

Reading in English as a Second Language (L2): a study about how working memory capacity, reading habits, and self-assessed L2 proficiency are associated with comprehension
Leitura em inglês como segunda língua (L2): um estudo sobre como a capacidade de memória de trabalho, os hábitos de leitura e a proficiência autodeclarada estão associados à compreensão

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Abstract: This study examines how working memory capacity (WMC), reading habits, and self-assessed L2 proficiency relate to reading comprehension in L2 English. It aims to determine whether these variables influence overall L2 reading comprehension as well as reading comprehension of referential and inferential information. A total of 36 participants took part in the study: 29 undergraduate students of *Letras Inglês* at UFRGS and 7 independent learners. They completed three tasks: a *Language History and Reading Habits Questionnaire*, a *Self-Applicable Reading Span Test*, and a *Reading Comprehension Task*, which assessed understanding of both referential and inferential information. Spearman correlation analyses revealed a significant positive association between WMC and overall reading comprehension, and the understanding of both referential and inferential information, supporting previous findings (Daneman; Carpenter, 1980; Azevedo *et al.*, 2022). Self-assessed proficiency also correlated positively with overall comprehension and with the understanding of both referential and inferential information, although the association with inferential comprehension was weaker. Interestingly, no significant correlation was found between reading habits and overall L2 reading comprehension, nor the comprehension of referential and inferential information, which may reflect self-reporting limitations (Cunningham; Stanovich, 2001; Hicks, 2023). These results suggest that cognitive and linguistic factors, particularly WMC, play a critical role in L2 reading performance.

Keywords: L2 reading comprehension; working memory capacity; reading habits; self-assessed proficiency.

Resumo: Este estudo examina como a capacidade de memória de trabalho (CMT), os hábitos de leitura e a proficiência autodeclarada na segunda língua (L2) se relacionam com a compreensão leitora em inglês como L2. Busca-se verificar se essas variáveis influenciam tanto a compreensão geral de leitura em L2 quanto a compreensão de informações referenciais e inferenciais no texto. Participaram da pesquisa 36 indivíduos, sendo 29 estudantes de Letras Inglês da UFRGS e 7 aprendizes independentes. Os instrumentos utilizados foram: um *Questionário de Histórico da Linguagem e Hábitos de Leitura*, um *Teste de Capacidade de Leitura Autoaplicável* e uma *Tarefa de Compreensão Leitora*, que avaliou compreensão de informações referenciais e inferenciais. Análises de correlação de Spearman revelaram associação positiva significativa entre a CMT e a compreensão leitora geral, de informações referenciais e inferenciais, em consonância com estudos anteriores (Daneman; Carpenter, 1980; Azevedo *et al.*, 2022). A proficiência autodeclarada também se correlacionou positivamente com a compreensão geral e de conteúdos referenciais e

inferenciais, embora a associação com a compreensão inferencial tenha sido mais fraca. Além disso, nenhuma correlação significativa foi encontrada entre os hábitos de leitura e a compreensão geral de leitura em L2, a compreensão de informações referenciais ou inferenciais, possivelmente devido a limitações dos instrumentos de coleta (Cunningham; Stanovich, 2001; Hicks, 2023). Os resultados sugerem que fatores cognitivos e linguísticos, especialmente a CMT, desempenham papel central na compreensão leitora em L2.

Palavras-chave: compreensão leitora em L2; capacidade de memória de trabalho; hábitos de leitura; proficiência autoavaliada.

1 Introduction

Reading comprehension involves a dynamic interaction between cognitive and linguistic processes. Central to this ability is working memory capacity (WMC), which enables individuals to temporarily store and manipulate information during reading, facilitating tasks such as word decoding, reference resolution, and inference generation (Polk, 2018; Kintsch; Rawson, 2005). Previous research indicates that individuals with higher WMC perform better on comprehension tasks, as they efficiently integrate syntactic and semantic cues (Daneman; Carpenter, 1980; De Groot, 2013).

In addition to WMC, reading habits and language proficiency may also shape reading performance. Regular reading fosters vocabulary growth, syntactic awareness, and automaticity in decoding in L1 (Cunningham; Stanovich, 2001). Despite the fact that previous studies have shown that L2 proficiency influences readers' ability to identify key ideas, make inferences, and construct coherent mental representations of the text (Tomitch, 2000; Kintsch; Rawson, 2005), results have not been consistent. For instance, using a self-assessed L2 proficiency measure, Azevedo *et al.* (2025) found no effect of L2 English proficiency on the recall of text ideas in L2 reading, which was attributed by the authors to a plateau in proficiency. Therefore, this study attempts to contribute to the discussion.

Investigating the combined effects of WMC, reading habits, and self-assessed L2 proficiency may contribute to a deeper understanding of the mechanisms underlying L2 reading. This study, therefore, explores how these three variables are associated with overall reading comprehension, as well

as the processing of referential and inferential information, in a group of young adults from the South of Brazil with varying L2 English proficiency levels. By identifying key cognitive and behavioral factors, this research highlights the importance of considering elements beyond linguistic knowledge when approaching L2 reading comprehension.

2 Literature review

2.1 Reading comprehension

Reading is a skill that engages numerous interconnected cognitive processes, including memory units that represent written and spoken forms of words, their meanings, grammatical rules, general world knowledge, and reading strategies (De Groot, 2013). Among other things, these cognitive processes include "letter and word recognition, grammatical analysis, and text integration, all essential for comprehension" (De Groot, 2013, p. 73).

According to the Research and Development Reading Study Group, reading comprehension is "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (Snow, 2002, p. 13). This definition emphasizes several key components: accurate text decoding, integrating inferences, and an active, motivated reader (Kintsch; Rawson, 2005).

At the most fundamental level, comprehension begins with word recognition, involving the activation of sublexical and lexical memory units, which include visual features, letters, and entire words, to facilitate comprehension (De Groot, 2013). This process requires interpreting orthography, phonology, morphology, and meaning (Kessler; Treiman, 2015),

enabling readers to access additional information, such as word meanings and syntactic properties.

In addition, effective sentence comprehension relies on both word recognition and grammatical analysis. While word recognition identifies sentence components, grammatical analysis interprets their relationships. This becomes evident in sentences such as “The cat looked at the dog” and “The dog looked at the cat”, which share the same words but differ in meaning due to their syntax structure.

At the initial level of reading comprehension, interpretation is often superficial, focusing primarily on linguistic cues from the text. However, deeper comprehension requires integrating linguistic knowledge with cognitive processes. Beyond decoding, effective reading involves higher-order cognitive abilities such as prediction, hypothesis testing, and critical evaluation (Clarke, 1980). This perspective challenges the traditional view of reading as a passive skill (Azevedo *et al.*, 2022), emphasizing that successful comprehension depends on aligning the reader’s cognitive resources with the demands of the text and the task at hand (Snow, 2002). In this sense, active engagement with the material is essential for meaning construction.

A key component of higher-level comprehension is the integration of background knowledge, which enables readers to infer meaning beyond what is directly stated in the text. This process enhances depth of understanding by connecting textual information with prior experiences, conceptual frameworks, and world knowledge (Kessler; Treiman, 2015; Kintsch; Rawson, 2005).

Inferencing, in particular, plays a central role in establishing coherence within and across sentences. Inferences can be *local*, when derived from immediate linguistic and contextual cues, or *global*, when built upon the reader’s broader knowledge and interpretation of the text’s structure and implications (Kintsch; Rawson, 2005).

According to Kintsch (1998), inferences allow readers to fill in conceptual gaps, resolve ambiguities, and form causal and referential connections that are not directly stated. These operations require a dynamic

interplay between working memory (WM) and long-term memory (LTM), as readers must simultaneously process incoming textual information and activate relevant prior knowledge. Through this integration, they construct a coherent and meaningful mental representation of the text, which is constantly being revised as new information that appears in the text is processed by the reader, whose job is to attribute meaning to the written information.

Given this dynamism and complexity, Snow (2010) presents a model that outlines four levels of reading comprehension that are attained by a successful reader. The model consists of a set of four concentric circles, each representing a distinct comprehension level. The innermost circle represents basic reading, which, according to the author, involves fundamental processes such as “accurate word recognition, fluent access to word meaning, recognition of syntactic cues to sentence meaning, and short-term phonological memory” (p. 415). The second circle outward from the center reflects a more advanced level of comprehension, where readers begin creating mental representations of the text (Kintsch, 1998), make text-based inferences, and link the text to real-world knowledge, including understanding inferential causal relationships and tracking events. The third circle from the center represents somewhat elaborate comprehension, where readers engage more actively with the material using strategies like visualization, reflecting on the information that is presented in the text, and making connections within the text, along with skills such as critiquing arguments and identifying a text’s point of view. Finally, the outermost circle describes highly elaborated comprehension, which requires deep background knowledge and specialized training in reading, such as for literary criticism or astronomy. At this level, readers can analyze texts on a profound, intellectual level.

Complementing this theoretical context, Kintsch and Rawson (2005) describe comprehension in terms of two key levels of mental representation: the *Textbase* and the *Situation Model*. The Textbase is constructed through the decoding and parsing of linguistic information, including vocabulary, grammar,

and sentence structure. It reflects what the text directly states and is built directly from the words and propositions present in the text. In contrast, the Situation Model represents a deeper, more integrated understanding. It goes beyond the linguistic surface to incorporate the reader's prior knowledge, inferences, and contextual understanding. According to Kintsch (1998), this model includes the temporal, spatial, and causal relationships described or implied in the text, as well as character motivations and broader thematic elements. It is constructed through a dynamic interaction between working memory and long-term memory, allowing the reader to form a coherent, enriched mental representation of the text's meaning.

While the Textbase provides the structural foundation of comprehension, the Situation Model enables readers to engage with the text at a conceptual level, facilitating critical interpretation and long-term retention. Together, the theoretical constructs proposed by Snow (2010) and by Kintsch and Rawson (2005) underscore the complexity of reading comprehension as a multilevel process that involves both surface-level decoding and the construction of enriched, meaning-driven mental representations.

In turn, L2 reading is inherently more complex, as it places greater demands on working memory due to reduced linguistic automatization (Kintsch; Rawson, 2005). Among other factors, reading comprehension in an L2 is influenced by both L1 literacy and L2 language proficiency. Research suggests that readers do not approach L2 texts with a blank slate. Instead, they often attempt to transfer strategies developed in their L1, especially if those skills are well established (McNeil, 2012). However, this transfer may be interrupted when L2 proficiency is insufficient, leading to what Clarke (1980) describes as a "short circuit" in comprehension.

The *Short Circuit Hypothesis* posits that a low level of L2 linguistic knowledge may block the effective use of otherwise functional L1 reading strategies (Clarke, 1980). This is supported by Cummins' (1979) *Threshold Hypothesis*, which argues that a minimum threshold of L2 proficiency is required for successful

transfer of L1 literacy skills. According to that perspective, until that threshold is reached, readers may struggle to implement higher-order comprehension strategies in the L2.

Cummins (1979) also proposes the *Developmental Interdependence Hypothesis*, which highlights that L2 reading development is partly dependent on L1 literacy. This means that well-developed reading skills in the first language can positively influence L2 reading, provided that the learner has achieved a sufficient level of competence in the target language.

Further refining these ideas, McNeil (2012) formulated the extended *Compensatory Model*, which integrates linguistic, cognitive, and experiential components. According to this framework, L2 readers compensate for limited linguistic knowledge by drawing on background knowledge, inferential reasoning, and cognitive strategies. These compensatory mechanisms are particularly important for readers whose lexical and syntactic processing in the L2 is not yet automatized.

Taken together, these theoretical perspectives underscore that L2 reading processes cannot be explained solely by vocabulary size or grammatical knowledge. Instead, they engage a dynamic interaction between L1 and L2 linguistic skills, background knowledge, strategic knowledge, and cognitive resources. One of the cognitive mechanisms that has been consistently shown to be involved in text comprehension in both L1 and L2 reading is working memory, which will be addressed next.

2.2 Working memory

Reading comprehension involves the decoding and integration of information into the text's interpretation. To store and process this content, the reader relies on their working memory capacity (Harrington; Sawyer, 1992), which temporarily holds and processes information in the service of the task at hand (Polk, 2018). Although some researchers have used short-term memory and working memory interchangeably, the latter is preferred in studies

focusing on the manipulation of information, as it emphasizes the essential role the mechanism plays in processing, which goes beyond mere storage of content (Baddeley, 2007, 2012; Daneman; Carpenter, 1980; Harrington; Sawyer, 1992; Polk, 2018). Such a perspective is also adopted throughout this paper.

Recognizing the complexity of working memory cognitive operations, Baddeley and Hitch (1974) proposed a Working Memory Model which conceptualizes WM as a dynamic system composed of a *Central Executive* and two specialized subsystems: the *Phonological Loop* and the *Visuospatial Sketchpad* (Baddeley, 2007). The Phonological Loop is responsible for the temporary storage and rehearsal of speech-based information. It enables the reader to retain verbal content through rapid subvocal repetition, which helps preserve memory traces for immediate processing. The Visuospatial Sketchpad, on the other hand, handles visual and spatial information, allowing individuals to manipulate mental images or navigate environments effectively.

Both subsystems are coordinated by the Central Executive, a domain-general mechanism that allocates attentional resources, shifts focus between tasks, and supervises ongoing cognitive activity (Polk, 2018). Far from being a passive controller, the central executive plays a critical role in regulating WM representations by maintaining relevant information, discarding irrelevant content, and directing attention based on task demands (Azevedo *et al.*, 2022).

Although the 1974 model was highly influential and helped explain findings such as those from the *Reading Span Test* (Daneman; Carpenter, 1980), it was later revised and presented in Baddeley (2000). The author identifies two important limitations in the original framework: first, the oversimplification of the Central Executive as a mere attentional system, excluding any storage function; and second, the model's limited ability to account for the integration of multimodal information from Long-term Memory into WM.

To address these concerns, a fourth component, the *Episodic Buffer*, was introduced in 2000 to the now-called *Multicomponent Model of*

Working Memory (MMWM) (Baddeley, 2012). The Episodic Buffer serves as a temporary storage system that integrates information from various sources, such as the Phonological Loop, the Visuospatial Sketchpad, and Long-term Memory into a coherent, multidimensional representation. It holds integrated chunks of visual, spatial, and verbal information, referred to as *Episodes*, and contributes to the creation of structured mental representations that connect perception and memory (Polk, 2018). With a limited capacity estimated at around four chunks, the Episodic Buffer depends on attentional control and active rehearsal to sustain information before it fades (Baddeley, 2012). It thus serves as a bridge between different representational formats and systems, playing a key role in tasks that require multimodal comprehension, such as reading.

The MMWM explains how WM is involved in constructing a mental representation from written materials. The strong association between individuals' working memory capacity and their performance on reading comprehension tasks suggests that a higher WM capacity enhances one's ability to comprehend and analyze textual information effectively, making them perform better on reading comprehension tests (Polk, 2018). Therefore, research suggests that WM is not only essential for managing immediate cognitive demands during reading but also for constructing coherent mental representations that underlie deep comprehension. That is, for effective comprehension, WMC is particularly relevant as readers must hold words and phrases in memory while integrating them into meaningful propositions, making inferences, and revising their understanding when needed. The successful construction of meaning thus depends on the reader's capacity to process current input while retaining prior textual elements.

The role of WMC becomes even more pronounced in L2 reading. Due to limited automatization in L2 lexical and syntactic processing, readers often experience greater cognitive load (McNeil, 2012) when processing texts in their L2. In such contexts, WMC may serve as a compensatory mechanism, enabling learners to sustain attention,

monitor comprehension, and manipulate linguistic input while coping with lower fluency.

In addition to its role in reading comprehension, WMC has also been associated with general reading proficiency. Tomitch (2000) emphasizes that proficient readers are better able to use cognitive resources strategically, which allows them to integrate new information more efficiently. In this context, Kintsch, Patel, and Ericsson (1999) refer to *Long-term Working Memory* (LTWM) to explain how expert readers manage large amounts of information during reading by activating Long-term Memory elements directly connected to their current focus of attention. Through retrieval structures, these readers access relevant prior knowledge rapidly and without taxing the limited capacity of Short-term Memory. Thus, LTWM is particularly evident in familiar domains, where extensive practice allows individuals to perform as experts, integrating information more effectively and sustaining comprehension over longer texts.

As proficiency develops and readers reach greater automaticity in lexical access and syntactic parsing, fewer demands are placed on working memory, freeing it for higher-level processes such as inference generation and monitoring comprehension (Kintsch; Rawson, 2005). Conversely, less proficient readers tend to rely more heavily on WMC, as their limited linguistic automatization increases the cognitive load during reading (McNeil, 2012). In such cases, WMC supports comprehension by compensating for processing inefficiencies, enabling readers to hold and manipulate partial interpretations while decoding the text (Daneman; Carpenter, 1980).

Previous research has consistently underscored the link between WMC and reading comprehension. Daneman and Carpenter (1980) introduced the Reading Span Test as a method to measure WMC in reading tasks, showing a strong correlation between WMC and comprehension. Follow-up studies confirmed this relationship: Harrington and Sawyer (1992) observed that higher WMC correlated with better L2 reading skills in advanced Japanese learners of English; Perry and Malaia (2013) demonstrated that WMC training improved sentence

comprehension, particularly in low-income students; and Roscioli and Tomitch (2022) found that WMC positively influenced L2 inference generation. Finally, Azevedo *et al.* (2022) further showed that WMC affected inferential (but not referential) comprehension in bilinguals multitasking during reading. These findings underscore WMC as a key cognitive resource in L2 reading, particularly in tasks that demand integrative or inferential processing.

2.3 Reading habits

Reading habits, developed through consistent and voluntary reading, are typically measured by the quantity of reading material consumed, reading frequency, and the average time spent on reading (Chalukya, 2021). Readers with limited engagement often exhibit lower proficiency and educational outcomes, partly due to reduced practice, decoding difficulties, or contact with overly complex texts (Cunningham; Stanovich, 2001). This low exposure harms the automatization of word recognition, placing a heavier demand on cognitive resources and thus hindering comprehension.

Frequent reading contributes to reading fluency, vocabulary acquisition, and syntactic awareness. According to the National Endowment for the Arts (2007), regular reading enhances academic performance by strengthening linguistic competence. Cunningham and Stanovich (2001) argue that extensive reading fosters familiarity with vocabulary, grammatical structures, and background knowledge, facilitating the processing of increasingly complex texts through a positive feedback loop.

Compared to spoken interaction, written language offers richer lexical variety (Hayes; Ahrens, 1988) and more complex syntax (Biber, 1986). Children's books, for instance, contain significantly more rare words than adult prime-time television or even the speech of college graduates, and popular magazines provide more opportunities for lexical learning than everyday conversation (Cunningham; Stanovich, 2001). These findings reinforce the idea

that reading is more effective than speech in fostering vocabulary development.

A broad vocabulary, developed through reading, allows individuals to express ideas with clarity, precision, and stylistic control across varied contexts (Hicks, 2023). Furthermore, reading contributes to critical thinking and cultural awareness by exposing readers to diverse perspectives and discourses (Stanovich; Cunningham, 1992; Acheson; Wells; MacDonald, 2008). These experiences enrich readers' mental models and enhance their ability to build intertextual and conceptual connections (Kintsch; Rawson, 2005; Snow, 2010).

Empirical studies support the relevance of reading habits for comprehension. Acheson, Wells, and MacDonald (2008) found that higher levels of print exposure were associated with better sentence processing and performance on standardized tests. Similarly, Pham (2021) reported a strong positive correlation between reading habits and comprehension in ESL learners, with time and attitude toward reading being the most influential factors. Artieda (2017) identified that L1 literacy benefited beginner English learners, while reading habits had a greater impact on intermediate learners' L2 outcomes. Chaudhary (2020), however, found no direct correlation between reading habits and L2 proficiency, suggesting the involvement of other mediating factors. Finally, Syafitri (2019) observed a moderate correlation between reading habits and ESL reading comprehension, reinforcing the value of sustained reading practice in L2 learning. Collectively, these findings suggest that while reading habits alone may not fully explain proficiency outcomes, they consistently contribute to improvements in L2 reading comprehension, particularly when combined with cognitive factors such as working memory capacity.

In light of the discussion above, we argue that it is necessary to further explore the extent to which these factors are associated and might affect reading skills, emphasizing that successful comprehension is also a dynamic interaction between the reader's cognitive abilities and their background knowledge. To address this issue empirically, this study aims to

analyze the correlation between WMC, reading habits, and L2 proficiency in L2 English. The following section, therefore, outlines the method adopted in the study reported here.

3 Method

The present study adopts a correlational design to examine the associations between working memory capacity, reading habits, self-assessed L2 proficiency, and L2 reading comprehension, considering both overall comprehension and the understanding of referential and inferential information. The sample comprised 36 Brazilian learners ($M = 25.17$; $SD = 10.48$), including 29 students from the *Letras Inglês* course at UFRGS and 7 independent language learners; 27 participants identified as female, 8 as male, and 1 preferred not to disclose gender.

Data was collected using three instruments: a *Language History and Reading Habits Questionnaire*, a *Self-Applicable Reading Span Test*, and a *Reading Comprehension Task*, which contained referential and inferential questions. The *Language History and Reading Habits Questionnaire* collected participants' background information, self-assessed L2 proficiency across the four language skills (adapted from Scholl and Finger, 2013), and data on reading habits in Brazilian Portuguese and English, including reading frequency, preferred genres, self-assessed reading comprehension, and strategies used when encountering unfamiliar vocabulary, with questions designed for this study. The questionnaire was administered in Portuguese to ensure comprehension by participants with different levels of L2 proficiency. Data on reading habits were obtained by two measures included in the questionnaire: reading frequency and reading duration. Participants indicated how often they read in L1 and L2 by selecting one of several frequency options (e.g., every day, one to two days per week), which were converted into a Likert-type numerical scale. They also reported the amount of time they typically spent reading on the days they selected. Although both measures were collected to capture

different dimensions of participants' reading habits, our analysis considered only reading frequency, as time constraints prevented the integration of frequency and duration into a single measure.

The *Self-Applicable Reading Span Test* (Oliveira; Woelfer; Tomitch, 2021) is an adapted version of the Reading Span Test (Daneman; Carpenter, 1980), designed to assess individual differences in WMC during reading. The self-applicable format of the test allows group administration with minimal researcher intervention. The computerized test presented sentences in random order and required participants to select the appropriate final word to complete each sentence and subsequently recall the final words at the end of each set. Working memory capacity was operationalized as the total number of correctly recalled words, with scores ranging from 0 to 60.

For the *Reading Comprehension Task*, participants read an English text from an electronic magazine adapted by Azevedo *et al.* (2022). No further modifications were made to the text, as the version used had already been adapted to enhance readability in terms of narrativity and syntactic simplicity. Multiple-choice comprehension questions in Brazilian Portuguese were used, five referential questions targeting information directly stated in the text, and five inferential questions requiring readers to draw conclusions beyond the referential content. The multiple-choice questions were presented in Portuguese to ensure that responses reflected reading comprehension rather than difficulties in understanding the answer options.

The topic of the text - English as a *Lingua Franca* - was selected for its familiarity and relevance for English learners. For students enrolled in the *Letras Inglês* course, the topic is directly connected to their academic training, as it is commonly addressed in discussions about language use and teaching. Although a subgroup of the participants was not enrolled in an academic English program, these individuals had prior exposure to the topic through guided discussions in private English lessons conducted before data collection. These discussions

focused on key principles of English as a *lingua Franca*, such as the acceptability of linguistic variation and the centrality of intelligibility over native-like accuracy. The choice of topic and the provision of prior exposure were intended to ensure comparable background knowledge across groups before task administration.

All the tasks were administered remotely due to exceptional contextual constraints. At the time of data collection, the state of Rio Grande do Sul was affected by severe flooding, which led to the suspension of in-person academic activities and required adaptations to the research procedures. The reading passage was made available via Google Docs, and the comprehension questions were presented using Google Forms. Access links to both tasks were provided to participants in the invitation message, and there was no time limit for the completion of the tasks.

This study is driven by the following research questions:

- (1) To what extent is working memory capacity associated with overall L2 reading comprehension as well as reading comprehension of referential and inferential information in an L2 reading passage?
- (2) Are reading habits in L1 and L2 associated with overall L2 reading comprehension as well as the reading of referential and inferential information in an L2 reading passage?
- (3) Is self-assessed L2 proficiency associated with overall L2 reading comprehension as well as reading comprehension of referential and inferential information in an L2 reading passage?

Based on previous empirical studies examining the role of working memory capacity, reading habits, and L2 proficiency in reading comprehension (e.g., Daneman; Carpenter, 1980; Harrington; Sawyer, 1992; Roscioli; Tomitch, 2022; Azevedo *et al.*, 2022; Acheson; Wells; MacDonald, 2008; Pham, 2021; Artieda, 2017), the following hypotheses were formulated:

(1) Working memory capacity (WMC) is positively correlated with overall L2 reading comprehension, as well as with the comprehension of referential and inferential information;

(2) Reading habits in both L1 and L2 positively correlates with overall L2 reading comprehension and with the L2 comprehension of referential and inferential information;

(3) Self-assessed L2 proficiency shows positive correlation with overall L2 reading comprehension, as well as with the comprehension of both referential and inferential information.

4 Data analysis and discussion

This section presents the findings of the study, organized according to its three guiding hypotheses. A general overview of the participants' profiles is provided first, followed by the main results.

Twenty-nine participants reported preferring reading in Brazilian Portuguese, four preferred English, and three had no preference. Among the sample, 22 participants stated they were learning another language, with Spanish being the most frequently reported (13 participants). The descriptive data for these participants are provided in Table 1.

Table 1 – Characterization of participants regarding demographic data, working memory, reading habits, reading comprehension, and English proficiency, Brazil, 2024

Category	Variable	Maximum score	Mean (SD)
Demographics	N	-	36
	Age of Initial Exposure to English	-	11.25 (4.38)
	Age at Which Became Fluent in English	-	17.34 (12.62)
Working Memory	Score of Working Memory Capacity	60.0	31.08 (13.37)
Reading Habits	Portuguese	5.0	3.83 (0.60)
	English	5.0	3.00 (1.35)
Reading Comprehension	Referential Information	5.0	4.22 (1.15)
	Inferential Information	5.0	4.72 (0.51)
	Total Score	10.0	8.94 (1.55)
English Proficiency	Reading	5.0	4.19 (1.09)
	Writing	5.0	3.53 (1.23)
	Speaking	5.0	3.30 (1.30)
	Listening	5.0	3.97 (1.23)
	Mean	5.0	3.75 (1.08)

Note: N = Sample size. SD = Standard Deviation.

Source: Authors (2026), based on data collected in 2024.

To test the hypotheses, Spearman's rank correlation tests were applied using R to address each

specific objective and its respective hypothesis. For all

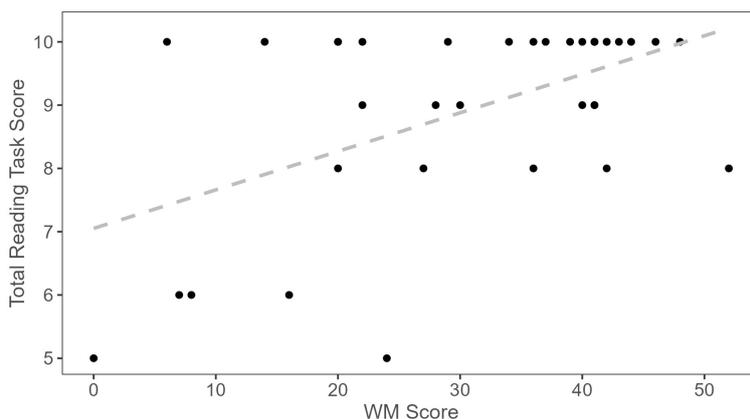
statistical tests, a significance level of $\alpha=0.05$ was used, and all tests were one-tailed.

4.1 Working memory capacity and reading comprehension

The first hypothesis predicted a positive correlation between WMC and overall L2 reading

comprehension, as well as between WMC and both referential and inferential information. Spearman's correlation confirmed this association for overall comprehension ($r(36) = 0.360, p = 0.0016$, one-tailed), supporting the hypothesis. These results are visually represented in Figure 1, in which it is possible to observe a positive increasing monotonic relationship between the variables.

Figure 1 – Correlation between overall L2 reading comprehension and WMC scores

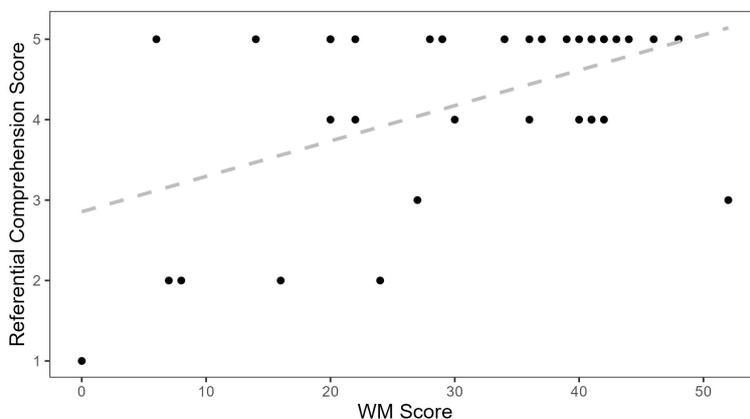


Source: Authors (2026).

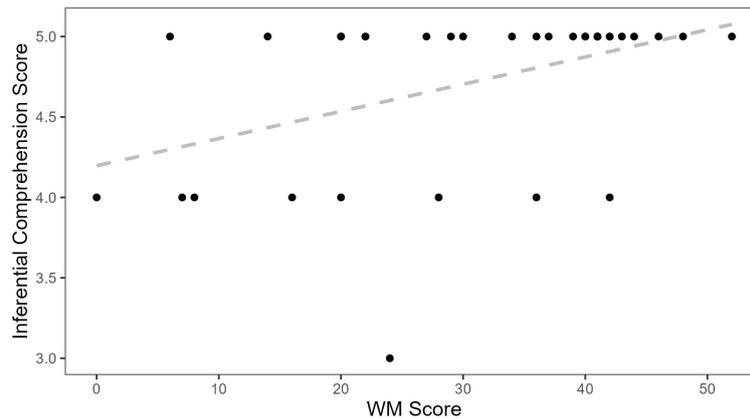
Further analysis showed that WMC correlated positively with performance on both referential ($r(36) = 0.339, p = 0.022$, one-tailed) and inferential ($r(36) = 0.429, p = 0.004$, one-tailed) comprehension questions. These findings align with previous studies that emphasize WMC's role in supporting syntactic

parsing, reference resolution, and inference generation (Daneman; Carpenter, 1980; Harrington; Sawyer, 1992; Roscioli; Tomitch, 2022). The tests are visually represented in Figures 2 and 3, in which it is possible to notice a positive increasing relationship between the variables.

Figure 2 – Correlation between reading comprehension of referential information and WMC score



Source: Authors (2026).

Figure 3 – Correlation between reading comprehension of inferential information and WMC score

Source: Authors (2026).

The stronger correlation with inferential comprehension suggests that WMC is particularly important for inferencing, a process essential for building mental models and achieving deeper understanding (Kintsch; Rawson, 2005; Snow, 2010). Since the reading text addressed English as a Lingua Franca, a topic familiar to many participants, prior knowledge may have facilitated the use of Long-term Working Memory resources (Kintsch; Patel; Ericsson, 1999).

These findings also relate to Azevedo *et al.*'s (2022) study, in which WMC influenced inferential, but not referential, comprehension under multitasking conditions. Unlike that design, our task involved only reading, which may have enabled more efficient allocation of cognitive resources to both comprehension types.

4.2 Reading habits and reading comprehension

The second hypothesis predicted a positive correlation between reading habits, both in L1 and L2, and overall L2 reading comprehension, as well as L2 comprehension of referential and inferential information. However, no significant associations were found for any combination of variables: (a) overall L2 reading comprehension and L2 reading habits ($p = 0.685$, one-tailed), (b) overall L2 reading

comprehension and L1 reading habits ($p = 0.633$, one-tailed), (c) referential comprehension and L2 reading habits ($p = 0.623$, one-tailed), (d) referential comprehension and L1 reading habits ($p = 0.575$, one-tailed), (e) inferential comprehension and L1 reading habits ($p = 0.844$, one-tailed), and (f) inferential comprehension and L2 reading habits ($p = 0.884$, one-tailed).

These results differ from prior studies (Pham, 2021; Syafitri, 2019), which identified reading frequency and duration as predictors of comprehension. One explanation may be the self-report nature of the questionnaire, which is prone to social desirability bias. Participants, especially *Letras Inglês* students, may have overstated their reading habits to match perceived expectations (Cunningham; Stanovich, 2001).

Alternative methods, such as updated versions of the Author and Magazine Recognition Tests¹ (Stanovich; West, 1989), were considered but discarded due to the likelihood that students would recognize authors and publications discussed in class without actively engaging with them. Thus, data from such tools might have also been biased.

These limitations suggest that while reading habits contribute to vocabulary growth and syntactic awareness, their impact on comprehension may

¹ The *Author Recognition Test* and the *Magazine Recognition Test* are instruments developed by Stanovich and West (1989) to assess print exposure. They consist of lists mixing real and fictitious names of authors or magazines, and participants are asked to indicate which ones they recognize, while avoiding random guessing.

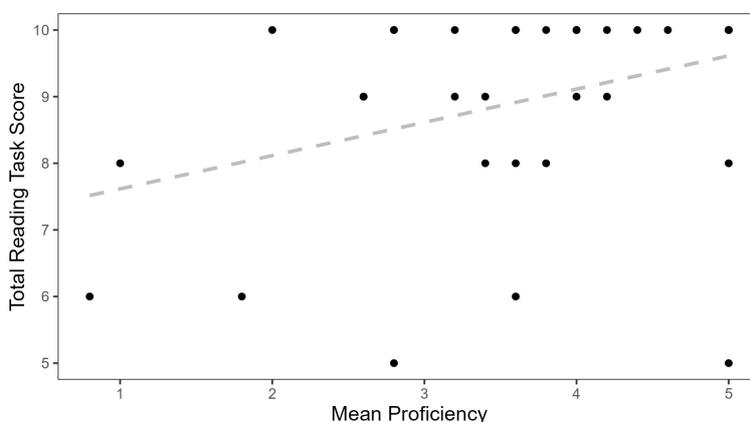
depend on factors not captured here, such as genre preferences, reading strategies, and engagement.

4.3 Self-assessed L2 proficiency and reading comprehension

The third hypothesis proposed a significant positive correlation between self-assessed L2 proficiency and overall L2 reading comprehension, as

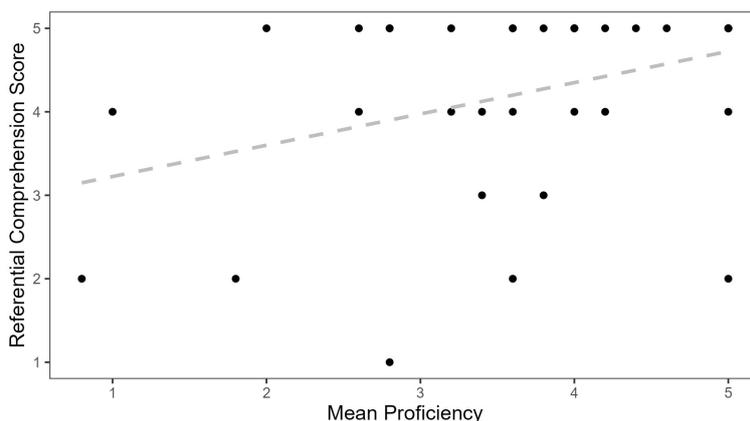
well as both the comprehension of referential and inferential information in L2. The results confirmed this. A significant correlation was observed with overall L2 reading comprehension ($r(36) = 0.378, p = 0.012$, one-tailed), as shown in Figure 4, with the comprehension of referential information ($r(36) = 0.348, p = 0.019$, one-tailed), as shown in Figure 5, and with the comprehension of inferential information ($r(36) = 0.286, p = 0.046$, one-tailed), as shown in Figure 6.

Figure 4 – Correlation between overall L2 reading comprehension and L2 proficiency



Source: Authors (2026).

Figure 5 – Correlation between reading comprehension of referential information and L2 proficiency



Source: Authors (2026).

comprehension, suggesting that inferencing skills might play a more significant role in understanding inferential content. While reading habits were hypothesized to influence L2 reading comprehension, no significant correlation was found, potentially due to social desirability bias or limitations in self-report measures. These findings emphasize the complexity of reading comprehension, highlighting how cognitive abilities, language proficiency, and other background factors shape the process.

However, several limitations should be considered when interpreting these results. The floods that affected the state where the university is located, combined with the transition to online data collection, made participant recruitment more difficult. As a result, most students were reached only through email and WhatsApp, which may have reduced their engagement. Furthermore, due to time constraints, the study relied solely on participants' self-reported reading frequency, without integrating it with the reported amount of time spent reading. As this data selection limited the precision of the analysis of participants' reading habits, future research should explore both variables in greater detail and consider alternative methods to assess reading habits more accurately. An additional limitation was the lack of time-on-task measures, also as a result of the transition to online data collection. Since we could not control for these variations, factors such as reading strategies might have influenced reading scores. These results should be replicated with this variable in future studies. Pedagogically, the findings underscore the need for a holistic approach to reading instruction that addresses both linguistic and cognitive factors, fostering skills that go beyond language proficiency to enhance reading comprehension.

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