica [Linguistic skills and reading comprehension: An empirical research]. *Bordón: Revista de Pedagogía*, 59(1), 153–166.
- Maury, P., & Teisserenc, A. (2005). The role of connectives in science text comprehension and memory. *Language and Cognitive Processes*, 20(3), 489–512. <https://doi.org/10.1080/01690960444000151>
- McNamara, D., Ozuru, Y., & Floyd, R. (2011). Comprehension challenges in the fourth grade: The roles of text cohesion, text genre and readers' prior knowledge. *International Electronic Journal of Elementary Education*, 4(1), 229–257.
- Messick, S. (1989). Validity. In R.L. Linn (Ed.), *Educational measurement* (3rd ed., pp. 13–103). New York, NY: American Council on Education & Macmillan.
- Messick, S. (1995). Standards of validity and the validity of standards in performance assessment. *Educational Measurement: Issues and Practice*, 14(4), 5–8. <https://doi.org/10.1111/j.1745-3992.1995.tb00881.x>
- Milian, M., & Camps, A. (2006). El razonamiento metalingüístico en el marco de las secuencias didácticas de gramática (SDG) [Metalinguistic reasoning in the framework of learning sequences of grammar]. In A. Camps (Ed.), *Diálogo e investigación en las aulas: Investigaciones en didáctica de la lengua* [Dialogue and research in the classroom: Research in the language method] (pp. 25–53). Barcelona, Spain: Graó.
- Ministerio de Educación. (2011). *Resultados PISA 2009 Chile: Competencias de los estudiantes chilenos de 15 años en lectura, matemáticas y ciencias* [Results PISA 2009 Chile: Skills of 15-year-old Chilean students in reading, math and science]. Santiago, Chile.
- Mizuno, J., & Moss, G. (2009). La ecología: Una noticia de moda: El registro periodístico y la transitividad en un texto de ciencias naturales [Ecology: A fashion news: The journalistic record and the transitivity in a text of natural sciences]. In M. Shiro, P. Bentivoglio, & F.D. Erlich (Eds.), *Haciendo discurso: Homenaje a Adriana Bolívar* [Making discourse: Homage to Adriana Bolívar] (pp. 647–660). Caracas, Venezuela: Chirimi.
- Montolío, M. (2001). *Conectores de la lengua escrita: Contraargumentativos, consecutivos, aditivos y organizadores de la información* [Connectives of written language: Counterargumentatives, consecutives, additives and organizers of information]. Barcelona, Spain: Ariel.
- Morales, S., Verhoeven, L., & van Leeuwe, T. (2011). Socio-cultural variation in reading comprehension development among fifth graders in Peru. *Reading and Writing*, 24(8), 951–969. <https://doi.org/10.1007/s11145-010-9242-2>
- Moss, G., Barletta, N., Chamorro, D., & Mizuno, J. (2013). La metáfora gramatical en los textos escolares de Ciencias Sociales en español [Grammatical metaphor in social sciences textbooks in Spanish]. *Onomázein*, 28, 88–104. <https://doi.org/10.7764/onomazein.28.3>
- Murillo-Rojas, M. (2014). Competencia definicional de los escolares costarricenses [Definitional competence in Costa Rican]. *Kánina*, 38(3), 127–152. <https://doi.org/10.15517/rk.v38i3.16459>
- Myhill, D., & Jones, S. (2015). Conceptualizing metalinguistic understanding in writing/Conceptualización de la competencia metalingüística en la escritura. *Cultura y Educación*, 27(4), 839–867. <https://doi.org/10.1080/11356405.2015.1089387>
- Nagy, W., Berninger, V.W., & Abbott, R.D. (2006). Contributions of morphology beyond phonology to literacy outcomes of upper elementary and middle-school students. *Journal of Educational Psychology*, 98(1), 134–147. <https://doi.org/10.1037/0022-0663.98.1.134>
- Nagy, W., & Townsend, D. (2012). Words as tools: Learning academic vocabulary as language acquisition. *Reading Research Quarterly*, 47(1), 91–108. <https://doi.org/10.1002/RRQ.011>
- Navarro, J., & Rodríguez, I. (2011). *Prueba de evaluación de la conciencia sintáctica (CS-ORD)* [Assessment of syntactic awareness]. Unpublished manuscript.
- Navarro, J., & Rodríguez, I. (2014). Evaluación de la conciencia sintáctica: Efectos de la verosimilitud en la resolución de tareas y en su relación con la comprensión de oraciones [Assessment of syntactic awareness: Effects of plausibility in solving tasks and in its relation to sentence comprehension]. *Revista Signos*, 47(84), 64–90. <https://doi.org/10.4067/S0718-09342014000100004>
- OECD. (2014). *PISA 2012 results: What students know and can do: Vol. 1. Student performance in mathematics, reading and science* (Rev. ed.). Paris, France: Author.
- OECD. (2016). *PISA 2015 results: Vol. 1. Excellence and equity in education*. Paris, France: Author.
- O'Reilly, T., & McNamara, D.S. (2007). Reversing the reverse cohesion effect: Good text can be better for strategic, high-knowledge readers. *Discourse Processes*, 43(2), 121–152.
- Peña, E. (2007). Lost in translation: Methodological considerations in cross-cultural research. *Child Development*, 78(4), 1255–1264. <https://doi.org/10.1111/j.1467-8624.2007.01064.x>

- Perfetti, C.A. (2007). Reading ability: Lexical quality to comprehension. *Scientific Studies of Reading*, 11(4), 357–383. <https://doi.org/10.1080/10888430701530730>
- Perfetti, C.A., & Adlof, S.M. (2012). Reading comprehension: A conceptual framework from word meaning to text meaning. In J. Sabatini & E. Albro (Eds.), *Assessing reading in the 21st century: Aligning and applying advances in the reading and measurement sciences* (pp. 3–20). Lanham, MD: Rowman & Littlefield.
- Perfetti, C.A., Landi, N., & Oakhill, J. (2005). The acquisition of reading comprehension skill. In M. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 227–247). Oxford, UK: Blackwell.
- Perfetti, C., & Stafura, J. (2014). Word knowledge in a theory of reading comprehension. *Scientific Studies of Reading*, 18(1), 22–37. <https://doi.org/10.1080/10888438.2013.827687>
- Phillips Galloway, E. (2016). *The development of core academic language and reading comprehension in preadolescent and adolescent learners* (Doctoral dissertation). Retrieved from <https://dash.harvard.edu/handle/1/27112709>
- Ramos, J.L., & Cuetos, F. (2011). *Evaluación de los Procesos Lectores: PROLEC-SE Manual* [Assessment of readers' processes: PROLEC-SE manual]. Madrid, Spain: TEA.
- RAND Reading Study Group. (2002). *Reading for understanding. Toward an R&D program in reading comprehension*. Santa Monica, RAND.
- R Development Core Team. (2013). *The R project for statistical computing*. Vienna, Austria: R Foundation. Retrieved from <https://www.r-project.org/>
- Real Academia Española. (2014). *Banco de datos (CREA), Corpus de Referencia del Español Actual* [Database (CREA), Reference Corpus of Current Spanish]. Retrieved from <http://www.rae.es/>
- Rex, L.A., Thomas, E.E., & Engel, S. (2010). Applying Toulmin: Teaching logical reasoning and argumentative writing. *English Journal*, 99(6), 56–62.
- Reznitskaya, A., Anderson, R.C., & Kuo, L.J. (2007). Teaching and learning argumentation. *The Elementary School Journal*, 107(5), 449–472. <https://doi.org/10.1086/518623>
- Ripoll, J.C., & Aguado, G. (2014). Reading comprehension improvement for Spanish students: A meta-analysis/La mejora de la comprensión lectora en español: Un meta-análisis. *Revista de Psicodidáctica*, 19(1), 27–44. <https://doi.org/10.1387/RevPsicodidact.9001>
- Sánchez, E., & García, J. (2009). The relation of knowledge of textual integration devices to expository text comprehension under different assessment conditions. *Reading and Writing*, 22(9), 1081–1108. <https://doi.org/10.1007/s11145-008-9145-7>
- Sánchez, E., García, J.R., & Bustos, A. (2017). Does rhetorical competence moderate the effect of rhetorical devices on the comprehension of expository texts beyond general comprehension skills? *Reading and Writing*, 30(3), 439–462. <https://doi.org/10.1007/s11145-016-9684-2>
- Sánchez, E., González, A., & García, J. (2002). Competencia retórica: Una propuesta para interpretar las dificultades de comprensión [Rhetoric competence: A proposal to interpret comprehension difficulties]. *Psicothema*, 14(1), 77–85.
- Schleppegrell, M.J. (2001). Linguistic features of the language of schooling. *Linguistics and Education*, 12(4), 431–459. [https://doi.org/10.1016/S0898-5898\(01\)00073-0](https://doi.org/10.1016/S0898-5898(01)00073-0)
- Schleppegrell, M.J. (2004). *The language of schooling: A functional linguistic perspective*. London, UK: Erlbaum.
- Shanahan, T., & Shanahan, C. (2008). Teaching disciplinary literacy to adolescents: Rethinking content-area literacy. *Harvard Educational Review*, 78(1), 40–59. <https://doi.org/10.17763/haer.78.1.v62444321p602101>
- Snow, C. (1990). The development of definitional skill. *Journal of Child Language*, 17(3), 697–710. <https://doi.org/10.1017/S0305000900010953>
- Snow, C., & Uccelli, P. (2009). The challenge of academic language. In D.R. Olson & N. Torrance (Eds.), *The Cambridge handbook of literacy* (pp. 112–133). New York, NY: Cambridge University Press.
- Soto, G., & Zenteno, C. (2004). Los sintagmas nominales en textos científicos escritos en español [Noun phrases in scientific texts written in Spanish]. *Estudios de Lingüística Universidad de Alicante*, 18, 275–292. <https://doi.org/10.14198/ELUA2004.18.14>
- Stahl, S.A., & Nagy, W.E. (2006). *Teaching word meanings*. Mahwah, NJ: Erlbaum.
- Strasser, K., & del Río, F. (2014). The role of comprehension monitoring, theory of mind, and vocabulary depth in predicting story comprehension and recall of kindergarten children. *Reading Research Quarterly*, 49(2), 169–187. <https://doi.org/10.1002/rrq.68>
- Strasser, K., del Río, F., & Larraín, A. (2013). Profundidad y amplitud del vocabulario: ¿Cuál es su rol en la comprensión de historias en la edad pre-escolar?/Vocabulary depth and breadth: Their role in preschoolers' story comprehension. *Estudios de Psicología*, 34(2), 221–225. <https://doi.org/10.1174/021093913806751401>
- Strasser, K., Larraín, A., & Lissi, M.R. (2013). Effects of storybook reading style on comprehension: The role of word elaboration and coherence questions. *Early Education and Development*, 24(5), 616–639. <https://doi.org/10.1080/10409289.2012.715570>
- Thorne, C., Morla, K., Uccelli, P., Nakano, T., Mauchi, B., Landeo, L., ... Huerta, R. (2013). Efecto de una plataforma virtual en comprensión de lectura y vocabulario: Una alternativa para mejorar las capacidades lectoras en primaria [Effect of a virtual platform on reading comprehension and vocabulary: An alternative to improve reading skills in primary school]. *Revista de Psicología*, 31(1), 3–35.
- Treviño, E., Toledo, G., & Gempp, R. (2013). Calidad de la educación parvularia: Las prácticas de clase y el camino a la mejora [Preschool education quality: Teacher practices and the path to improvement]. *Pensamiento Educativo: Revista de Investigación Educativa Latinoamericana*, 50(1), 40–62. <https://doi.org/10.7764/PEL.50.1.2013.4>
- Uccelli, P., Barr, C., Dobbs, C., Phillips Galloway, E., Meneses, A., & Sánchez, E. (2015). Core academic language skills: An expanded operational construct and a novel instrument to chart school-relevant language proficiency in preadolescent and adolescent learners. *Applied Psycholinguistics*, 36(5), 1077–1109. <https://doi.org/10.1017/s014271641400006x>
- Uccelli, P., Demir, Ö.E., Rowe, M., Goldin-Meadow, S., & Levine, S. (2017). *Children's early decontextualized talk predicts academic language proficiency in mid-adolescence*. Manuscript submitted for publication.
- Uccelli, P., & Meneses, A. (2015). Habilidades de lenguaje académico y su asociación con la comprensión de lectura en la escuela primaria y media: Un nuevo constructo operacional [Academic language skills and their association with reading comprehension in primary and middle school: A new operational construct]. *Miríada Hispánica*, 10, 179–206.
- Uccelli, P., Phillips Galloway, E., Barr, C., Meneses, A., & Dobbs, C. (2015). Beyond vocabulary: Exploring cross-disciplinary academic-language proficiency and its association with reading comprehension. *Reading Research Quarterly*, 50(3), 337–356. <https://doi.org/10.1002/rrq.104>
- Valenzuela, J.P., Bellei, C., & de los Ríos, D. (2013). Socioeconomic school segregation in a market-oriented educational system: The case of Chile. *Journal of Education Policy*, 19(2), 217–241. <https://doi.org/10.1080/02680939.2013.806995>
- Venegas, R. (2010). Multi-dimensional analysis of an academic corpus in Spanish. In G. Parodi (Ed.), *Academic and professional discourse genres in Spanish* (pp. 101–119). Philadelphia, PA: John Benjamins.
- Wilson, M.R. (2005). *Constructing measures: An item response theory approach*. Mahwah, NJ: Erlbaum.

Zeno, S.M., Ivens, S.H., Millard, R.T., & Duvvuri, R. (1995). *The educator's word frequency guide*. Brewster, NY: Touchstone.

Ziegler, J., Bertrand, D., Tóth, D., Csépe, V., Reis, A., Faisca, L., ... Biomert, L. (2010). Orthographic depth and its impact on universal predictors of reading: A cross-language investigation. *Psychological Science*, 21(4), 551–559. <https://doi.org/10.1177/0956797610363406>

Ziegler, J., & Goswami, U. (2005). Reading acquisition, developmental dyslexia, and skilled reading across languages: A psycholinguistic grain size theory. *Psychological Bulletin*, 131(1), 3–29. <https://doi.org/10.1037/0033-2909.131.1.3>

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APPENDIX A

S-CALS-I

Task	Skill measured	Description of item	Sample item
Packing and unpacking nominalizations	Morphologically composing and decomposing nominalizations	The administrator reads items in which students are asked to decompose a given nominalization into a verb or adjective or derive a nominalization from a given verb or adjective.	1. <i>Refutación. El científico logró ____ la hipótesis.</i> (Refutation. The scientist made ____ the hypothesis.) 2. <i>Obtener. La ____ de energía es importante para vivir.</i> (Get. The ____ of energy is important to live.)
Organizing compact and complex sentences	Organizing compact and complex sentences	Students read a disordered set of words and are asked to organize the sentence (cues are provided for first and last words).	1. <i>formación un proceso La rocas de es lento.</i> (formation a process The rocks of is slow.)
Connecting ideas logically	Understanding school-relevant connectives	Students are asked to select the appropriate connective to link two sentences, or to select the best continuation for a fragment that includes a connective.	1. <i>Una araña tiene ocho patas; ____ una mariposa posee seis patas.</i> (A spider has eight legs; ____ a butterfly has six legs.) a. <i>de tal modo que</i> (so that) b. <i>entonces</i> (then) c. <i>en cambio</i> (instead) d. <i>por consiguiente</i> (therefore) 2. <i>En el paseo de curso llovió todo el día. No obstante,</i> (On the course ride it rained all day. However,) a. <i>fue una experiencia divertida para todos los estudiantes.</i> (it was a fun experience for all students.) b. <i>fue un día con gran cantidad de truenos y relámpagos.</i> (it was a day with a lot of thunder and lightning.) c. <i>fue un paseo aburrido para muchos de los estudiantes.</i> (it was a boring ride for many of the students.)

(continued)

S-CALS-I (continued)

Task	Skill measured	Description of item	Sample item								
Tracking participants and themes	Resolving conceptual anaphora and other types of anaphora prevalent in school texts	Students are asked to select among three options the correct antecedent for the underlined anaphor.	<p><i>Nuestro planeta está hecho de muchas capas de roca. La capa más profunda está tan caliente que una parte de la roca se derrite. Los volcanes se forman cuando la roca derretida rompe las capas superiores para salir a la superficie. <u>Este fenómeno</u> ha sido ampliamente estudiado.</i> (Our planet is made of many layers of rock. The deepest layer is so hot that part of the rock melts. Volcanoes are formed when molten rock breaks through the upper layers to surface. <u>This phenomenon</u> has been widely studied.)</p> <p><i>En este pasaje, “este fenómeno” se refiere a:</i> (In this passage, “this phenomenon” refers to:)</p> <p>a. <i>nuestro planeta está hecho de muchas capas de roca.</i> (our planet is made up of many layers of rock.)</p> <p>b. <i>la roca derretida rompe las capas superiores.</i> (the melted rock breaks the upper layers.)</p> <p>c. <i>la capa más profunda está tan caliente que la roca se derrite.</i> (the deepest layer is so hot that the rock melts.)</p>								
Interpreting writers’ viewpoints	Understanding epistemic markers that signal the writer’s degree of certainty toward an advanced claim	After presenting a scenario, the administrator reads a series of scientists’ statements that include epistemic markers. On the basis of each statement, students are asked to decide how certain the scientist is about his or her claim.	<p><i>¿Cree este científico que la roca viene del espacio?</i> (Does this scientist believe that rock comes from space?)</p> <table border="1"> <thead> <tr> <th>Sí (Yes)</th> <th>Quizás sí (Maybe yes)</th> <th>Quizás no (Maybe no)</th> <th>No (No)</th> </tr> </thead> <tbody> <tr> <td colspan="4"> <p><i>Es indudable que la roca viene del espacio.</i> (There is no doubt that the rock comes from space.)</p> </td> </tr> </tbody> </table>	Sí (Yes)	Quizás sí (Maybe yes)	Quizás no (Maybe no)	No (No)	<p><i>Es indudable que la roca viene del espacio.</i> (There is no doubt that the rock comes from space.)</p>			
Sí (Yes)	Quizás sí (Maybe yes)	Quizás no (Maybe no)	No (No)								
<p><i>Es indudable que la roca viene del espacio.</i> (There is no doubt that the rock comes from space.)</p>											
Understanding metalinguistic terms	Understanding school-relevant metalinguistic terms that refer to cognitive or discourse processes	Students are asked to select among four options the appropriate metalinguistic word for an academic discussion.	<p>Discussion</p> <p><i>El recreo es el momento perfecto para hacer amigos.</i> (Recess is the perfect time to make friends.)</p> <p>Item</p> <p><i>Susana dice: “Un estudio reportó que el 92% de los estudiantes hizo nuevos amigos durante el recreo.” La respuesta de Susana presenta...</i> (Susana says, “One study reported that 92% of the students made new friends during recess.” Susana’s answer presents...)</p> <p>a. <i>una hipótesis</i> (a hypothesis)</p> <p>b. <i>una opinión</i> (an opinion)</p> <p>c. <i>una definición</i> (a definition)</p> <p>d. <i>una evidencia</i> (an evidence)</p>								
Organizing analytic texts	Organizing an argumentative text	Students are asked to order fragments of an argumentative text presented in random order. Discourse markers (e.g., <i>por último</i> [by last], <i>en conclusión</i> [in conclusion], <i>finalmente</i> [finally], <i>por una parte</i> [on one side], <i>por otra parte</i> [on the other side]) and conventional argumentative structure were used.	<p>Mejores almuerzos en el colegio (Better Lunches at School)</p> <p>___ <i>En segundo lugar, la comida del colegio debe variar porque a los estudiantes les gusta elegir su comida.</i> (Second, school food should vary because students like to choose their food.)</p> <p>___ <i>En conclusión, los almuerzos del colegio serían mejores si hubiera comida más sana, variada y en mayor cantidad.</i> (In conclusion, school lunches would be better if there were healthier, more varied food and more.)</p> <p>___ <i>En primer lugar, necesitan comida más saludable para estar sanos y así estudiar mejor.</i> (First, they need healthier food to stay healthy and so study better.)</p> <p>___ <i>Algunos piensan que los estudiantes deberían recibir mejores almuerzos en el colegio.</i> (Some think that students should receive better lunches at school.)</p> <p>___ <i>Por último, muchos estudiantes necesitan más comida porque están creciendo.</i> (Finally, many students need more food because they are growing.)</p>								

(continued)

S-CALS-I (continued)

Task	Skill measured	Description of item	Sample item
Identifying academic register	Identifying academic definitions	Students are asked to select the most academic definition among a set of three options.	<p>Paraguas (Umbrella)</p> <p>a. <i>Un paraguas es un objeto que sirve de protección para la lluvia, fabricado con tela impermeable.</i> (An umbrella is an object that serves as protection for rain, made with waterproof fabric.)</p> <p>b. <i>Un paraguas es algo que te tapa de la lluvia con una tela que se pega sobre unos alambres doblados.</i> (An umbrella is something that gets you out of the rain with a cloth that sticks over bent wires.)</p> <p>c. <i>Un paraguas es para que uno no se moje con la lluvia y está hecho de tela o plástico que te protege.</i> (An umbrella is so that one does not get wet with rain and is made of cloth or plastic that protects you.)</p>

S-AVOC-T

Task	Skill measured	Description of item	Sample item
Understanding academic vocabulary	Understanding school-relevant cross-disciplinary academic vocabulary	Students are asked to select, among four options, the correct synonym for an underlined academic word used in a sentence context.	<p><i>Los estudiantes <u>interpretaron</u> los resultados de manera diferente.</i> (The students <u>interpreted</u> the results differently.)</p> <p>a. <i>entendieron</i> (understood)</p> <p>b. <i>incorporaron</i> (incorporated)</p> <p>c. <i>señalaron</i> (pointed)</p> <p>d. <i>crearon</i> (created)</p>

APPENDIX B

Psychometric Information of S-CALS-I and S-AVoc-T and Pairwise Correlations

Psychometric Information

Reliability evidence for S-CALS-I was robust with a Cronbach's alpha index of .88. To select the items, item difficulty was estimated (between -2.88 and 1.94). Of the 53 items, 48 exhibited infit statistics within the 0.75 and 1.33 range suggested by Wilson (2005). The remaining five items showed infit statistics only slightly below or above the cutoff score, not representing a relevant deviation from the expected item functioning.

Additionally, biserial correlations (between .17 and .65) and proportion correct (between .24 and .85) were calculated to provide adequate S-CALS information from grades 4–8.

For S-AVoc-T, items included in the final version exhibited omission rates of between 3% and 8.1%, biserial correlations between .3 and .58, item difficulty between -1.53 and 1.32 , and proportion correct between .32 and .82. All 15 items exhibited infit statistics within the 0.75 to 1.33 range suggested by Wilson (2005).

Pairwise Correlations for S-CALS-I Tasks and S-AVoc-T

Task	1	2	3	4	5	6	7	8	9
1. Packing and unpacking nominalizations	—								
2. Organizing compact and complex sentences	.69***	—							
3. Connecting ideas logically	.67***	.60***	—						
4. Tracking participants and themes	.58***	.57***	.60***	—					
5. Interpreting writers' viewpoints	.49***	.44***	.52***	.47***	—				
6. Understanding metalinguistic terms	.61***	.56***	.63***	.53***	.57***	—			
7. Organizing analytic texts	.62***	.57***	.64***	.59***	.48***	.58***	—		
8. Identifying academic register	.50***	.48***	.53***	.47***	.45***	.49***	.53***	—	
9. Understanding academic vocabulary	.71***	.64***	.68***	.66***	.54***	.66***	.67***	.54***	—

*** $p < .001$.

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