The Reading Matrix: An International Online Journal
Volume 21, Number 1, April 2021

The Effects of Working Memory Capacity on Reading Comprehension and Strategy Use with Chinese EFL University Students

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ABSTRACT

The present study explored the association between working memory capacity (WMC) and second language reading performance as measured with three types of comprehension tasks: free written recall, sentence completion, and multiple-choice. It also examined the contribution of WMC to the frequency and variety of strategy use, as well as the differences in strategy use by readers of different WMC. Ten Chinese EFL undergraduates from a large public medical university individually read two medical texts following think-aloud procedures and completed three comprehension tasks, a semi-structured interview, and the automated Operation Span Task (OST) (Unsworth et al., 2005). The correlation analyses showed that the contribution of WMC to reading comprehension varied depending on the type of comprehension measures used and that readers with a larger WMC employed a greater variety of reading strategies than those with a smaller WMC. In addition, correlation analyses and independent sample t-tests revealed that, compared to readers with a smaller WMC who favored decoding strategies, readers with a larger WMC tended to use more top-down strategies that facilitated the global comprehension of the text. Implications and suggestions for future research are also provided.

INTRODUCTION

Across learning contexts, as a limited-capacity system utilizing resources associated with attention and awareness, working memory (WM) is responsible for simultaneously manipulating and storing information that is necessary for carrying out numerous complex activities and tasks (Baddeley, 2003; Just & Carpenter, 1992), such as reasoning (Kane et al., 2004), planning, abstraction, mental arithmetic (Linck et al., 2014), and first language (L1) processing (Baddeley, 2000a; Olive et al., 2008). Working memory capacity (WMC) refers to an individual's ability to control attention, which is limited and shared by all processes involved in completing a task (Engle, 2002).

More than 30 years of research in L1 reading since Daneman and Carpenter's (1980) seminal work on WM and reading has demonstrated that WM is an important predictor of reading performance (e.g., Daneman & Merikle, 1996). These findings have paved the way for

second language (L2) research on the relationship between WM and reading performance. There is little argument that WMC contributes to individual differences in L2 reading comprehension outcomes (Baddeley, 2007; Oh, 2011; Shin et al., 2019). Readers' comprehension outcomes are operationalized with their performance on comprehension tasks such as multiple-choice, summary test, cloze test, etc. Each type of assessment tasks only measures some aspects of the reader's comprehension (Alderson, 2000). Therefore, the effect of WMC on L2 reading comprehension is hypothesized to differ when different types of comprehension tasks are used. To test this hypothesis the current study examined the association between WMC and the reader's performance on three types of reading measures. Few studies have included at least two or more types of comprehension tasks in a single study. The results of the study will provide important implications for research practice in terms of reading measures when examining the association between WMC and L2 reading comprehension.

In addition, the relationship between WMC and different variables associated with L2 reading comprehension have been explored, including the distinction of explicit/implicit knowledge (Ercetin & Alptekin, 2013), look up behavior (Chun & Payne, 2004), text modality or the mode of text presentation (Fontanini & Tomitch, 2009), prior knowledge (Joh & Plakans, 2017), effects of task complexity (Jung, 2018), topic familiarity (Lessor, 2007), inserted adjuncts (Medina et al., 2017), and domain experience (Payne et al., 2009). What current research lacks is the interaction between WMC and strategy use, which is surprising considering the inherent role of strategies in both reading processes and products (Bernhardt, 2011; He, 2008; Zhang & Wu, 2009). The present study fills a gap in the literature by exploring how WMC is associated with both reader's strategy use in terms of frequency and variety as well as the utilization of the specific reading strategies.

LITERATURE REVIEW

Strategy Use and L2 Reading

L2 reading is a highly sophisticated meaning-constructing process during which the reader works a multitude of strategies with various available sources (e.g., L2 linguistic knowledge, textual knowledge, attitudes toward the world, strategic knowledge) to achieve different levels of comprehension (Bernhardt, 2011; He, 2008; Zhang & Wu, 2009). Performance in L2 language use depends in part on strategies (Cohen, 2014), including reading. The critical role of reading strategies was also stressed by Bernhardt (2011) in her compensatory reading model. The model predicted that 50% of L2 reading scores were explained by L2 language knowledge (e.g., grammar and vocabulary) and L1 literacy (e.g., beliefs about word and sentence configuration). For the remaining 50% of the unexplained variance, Bernhardt argued that it may be partly accounted for by reading comprehension strategies.

Acknowledging the vital role of strategy use in L2 reading, researchers have studied this association extensively while considering a number of moderating variables such as language proficiency (e.g., Carrell, 1989; Endley, 2016), linguistic distance (e.g., Bang & Zhao, 2007; Block, 1986), reading outcomes (e.g., Anderson, 1991; Han, 2017), reading in L1 versus L2 (e.g., Alsheikh & Mokhtari, 2011; Yang, 2006), L1 literacy (e.g., Kong, 2006; Tsai et al., 2010), and background knowledge (e.g., Kong, 2006; Pritchard, 1990). The greater part of the literature on strategy use in L2 reading paid particular attention to comparing how readers of different language proficiency levels use reading strategies in terms of the variety and frequency of strategy usage as well as the specific strategies preferred.

Research that focuses on the variety and frequency of strategy usage has produced mixed results. For example, Zhang and Wu (2009) found that participants were similar in the overall types of strategy usage regardless of proficiency levels. Echoing Zhang and Wu's (2009) conclusion, Yayli (2010) and Zhou and Zhao (2014) concluded that participants of different proficiency levels were similar in the variety but different in the frequency of reading strategies employed. In direct contradiction to these findings, Ghavamnia, Ketabi and Tavakoli (2013) and Lin and Yu (2015) contended that readers of different language proficiency levels were similar in the variety of strategy usage but different in the frequency with which strategies were used.

These contradictory findings suggest that language proficiency is not the determinant of readers' variety and frequency of strategy use in L2 reading. Other variables such as readability of the texts, strategy knowledge, topic familiarity, and WMC may also explain how individual readers employ strategies in terms of variety and frequency. To gain a comprehensive understanding of this matter, researchers should account for these variables in this line of research. This paper specifically looks at WMC.

With regard to the specific strategies that different L2 readers preferred, there is a widespread consensus that more successful readers tend to use more top-down strategies (e.g., questioning content, identifying main ideas) that facilitate the global comprehension of the text; by comparison, less successful readers favor bottom-up strategies (e.g., translation, underling) that target word and sentence level decoding (Alkhaleefah, 2017; Block, 1992; Brantmeier, 2002; Endley, 2016; Ghavamnia et al., 2013; Lin & Yu, 2013; Wang, 2016). In addition to L2 proficiency, reader's individual differences in cognitive resources may be an explanation for this pattern of strategy use among L2 readers. Less successful readers lack more L2 linguistic knowledge and therefore devote most of their cognitive resources to process the linguistic information of the L2 text, which necessitates decoding or bottom-up strategies. As a result, insufficient resources are left for the reader to employ top-down strategies to integrate information and construct meaning from the text (Grabe & Stoller, 2011; Han, 2017; Lin & Yu, 2013).

Note that, it should not be inferred that top-down strategies are "better" or more effective than bottom-up strategies. In fact, strategies should not be labeled as good or bad (Anderson, 1991; Yang, 2006). Instead, the effectiveness of one strategy is determined by the extent to which an individual reader knows when and how to choose and work with a combination of different strategies (including both top-down and bottom-up strategies) to resolve certain reading problems and address desired reading goals (Akyel & Erçetin, 2009; Anderson, 1991; Cohen, 2014; Grabe & Stoller, 2011). The ability to manipulate reading strategies in an orchestrated and effective way is associated with readers' WMC. Arguably, readers' WMC moderates their employment of specific strategies in L2 reading processes. Hence, WMC should be considered when investigating the relationship between strategy usage and L2 reading.

WM Measures

Researchers operationalize the concept of WM through WMC, which is determined by both storage and processing components (Juffs & Harrington, 2011). In research, WMC is measured with both simple span tasks and complex span tasks (Wen, 2016). In simple span tasks, participants are given a list of to-be-remembered (TBR) items including letters, digits, words, or shapes. They are then asked to recall the list in the correct serial order immediately after being

presented with the last item. To name a few, simple span tasks include the digit span task, the letter span task, and the word span task.

By comparison, complex span tasks require participants to engage in some processing activity (e.g., reading sentences, solving arithmetic problems), which is interleaved between presentation of the individual TBR items. Then, as in simple span tasks, participants must recall the list of TBR items in the correct serial order. Some commonly used complex span tasks include the operation span task (OST), the reading span task (RST), the speaking span task, and the symmetry span task. Compared with simple span tests which typically measure WM's storage capacity, complex span tests, which were designed to measure both storage and processing capacity of WM, have demonstrated stronger correlations with higher order cognition (Conway et al., 2002; Unsworth & Engle, 2007; Daneman & Merikle, 1996).

In L2 research, both simple and complex span tasks have been found to significantly predict L2 processing and proficiency outcome measures (Linck et al., 2014). Nonetheless, evidence has shown that complex span tests tend to serve as better predictors of L2 reading skills (e.g., Harrington & Sawyer, 1992). The current investigation employed the automated OST developed by Unsworth and colleagues (2005), which has proven to be valid and reliable (Conway et al., 2005; Redick et al., 2012). Additionally, unlike RST, OST does not involve testing the participants' reading ability and is not influenced by language proficiency (Service et al., 2002; Han, 2017).

WM and L2 Reading Comprehension Tasks

L2 reading is a dynamic, recursive, and multifaceted meaning-making process made more complex by the involvement of numerous factors related to texts (e.g., readability, text types) and reader's individual experiences (e.g., topic familiarity, social and cultural assumptions) (Grabe & Stoller, 2011; Koda, 2005; Tsai et al., 2010). These factors interact with one another in both the course of lower-level linguistic processes (e.g., lexical access) and higher-level comprehension processes (e.g., a text model of comprehension) for L2 readers to reach comprehension of different levels (e.g., sentence level comprehension, a situation model of reader interpretation) (Grabe & Stoller, 2011). Reading comprehension outcomes are therefore displayed differently when distinct comprehension measures are utilized because different tasks "almost certainly measure different aspects of the reading process or product" (Alderson, 2000, p. 270). As a result, the relationship between WMC and L2 reading comprehension is elusive.

To illustrate, in an early study with 34 university-level L2 learners, Harrington & Sawyer (1992) compared the relationship between WMC and reading skills assessed with both the grammar and reading section of the TOEFL in the format of multiple-choice questions and a cloze test. Reader's WMC (measured with the RST) was found to correlate significantly with the multiple-choice questions but not with the cloze test. Echoing Harrington & Sawyer's (1992) results, with 167 university-level Chinese EFL learners reading two texts from a reading test battery for English as a second language (ESL) learners, Shen & Park (2018) revealed WMC (assessed with the RST) as a significant predictor of foreign language (FL) reading comprehension when multiple-choice questions were utilized.

Contradicting Harrington & Sawyer's (1992) and Shen & Park's (2018) findings, with 52 Korean EFL university students reading two texts selected from past TOEFL iBT tests, Jung (2018) examined the effects of WMC on FL reading comprehension in two conditions depending

on the complexity of the reading measures. The "simple" condition required participants to answer 14 multiple-choice questions following each text; the "complex" condition asked participants to arrange five segments of mixed order into a correct order to make a coherent text in addition to the 14 multiple-choice questions. WMC (measured with nonword repetition test) was found to make significant contribution to L2 reading performance only in the complex condition.

Using a different type of comprehension measure, Abu-Rabia (2003) asked 47 high school ESL students four comprehension questions which assessed their ability to name the referent of a pronoun, recall two facts from the text, and provide a title for the text after reading each of the two short stories. Abu-Rabia found that those with a larger WMC (measured with the RST) performed significantly better in answering these comprehension questions.

Purportedly, WM's contribution to L2 reading comprehension varies when different measures are considered. However, no study has directly examined it. This investigation includes three types of comprehension measures: free recall (FR), sentence completion (SC), and multiple-choice (MC), in a single study. The findings will shed new light on the relationship between WMC and L2 reading comprehension when different types of reading measures are used.

To assess L2 reading comprehension, in addition to the techniques employed in the aforementioned studies, other measures used in research include free recall, matching activity, open-ended question, sentence completion, summary, and true/false (Alderson, 2000; Brantmeier, 2005, 2006; Grabe, 2009). FR requires readers to write down everything they can remember from the text without looking back at the passage. FR is argued to be "a purer measure of comprehension" because there are no retrieval cues to intervene between the reader and the text (Alderson, 2000, p. 230). Pausal units are commonly used to score FR (e.g., Liu & Brantmeier, 2019). A pausal unit is a unit that has a "pause on each end of it during normally paced oral reading" (Bernhardt, 1991, p. 208). FR is a relatively subjective evaluation of the reader's comprehension. MC asks readers to choose their answer to a question from four predetermined options. As there is no ambiguity in the scoring of the right/wrong answers, multiple-choice is an objective method (Brantmeier, 2006; Koda, 2005). SC is a semi-objective alternative to MC. SC asks participants to complete sentences according to the cues embedded in the sentence frames, and all possible answers are foreseeable (Alderson 2000; Brantmeier, 2005, 2006).

The present study chose these three comprehension measures because different measures tend to assess different aspects of the reading process and product, and a variety of assessment tasks are necessary for L2 reading research (Anderson, 2000; Brantmeier, 2005; Bernhardt, 1991); In addition, Alderson (2000) recommended that "objective methods can usefully be supplemented by more subjectively evaluated techniques" (p. 206). The combination of FR, SC, and MC represents a well-balanced package of subjective, semi-objective, and objective methods.

WM and Strategy Usage

Grabe and Stoller (2011) described in detail how both L1 and L2 readers' lower-level linguistic processes (lexical access, syntactic parsing, and semantic proposition formation) and

higher-level comprehension processes (a text model of comprehension, a situation model of reader interpretation, and executive control processes) take place in WM. WM controls attentional resources to achieve local and global understanding of a text through an iterative integration process in which WM holds information retrieved from long-term memory and updated via decoding preceding texts in an active mode for a short period of time so as for readers to paste together ideas mentally (Abu-Rabia, 2003; Ercetin & Alptekin, 2013; Shin et al., 2019).

Some of WM's specific duties in L2 reading include focusing attention selectively, prioritizing task operations accordingly, setting goals for reading, monitoring comprehension, repairing comprehension problems (Grabe & Stoller, 2011). How does WM get all the work done? Indispensably, commanded by WM and "fueled" by WMC (Grabe, 2009), reading strategies plan, repair, evaluate, and monitor comprehension processes (Grabe & Stoller, 2011; McNeil, 2012; Mokhtari & Reichard, 2004). Despite the fact that WM and strategy usage are closely related to each other in L2 reading processes, little research has explored the relationships between these factors.

To date, Han (2017) is one of the very few studies that have investigated how WMC is related to the use of reading strategies in the FL reading. In the study, Han examined whether readers were able to compensate for inefficient word recognition and WM limitation by using metacognitive reading strategies in non-time constrained reading conditions. She asked 30 Chinese college EFL learners to read one expository text following think-aloud protocols and to complete 10 multiple-choice questions. The reading strategies were classified into language-oriented strategies, content-oriented strategies, re-reading, pausing, and meta-comment. Using automated OST, Han found that readers with a smaller WMC tended to use language-oriented strategies and paused more frequently. This work has informed us about the role of WMC in the reader's employment of specific strategies. Nevertheless, for the purpose of this paper, Han did not produce any findings on the relationship between WMC and the reader's utilization of strategies in terms of variety and frequency. Acknowledging the paucity in this line of research, the present study explored the relationship between WMC and strategy usage in L2 reading comprehension with university-level Chinese EFL learners while reading two domain-specific texts.

THE PRESENT STUDY

Research Questions

(1) With native Chinese EFL university learners, is WMC associated with reading comprehension, as measured with three tasks: FR, SC, and MC?

(2) Is there a relationship between WMC and the variety and frequency of reading strategy usage when assessed with verbal reports?

(3) What strategies do readers of different WMC use?

Participants

Due to the qualitative nature of verbal reports (think-aloud protocols and stimulated recall), studies employing this measure tend to consist of a relatively small sample. For instance, Yang (2006) had 20 intermediate Chinese college EFL readers:10 proficient and 10 less-

proficient readers; Endley (2016) had 12 participants from an English-speaking university in the Gulf region: five in high proficiency reading group and seven in low proficiency reading group; and Alkhaleefah (2017) had four Saudi EFL male students, two good readers and two poor readers.

Similar to this common practice,10 participants (two males and eight females, between 19 and 21 years old) were recruited from a large public university in Northeast China. Criteria for selecting the participants were as follows: 1) completed the College English Test (CET), which is a national standardized test in China used to assess the English language proficiency of college students whose major is not English, 2) enrolled in a medicine-related major, 3) undergraduate, and 4) native Chinese speaker. In order to enhance the variance among samples, 30 participants were first recruited and ranked based on their scores on the CET test. Then, five more proficient and five less proficient participants from the two ends were selected for the current study. Each participant received 150 yuan (Chinese currency) for participating in the study.

Materials

Demographic Questionnaire

The questionnaire asked participants about their background information such as gender, age, and their scores on the CET test (see Appendix A).

Reading Texts

Strong evidence has illustrated that readers' processing behaviors change when their knowledge about the topic of a text changes (Akyel & Erçetin, 2009; Pritchard, 1990). Brantmeier and Yu (2014) advocated for the potential benefits of using domain-specific texts in L2 reading research. Therefore, to help medical students read discipline related texts, the present study used two medicine-related texts in English. Both texts of approximately 450 words were excerpts from two journal articles. One was about Chinese traditional theories of drug interactions and the other was about the control of cardiovascular disease in the 20th Century (see Appendix B). Both texts had a readability of 17, appropriate for college and graduate students, based on the Flesch Reading Ease Calculator.

Reading Comprehension Tasks

One FR, five SC items, and five MC questions were used to assess comprehension after reading each text (see Appendix B). The FR asked participants to recall in Chinese as much as possible about the texts including both details and main ideas. The SC and MC were designed in a way that readers were not able to determine the correct responses by looking at the other questions on the page (Brantmeier, 2006). Both SC and MC were constructed to assess readers' comprehension of the text as a whole as well as the details (Brantmeier & Dragiyski, 2009), and the construction of the SC and MC items were validated by three specialists.

Reading Strategies Measure

Think-aloud protocols (TAP) and stimulated recall in the format of semi-structured interviews were employed to assess strategy use. TAP asked readers to verbalize those self-generated thoughts while performing the task (Ericsson & Simon, 1993). Semi-structured interviews took place after readers had finished reading a text for the purpose of obtaining more in-depth data

concerning the reading process (Gass & Mackey, 2013; Zhang & Seepho, 2013). Both TAP and semi-structured interviews have been validated and proved to be reliable measures (Brantmeier, 2002; Cowan, 2014; Ericsson & Simon, 1993; Gass & Mackey, 2013), and have been widely used in L2 reading research (e.g., He, 2008; Lin & Yu, 2015; Wang, 2016).

WMC Measure

Automated OST, developed by Unsworth and colleagues (2005), is completely computerized, mouse-driven, and automatedly scored. The Cronbach's alpha was .78 (Unsworth et al., 2005). The test can be downloaded for free online. In order to ensure that participants were not memorizing letters at the expense of solving math problems, 85% of accuracy criterion on the math operation was required (Medina et al., 2017). All participants in the study were within the threshold and therefore included in the analyses. The total number of letters recalled in the correct serial position, irrespective of whether or not all the items in the trial were perfectly recalled, were used as the index of WMC (Jung, 2018; Medina et al., 2017).

Procedure

On Day One, 30 potential participants completed the automated OST and a demographic questionnaire. Based on the CET scores, 10 participants were selected and scheduled to meet with the researcher individually for two more meetings. On Day Two, the researcher explained TAP and provided participants with a short passage to practice the TAP procedures until they were ready to proceed with Text One. The TAP procedures were video recorded. The researcher was sitting in the back of the room and did not intervene with the reading process except for reminding the participants to "keep talking" when they stopped talking for approximately 15 seconds. After finished reading the text, the participant signaled the researcher to stop the recording and then continued to complete the rest of the tasks: three reading comprehension tasks following each passage. Meanwhile, the researcher played the recording of participants' TAP procedures and took notes on the reading behaviors which needed clarification. Immediately after the participants completed all the aforementioned tasks, a semi-structured interview was conducted in Chinese. Participants were asked to clarify some reading behaviors while playing back the recording as well as answer a few general questions about their experience of reading the text. To give an example, one of the general questions was *From 1 to 10, how would you rate the difficulty of the text? 1 means "very easy" and 10 means "I don't understand it at all"*. The semi-structured interviews were also video recorded. On Day Three, the exact same processes repeated for Text Two.

Data Coding

The video recordings of the TAP procedures and the semi-structured interviews captured not only what participants verbalized but also their reading behaviors that were not verbalized (e.g., underling or using a dictionary). The video content was transcribed verbatim by the researcher.

In L2 reading research, reading strategies have been classified in a number of different ways. For example, O'Malley and Chamot (1990) grouped reading strategies into cognitive, metacognitive, and social/affective strategies, while Mokhtari and Reichard's (2002) Metacognitive Awareness of Reading Strategies Inventory (MARSI) categorized reading strategies as global reading strategies, problem-solving strategies, and support reading strategies. Additionally, some studies adapted a binary division of reading strategies as top-down and bottom-up strategies (e.g., Horibe, 1995; Huang et al., 2009). For the purpose of coding and categorizing

the reading strategies, the Survey of Reading Strategies (SORS) (Mokhtari & Sheorey, 2002) with minor modifications was used as the coding scheme (Bakhshalinezhad, Nikou, & Bonyadi, 2015; Block, 1986; Hosenfeld, 1977; Mokhtari & Reichard, 2002; Tsai, Ernst, &Talley, 2010). The final survey included 33 items and classified strategies into three groups: support strategies, problem-solving strategies, and global strategies. Considering some strategies are almost impossible to be counted for the exact number of usage (e.g., Sup9: When reading, I think about information in both English and my mother tongue.), reading strategies were further grouped into Yes/No strategies (19 out of 33) and Countable strategies (14 out of 33) (see Appendix C). For the former, the code "1" was assigned if a strategy was used by a participant, and the code "0" was assigned if the strategy was not used; for the latter, the exact number of strategy usage was counted. In addition to the researcher, a second scorer who has been teaching reading strategies to university-level Chinese EFL learners for decades coded half of the data. The interrater reliability, calculated with MAXQDA 2020, was 95.49% and 97.48% for Text One and Text two, respectively.

Free recall was scored based on the pausal unit protocol described in Bernhardt (2011). Two native English speakers read the texts and marked all the pausal units with an initial 100% and 96% overlap for the first and second text, respectively. The disagreements were settled with a third reader. The final agreement was that Text One had 47 and Text Two had 54 pausal units. Each unit was worth one point. For SC, all possible answers were determined by a native speaker of English and two experienced EFL teachers. Similarly, the answers for MC were pre-determined without ambiguity. Participants received one point for each correct answer for both tasks.

RESULTS AND DISCUSSION

A Pearson correlation was performed to examine how WMC was related to participants' English language proficiency as indexed with the CET score. As shown in Table 1, a low correlation of .24 was produced. This suggests that WMC and language proficiency were not likely measuring the same construct as related to strategy use. Hence, participants' pattern of strategy usage based on WMC observed in the data was not due to the influence of language proficiency.

Table 1

Correlation Between Participants' WMC and CET Score

		CET Score
WMC	Pearson Correlation	.242
	Sig. (2-tailed)	.501
	N	10

Note that given the small sample size in the study, the correlations are not meant to be generalized to the overall population. Rather, they are to be used as initial findings that demonstrate the importance of the research question and suggest further investigation with a larger sample. Unlike null-hypothesis significance testing, effect sizes are not dependent upon sample size (Ferguson, 2009). As a measure of effect size, Pearson's r is an index of the strength of association between two continuous variables. Pearson's r of .2, .5, and .8 are considered as small, medium, and large effect sizes, respectively, in the contexts of social and behavioral research (Ferguson,

2009; Lipsey, et al., 2012). Thus, this convention was used to interpret the correlational results in the current study.

(1) With native Chinese EFL university learners, is WMC associated with reading comprehension, as measured with three tasks: FR, SC, and MC?

A Pearson correlation analysis was conducted and the results presented in Table 2 show medium-high effect sizes for FR (r = .602) and SC (r = .695), indicating readers with a larger WMC scored notably higher on those two tasks than those with a smaller WMC. Turning to MC, no meaningful correlation was found suggesting readers' WMC did not associate with their performance on MC.

Table 2

Correlations Between WMC and Three Reading Comprehension Measures

		FR	SC	MC
WMC	Pearson Correlation	**.602**	**.695**	.124

Note. Pearson correlation was performed.
Effect sizes 8 > (|r|) > .5 represent "medium-high" effect sizes and are bolded in the table.

The substantial contribution of WMC to SC is in agreement with that obtained by Abu-Rabia (2003). Although Abu-Rabia (2003) used four comprehension questions as the reading measure, they were essentially SC in the format of an interrogative sentence rather than a declarative sentence with a blank. These results suggest that the effect of WMC on reading comprehension was readily manifested by SC tasks.

As for FR, our finding is somewhat in contradiction with the correlation of .018 that Chun and Payne (2004) found between WMC and text recall. A possible explanation is that compared with the linear texts used in this study, Chun & Payne (2004) asked participants to read the text using a multimedia reading program CyberBuch. The latter was argued to consume more attentional resources (i.e., WMC). Due to the limited WMC shared by all reading processes, less WMC was left for processing texts, which led comprehension to suffer. Consequently, the variance in reading performance among readers of different WMC was diminished (Fontanini & Tomitch, 2009). The moderating effects of text factors need to be further examined in the future research on the association between WMC and reader's performance on different comprehension measures.

Moreover, our results echo Jung's (2018) conclusion that WMC did not contribute to the variance in the reader's performance on MC conclusion. This finding, however, differed from Harrington & Sawyer's (1992) and Shen & Park's (2018) conclusion that WMC was a significant predictor of L2 reading comprehension when measured with MC. The difference in WM measures may in part explain the opposite findings. Both Jung (2018) and this study utilized automated OST; by comparison, both Harrington & Sawyer (1992) and Shen & Park (2018) employed RST. The OST has been evidenced to effectively assess the WMC constructs in a non-native-English speaker population (Sanchez et al., 2010). Similarly, RST has been shown to correlate strongly with measures of L1 reading comprehension (Harrington & Sawyer, 1992); yet, in the L2 context, it is less than certain whether the correlation is resulting from shared

verbal ability between comprehension measures and the RST or purely due to the updating and maintenance components of the WMC task (Koda, 2005; Payne et al., 2009). To help address this issue, Sanchez and colleagues (2010) compared OST and RST for measuring WM construct with both native and non-native English speakers in reference to Raven's Advanced Progressive Matrices (RAPM), a measure of fluid intelligence (Raven et al., 1998, cited in Sanchez et al., 2010). RST and OST were found to tap the same construct of WMC for native English speakers but not for bilingual speakers. Sanchez and colleagues thus argued that OPT remained an accurate assessment of the WM construct for non-native English speakers, whereas RST did not seem to be a good measure of this construct. Purportedly, WM measures moderate the relationship between WMC and reading comprehension.

(2) Is there a relationship between WMC and the variety and frequency of reading strategy usage when assessed with verbal reports?

The frequency of strategy use is the sum of the strategy used for a participant, and the variety of strategy usage is the sum of unique strategies. To determine whether the frequency and variety of strategy usage are associated with WMC, a Pearson correlation analysis was carried out. The results, presented in Table 3, reveal a "low-medium" effect size (r = .436) between WMC and the variety of strategy usage, suggesting readers with a larger WMC tended to use a greater variety of strategies.

Table 3

Correlations Between WMC and the Frequency and the Variety of Strategy Usage

		Frequency	Variety
WMC	Pearson Correlation	-.053	**.436**

Note. Pearson correlation was performed.
Effect sizes .5 > (|r|) > .3 represent meaningful "low-medium" effects and are listed in the table.

Our study is among the first to examine the role of WMC in reader's variety and frequency of strategy use when reading L2 texts. The finding is not unanticipated. Reading strategies refer to behaviors, actions, and thoughts the readers engage in to solve reading problems and achieve certain reading goals (He, 2008). Strategy use is characterized with "intention" and therefore requires cognitive resources (Akyel & Erçetin, 2009; Grabe & Stoller, 2011). As different strategies target different comprehension goals (e.g., word recognition, identifying main ideas), a range of strategies are likely necessary for constructing a situation model of reader interpretation. Machines on the production lines need electricity to function; analogically, the carryout of reading strategies is "fueled" by WMC. It is therefore natural for readers with a larger WMC to "power up" a greater variety of strategy usage necessary than those with a smaller WMC in the course of achieving different comprehension goals and the ultimate comprehension.

In addition, when reviewing the literature on the variety and frequency of strategy usage in L2 reading, it appears that much research has taken as its focus language proficiency as the predicting factor and produced contradictory findings. There is no debate over the vital rule of language proficiency in L2 reading comprehension (e.g., Bernhardt, 2011; Grabe & Stoller, 2011). Nevertheless, these contradictory results suggest that in addition to language proficiency,

other factors need to be taken into the equation when examining the association between reader's variety and frequency of strategy use and comprehension products. WM offers cognitive resources for and influences virtually all aspects of comprehension (Koda, 2005). Plus, our data revealed a strong association between WMC and the variety of strategy use. Given that WMC is directly associated with strategy use, the contradictory results are likely moderated by the reader's individual differences in WMC. WMC therefore ought to be included in the framework in the future studies on this topic. Although limited in the size of the data set and scope, our analyses foreground a different perspective for understanding the association between strategy use and L2 reading comprehension, which involves WMC and its interaction with other factors (e.g., language proficiency).

(3) What strategies do readers of different WMC use?

To discover the differences in strategy usage among participants of different WMC, a Pearson correlation analysis was conducted for the countable strategies. For the Yes/No strategies, independent sample t-tests were performed, and effect sizes were calculated. Table 4 displays the five countable strategies that had a correlation of .30 (a low-medium effect size) and above with WMC, including Sup1 (r = .373), Sup7 (r = .326), Glob10 (r = .425), Glob11 (r = .425), and Sup2 (r = - .306). The results suggest that participants with a larger WMC tended to use Sup1 (TakeNotes), Sup7 (AskSelfQs), Glob10 (Predict), and Glob11 (CheckPrediction); by comparison, those with a smaller WMC appeared to use more Sup2 (Underline).

Table 4
Correlations Between WMC and Countable Strategies

Strategy	Identifier	WMC
Sup1	TakeNotes	.373
Sup2	Underline	-.306
Sup7	AskSelfQs	.326
Glob10	Predict	.425
Glob11	CheckPrediction	.425

Note. Pearson correlation was performed.
Effect sizes .5 > (|r|) > .3 represent meaningful "low-medium" effects and are listed in the table.

If we now turn to the results of independent samples t-tests on each of the Yes/No strategies for WMC, summarized in Table 5, a significant (p = .004) difference in WMC was found between participants who did and did not use the Glob5 strategy, implying the contribution of a higher WMC to the use of the strategy. In addition, the effect size of WMC for each Yes/No strategy was computed with sample size, standard deviation, mean difference, and pooled variance. The effect size was interpreted as the number of standard deviation units above the mean score. Take Sup6 for instance, the effect size of .87 means that the mean WMC score of participants who used Sup6 was .87 standard deviation units above the mean of those who did not use the strategy. In addition to Sup6, a few other strategies were brought to our attention: Prob1 (-.82), Prob 6 (.82), and Prob10 (.75). These effect sizes were considered potentially meaningful and would likely reach significance with a larger sample size. These results suggest

that readers with higher WMC scores tended to use more Sup6 (Back&Forth), Prob 6 (VisualizeInfo), Prob10 (AnalyzeGrammar), and use less Prob1 (CarefulReading).

Table 5
Independent Samples T-tests on the Yes/No Strategies for WMC

	Identifier	Mean Difference	Std. Difference	t	P	Effect size
Sup6	Back&Forth	5.000	4.524	1.105	.301	.87
Glob5	UseTables	11.250	2.788	4.035	.004	3.20
Prob1	CarefulReading	-4.583	3.620	-1.266	.241	-.82
Prob6	VisualizeInfo	4.583	3.620	1.266	.241	.82
Prob10	AnalyzeGrammar	4.375	4.604	.950	.370	.75

Taken together, after examining the strategies that readers of different WMC employed, we found that participants who had a larger WMC tended to use top-down strategies that promote readers' holistic comprehension of the texts including Sup1 (TakeNotes), Sup6 (Back&Forth), Sup7 (AskSelfQs), Glob10 (Predict), Glob11 (CheckPrediction), Glob5 (UseTables), and Prob6 (VisualizeInfo) in addition to Prob10 (AnalyzeGrammar) for clause-level comprehension. In contrast, those with a smaller WMC appeared to use more of the strategies for decoding, namely, Sup2 (Underline) and Prob1 (CarefulReading).

This outcome is contrary to Han's (2017) finding in that her analyses did not show the association of a larger WMC with the use of top-down reading strategies (i.e., content-oriented strategies and meta-comment strategies). This inconsistency may be due to the distinct readability of texts. Han used one expository text with the Flesch-Kincaid Grade level of 9.8 (tenth grade), whereas the present study used two domain-specific texts with an average Flesch-Kincaid Grade level of 17.6 (college graduate). Readability impacts L2 reader's comprehension process and strategy use (Grabe & Stoller, 2011; Mokhtari & Reichard, 2004; Yayli, 2010) as the more difficult a text is, more cognitive resources (WMC) are demanded (Jung, 2018). Once again, text variables (e.g., text structure, length, readability) appear to moderate the interplay between WMC and strategy usage, which calls for further examination.

Conversely, our findings support Han's (2017) conclusion that readers of a smaller WMC tended to use language-oriented strategies for decoding and pause more frequently. In other words, smaller WMC is associated with the use of decoding strategies and relatively slow reading speed. Word and other lower-level linguistic processes are the building blocks for higher-level processes and successful reading comprehension outcomes (Grabe & Stoller, 2011), which therefore deserve attention from readers. In addition, even though WMC refers to its ability to process and store information (Just and Carpenter, 1992), individual differences in WMC reside in the efficiency of processing rather than the passive storage capacity (Daneman & Carpenter, 1980). In L2 reading, efficient processing means that readers can quickly retrieve linguistic knowledge from long term memory for decoding and integrate the information emergent from the on-going reading process into readers' existing schema. These processes take place when different components are still active in WM (Joh & Plakans, 2017). In the same way, readers with a smaller WMC are slow in the decoding and integrating processes, and the

information activated in WM may be lost before further amalgamation. To offset this disadvantage, readers distribute additional attentional resources to the decoding strategies (Grabe & Stoller, 2011), such as Sup2 (Underline) and Prob1 (CarefulReading) in this study. Because WMC is limited and shared by all aspects of reading, less WMC is left for higher-level comprehension processes and there is not enough capacity for carrying out top-down strategies. As a result, the strategy use of L2 readers with a smaller WMC tends to be restricted to strategies that target lower-level linguistic processes.

Implications

These findings provide two important implications for researchers and practitioners. First, the association between WMC and reading comprehension varies depending on the reading measure utilized, which is not surprising as L2 reading comprehension is a multi-level representational architecture (Kintsch, 1998; Alptekin & Ercetin, 2010). L2 reading is comprised of various aspects of reading processes and different levels of comprehension (lower-level and higher-level) (Grabe & Stoller, 2011). As each comprehension measure is limited to assess certain aspects of the reading process and product, a combination of different assessment tasks is necessary in a single study to get a comprehensive picture of how WMC is related to L2 reading comprehension (Alderson, 2000; Brantmeier, 2005, 2006).

Second, readers of a greater WMC appear to have advantages in the variety and types of strategy use in L2 reading comprehension. Our data revealed that compared with readers with a smaller WMC, those with a larger WMC tended to use not only a greater variety of strategies but also more top-down strategies. This implies that for readers of a smaller WMC to counteract their comparative disadvantages, practitioners need to help them efficiently make use of their relatively smaller resources by mimicking what readers with a larger WMC do in L2 reading.

In L2 reading, readers need to exert greater efforts to carry out decoding strategies such as those that aid word recognition and syntactic parsing to perform lower-level linguistic processes. These processes demand large amounts of cognitive resources. This phenomenon could be detrimental for readers with a smaller WMC because they will have little to none left for higher-level comprehension processes (Grabe & Stoller, 2011). Therefore, to behave like those with a larger WMC, these readers need to be able to shift their attention from the decoding processes to the overall construction of the meaning from the texts. To achieve that, readers with a smaller WMC are required to carry out decoding strategies and their associated lower-level processes in an automatic or a routinized fashion (Ercetin & Alptekin, 2013; Harrington & Sawyer, 1992). As automaticity does not require attention, they could save and allocate as much WMC as possible to the employment of more unique strategies necessary for reaching desired reading goals as well as to the employment of more top-down strategies that facilitate readers' global understanding of the texts (Wen, 2016). Subsequently, better L2 reading products follow. Automaticity requires a strong linguistic knowledge base and thousands of hours of practice in reading (Grabe & Stoller, 2011). Thus, it is recommended that practitioners should devote time and instruction to not only explicit strategy training but also L2 readers' linguistic knowledge growth including both vocabulary and syntactic knowledge (Anderson, 1991; Cohen, 2014; Yapp et al., 2021; Grabe & Stoller, 2011).

CONCLUSION

Our data showed that the contribution of WMC to reading comprehension varied depending on the type of comprehension measures used. Researchers are therefore encouraged to use a combination of different types of comprehension measures in a single study when examining the relationship between WMC and L2 reading comprehension. Additionally, the results of the study demonstrated the interdependent relationship between WMC and strategy usage in L2 reading. To be specific, small WMC is associated with slow word recognition and slow reading speed which are considered reading problems. This is when corresponding strategies are prompted, commanded by WM, to repair these reading problems. By comparison, a greater WMC translates into more "fuel" to sustain the utilization of more types and a greater variety of reading strategies. Readers with a larger WMC not only tackle linguistic tasks (e.g., word recognition) more efficiently, but also have additional resources to strategically promote higher-level comprehension processes. Caution should be exercised when interpreting the results due to the limitations resulting from the small dataset. Having said that, the findings highlighted the elusive relationship between WMC and L2 reading and strategy usage when various text, task, and reader variables are involved, which necessitates more research on the topic.

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Appendix A

Demographic questionnaire

Please complete the following:

1. Gender:
2. Age:
3. Major area of study:
4. Native language(s):
5. Are you a _____ (first year, second year, third year, fourth year, graduate) student?
6. How many hours of English classes do you attend every week? _____
7. Where do you plan to use English in the future?
   _____
8. Are you planning to go to graduate school to study medicine? (please circle one)
   Yes Maybe No
9. How many years have you studied English? _____
10. How many hours on average do you spend reading in English every week?
    _____
11. What percentage of readings about medicine do you read in English each week?
    _____
12. Do you think it is important to learn English well? (please circle one from below)
    Absolutely yes not sure no
    Why? Or why not?
    _____
    _____
13. How interested are you in learning English? (please circle one)
    very interested a little interested neutral not very interested not interested at all
14. Ever since you started to learn English, how often have you been taught to use reading strategies? (please circle one)
    Never seldom sometimes often very often
15. How familiar are you with different types of reading strategies? (please circle one)
    Not familiar at all somewhat unfamiliar neutral familiar very familiar
16. Which CET have you taken_____, and what is your overall score on that? _____, and what is the score for the reading section? _____
17. How long ago did you take the CET (please circle one):
    within 6 months, within 1 year, within 1.5years, within 2 years, more than two years ago

Appendix B

Sample reading passages, free recall, sentence completion and multiple-choice questions

Test 1:

Please read the passage following the TALK ALOUD instruction. You CAN use a dictionary while reading. After reading the passage, you will also complete three reading comprehension tasks WITHOUT LOOKING BACK AT THE PASSAGE. Please note that this passage is taken from an article published in the journal of *Perspective in Biology and Medicine*.

Modern clinical applications related to Chinese traditional theories of drug interactions

Conclusions

Even though the Chinese theories on drug action have become dated, the time frame has not been that long. Pharmacology did not emerge as a disciplinary entity in the West until the end of the 19th century, and only then did the textbooks begin to give attention to the factors that may alter drug action, which the Chinese had thought about and written about centuries earlier. What the Chinese enunciated with respect to drug action transcends the thousands of remedies they discovered for treating the ills of their population. What they conjured and anticipated parallels in many respects the modern concepts of the West. Their theories, however, lack the flexibility to incorporate the rapid advances made in modern science. In contrast to the Western approach, wherein new findings can be applied to modify or correct existing theories, with traditional Chinese medicine, new data must be incorporated into existing dogma that is immutable. As a consequence, a curious dichotomy exists today in traditional medicine between its basic and practical facets. While pharmaceutical chemists and pharmacologists strive to isolate and characterize active plant principles, herbalists throughout the world, including Europe and the United States in addition to Asia, continue to ply their trade applying outmoded ancient theories and methodologies.

Despite the criticisms of the traditional theories, the beneficial consequences for mankind have been many and varied. It is irrefutable that a large number of useful preparations were discovered at the time the notions were in effect. No doubt the discovery of useful natural products in the beginning was empiric and serendipitous, but the concepts formulated later from such findings were essentially a concept unique to Chinese civilization. The fruits from the *yin-yang* and five elements doctrine include efficacious medicinal remedies still in use. Undoubtedly, the greatest gift the Chinese contributed to preserving the health of the human race is the first immunologic procedure, smallpox inoculation. The eminent historian Joseph Needham points out this was the beginning of immunology, the most beneficent department of modern medical science. Besides the therapeutic agents, the holistic prerequisites brought into focus the importance of preventive medicine, calisthenics, and massage that are so popular in modern health facilities. The theories facilitated the systematization and rationalization of a large mass of data on medicinal remedies, the development of proto-sciences that have become important basic and clinical disciplines related to pharmaceutics, and the compilation of invaluable compendia on *materia medica*, including the first pharmacopeia and the formulation of some principles in pharmacology that can be extrapolated for current application.

Free recall. Without looking back at the passage, recall in Chinese as much as you can of what you just read. Try to recall main ideas as well as details. The emphasis is on the quantity recalled.

Sentence completion. Based on the text you just read, please complete the following sentences. You can use Chinese to complete the sentences if you want.

Sample 1: Use one word or phrase to describe the author's overall attitude towards Chinese traditional theories on medicine: _____.

Sample 2: Traditional Chinese medicine _____ incorporating the rapid advances made in modern science.

Multiple-choice questions. Based on the text you just read, please circle the letter of the best answer to each of the following questions (there is only ONE correct answer).

Sample 1: Which of the following words or phrases best describes the author's attitude towards Chinese theories on drug action?

a. Criticizing
b. Overall positive
c. Neutral
d. Overall negative

Sample 2: Which of the following statements is NOT true?

e. Chinese had thought about and written about the factors that may alter drug action centuries earlier before Pharmacology emerged as a disciplinary entity in the West.
f. Centuries earlier before Pharmacology emerged as a disciplinary entity in the West, the Chinese had already discovered thousands of remedies for treating the ills of their population.
g. Traditional Chinese medicine is flexible with incorporating the rapid advances made in modern science.
h. There is a dichotomy existing today in traditional medicine between its basic and practical facets.

Text 2

Please read the passage following the TALK ALOUD instruction. You CAN use a dictionary while reading. After reading the passage, you will also complete three reading comprehension tasks WITHOUT LOOKING BACK AT THE PASSAGE. Please note that this passage is taken from an article published in the journal of *Perspective in Biology and Medicine*.

Control of Cardiovascular Disease in the 20th Century: Meeting the Challenge of Chronic Degenerative Disease.

Making It Happen: Cardiovascular Disease (CVD) as a Public Health Priority

A coalition of professional organizations, most prominently the American Heart Association, and federal agencies, with the National Heart, Lung and Blood Institute (NHLBI) in the lead, launched a vigorous public education campaign aimed at the general public, patients, and physicians. The NHLBI played a key role through the National High Blood Pressure Education Program (NCEP), which promoted screening, detection, and control with pharmacologic agents, and the National Cholesterol Education Program, which initially created awareness of the importance of high cholesterol, disseminated information on beneficial dietary patterns, and subsequently set guidelines for drug treatment.

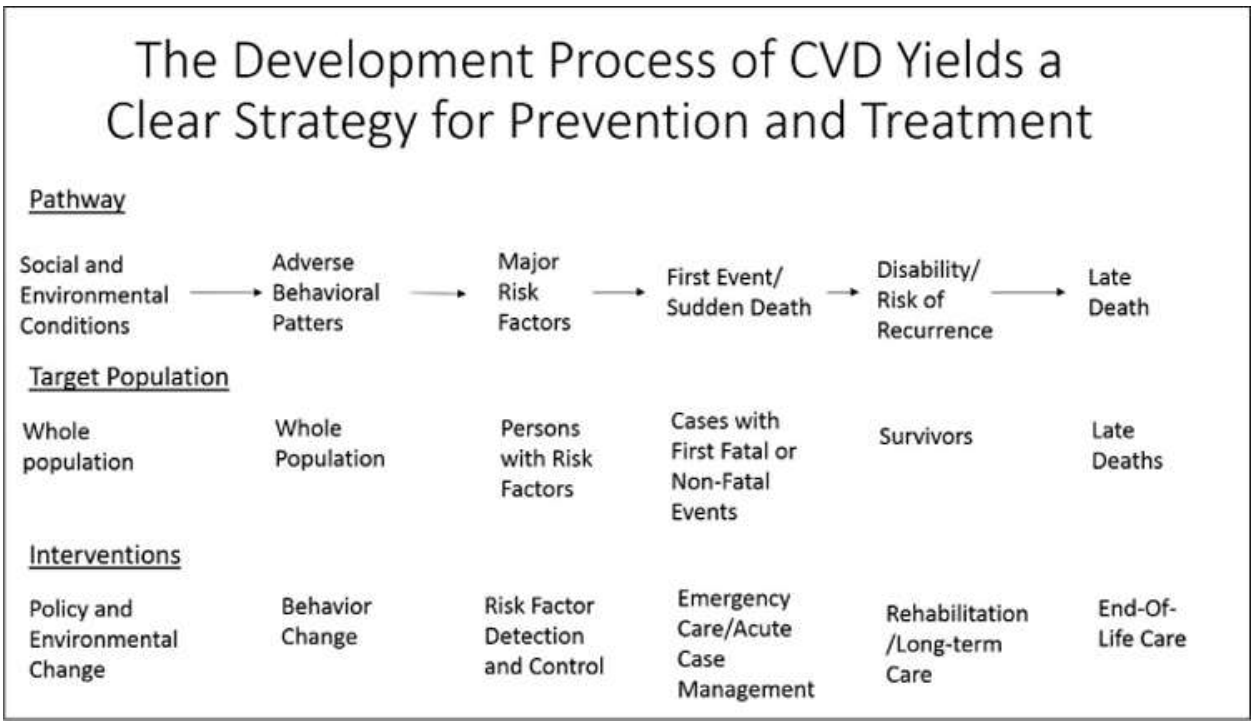
National survey data from the National Health and Nutrition Examination Survey (NHANES) documented the decline in mean serum cholesterol from 220 mg/dl in the 1980s to less than 200 mg/dl at the present time, and the increase in treatment and control of hypertension to greater than 50% in the population. The advent of statins in the 1990s led to a major improvement in cholesterol control in high-risk individuals. Over this entire period, of course, advances in

hospital methods led to higher survival rates with myocardial infarction and continuous improvement in surgical and catheter-based methods to re-vascularize diseased coronary and carotid vessels. A well-developed strategy now exists to intervene on every stage of the etiologic sequence from dietary intake to rehabilitation and secondary prevention (Table 1).

Of course, all of these efforts were met with staunch resistance. The food industry, particularly the egg and beef interests, fought tooth and nail to delay public health action. Scientific evidence was criticized, the reputations of individual scientists were impugned, data were subpoenaed for "re-analysis," and a small cohort of academics allowed themselves to be used as "responsible critics." These efforts certainly sowed confusion in the media and created a legacy of hucksters and quacks who to this day promote a panoply of theories and diets that lack scientific support. These disruptive voices have no doubt limited progress, at the cost of many needless deaths and lives of long-term disability. But this level of dissension, if so it can be called, is inevitable in a pluralistic society. In truth it must be said that the CVD prevention message has demonstrated remarkable durability and success. The positive outcomes must be taken as a tribute to the elegance and validity of the theory and the dedication and skill of those who have fought to make a heart healthy lifestyle the norm, and as proof—most of all—that in the long-term success breeds ever greater success.

Table 1.

The Development Process of CVD Yields a Clear Strategy for Prevention and Treatment



Free recall. Without looking back at the passage, recall in Chinese as much as you can of what you just read. Try to recall main ideas as well as details. The emphasis is on the quantity recalled.

Sentence completion. Based on the text you just read, please complete the following sentences. You can use Chinese to complete the sentences if you want.

Sample 1: The American Heart Association, and federal agencies, with the National Heart, Lung and Blood Institute (NHLBI) in the lead, _____ aimed at the general public, patients, and physicians.

Sample 2: The National survey data from the National Health and Nutrition Examination Survey (NHANES) documented that (please name at least one) _____.

Multiple-choice questions. Based on the text you just read, please circle the letter of the best answer to each of the following questions (there is only ONE correct answer).

Sample 1: What did the American Heart Association and the National Heart, Lung and Blood Institute (NHLBI) do to help fight cardiovascular disease (CVD) and make it a public health priority?

a. Trained physicians
b. Told the public about the best food for fighting CVD
c. Launched a vigorous public education campaign
d. Provided the public with effective treatment

Sample 2: Which of the following phenomena was documented by the National survey data from the National Health and Nutrition Examination Survey (NHANES)?

a. The success in treating diabetes
b. The increase in mean serum cholesterol
c. The success in treating high blood pressure
d. The success in treating heart attack

Appendix C

The list of Yes/No strategies (19 out of 33) and Countable strategies (14 out of 33)

Type	Identifier	Reading strategies
Yes/No strategies	Back&Forth	Sup6: I go back and forth in the text to find relationships among ideas in it.
	ThinkL1&L2	Sup9: When reading, I think about information in both English and my mother tongue.
	PriorKnowledge	Glob1: I think about what I know to help me understand what I read.
	Overview	Glob2: I take an overview of the text to see what it is about before reading it.
	SkimFirst	Glob3: I skim the text first by noting its characteristics like length and organization.

	What2Ignore	Glob4: When reading, I decide what to reading closely and what to ignore.
	UseTables	Glob5: I use tables, figures, and pictures in text to increase my understanding.
	TypographicalFeatures	Glob7: I use typographical features like bold face and italics to identify key information.
	NewInfo	Glob9: I check my understanding when I come across new information.
	DiscoursePtns	Glob13: I tend to identify the text type and the structure or discourse patterns of the text.
	FollowIdeas	Glob14: While reading, I constantly check if I know the main ideas of the text and clearly know it when there is a breakdown.
	CarefulReading	Prob1: I read slowly and carefully to make sure I understand what I am reading.
	AdjustSpeed	Prob3: I adjust my reading speed according to what I am reading.
	SlowWhenDiff	Prob4: When text becomes difficult, I pay closer attention to what I am reading.
	VisualizeInfo	Prob6: I try to picture or visualize information to help remember to help remember what I read.
	Re-read	Prob7: When text becomes difficult, I re-read it to increase my understanding.
	GuessMeaning	Prob8: When I read, I guess the meaning of unknown words or phrases.
	IgnoreUnknown	Prob9: When reading, I purposely ignore some unknown words and read on.
	AnalyzeGrammar	Prob10: I analyze grammatical structure (e.g., conjunctive adverbs and clauses) to help me understand the text.
Countable strategies	TakeNotes	Sup1: I take notes while reading to help me understand what I read.
	Underline	Sup2: I underline or circle information in the text to help me remember it.
	UseDictionary	Sup3: I use reference materials (e.g., a dictionary) to help me understand what I read.
	Paraphrase	Sup4: I paraphrase (restate ideas in my own words) to better understand what I read.
	Summarize	Sup5: I summarize what I read to reflect on important information in the text.
	AskSelfQs	Sup7: I ask myself questions I like to have answered in the text.
	Translate	Sup8: When reading, I translate from English into my first language.
	ContextClues	Glob6: I use context clues to help me better understand what I read.

	EvalInfo	Glob8: I critically analyze and evaluate the information presented in the text.
	Predict	Glob10: I try to guess what the content of the text is about when I read (making predictions).
	CheckPrediction	Glob11: I check to see if my guesses about the text are right or wrong.
	MainVsSupport	Glob12: When reading, I tent to identify main ideas and distinguish them from supporting ideas.
	LoseConcent	Prob2: I try to get back on track when I lose concentration.
	Pause	Prob5: I stop from time to time and think about what I am reading.

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