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# Can Vocabulary and Grammar Hold the Doorway for College Reading Success? The Case of Arabic Learners of English

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## Cover Page Footnote

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# Can Vocabulary and Grammar Hold the Doorway for College Reading Success? The Case of Arabic Learners of English

# هل يمكن فتح أبواب النجاح في القراءة الجامعية عن طريق المفردات اللغوية والمهارات النحوية؟ حالة العرب المتعلّمين للغة الإنجليزية

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**Abstract**

Reading is an important skill for college success. This study investigated cognitive predictors of English reading comprehension success among college students whose first language is Arabic. Knowledge of vocabulary/grammar emerged as the strongest predictor of reading success, followed by silent reading fluency, and then decoding skill. However, metacognitive awareness of reading strategies did not statistically significantly contribute to the model. Findings suggest that Arabic speakers draw on their vocabulary and grammar knowledge when tackling an English reading comprehension task, skills that are language specific to L2. Implications include the recommendation for placing the development of college students' language reservoir at the heart of language programs, and incorporating silent reading fluency and decoding skill within these programs. The finding regarding metacognitive awareness of reading strategies brings into question whether a certain level of language proficiency must be met by language learners before reading strategies begin to contribute to reading comprehension achievement.

*Keywords*: Arabic speakers, Cognitive Model, college reading, decoding skill, EFL, ELL, English language learners, ESL, grammar knowledge, metacognitive awareness of reading strategies, reading comprehension, second and foreign language acquisition, silent reading fluency, vocabulary knowledge

**مستخلص البحث**

تُعد القراءة مهارة مهمة للنجاح في الجامعة. بحثت هذه الدراسة المؤشِّرات المعرفية للنجاح في مهارة الفهم والاستيعاب عند القراءة باللغة الإنجليزية بين طلاب الجامعات الذين لغتهم الأولى هي اللغة العربية. برزت معرفة المفردات اللغوية والمهارات النحوية كأقوى مؤشر على النجاح في القراءة، يليها إتقان الطلاقة في القراءة الصامتة، ثم مهارة فك الرموز لقراءة الكلمات. رغم ذلك، فإن الوعي ما وراء المعرفي باستراتيجيات القراءة لم يساهم بشكل كبير من الناحية الإحصائية في النموذج. تشير النتائج إلى أن المتحدثين باللغة العربية يعتمدون على مفرداتهم اللغوية ومعرفتهم النحوية في فهم واستيعاب النصوص باللغة الإنجليزية، وهي مهارات لغوية خاصة باللغة الثانية. تتضمن الآثار المترتبة على ذلك التوصية بوضع منهج لتطوير المخزون اللغوي لطلاب الجامعات في صميم البرامج اللغوية، ودمج مهارة إتقان الطلاقة في القراءة الصامتة ومهارة فك الرموز لقراءة الكلمات في هذه البرامج. تثير النتائج المتعلقة بالوعي ما وراء المعرفي لاستراتيجيات القراءة تساؤلات حول ما إذا كان يجب أن يصل متعلمو اللغة إلى مستوى معين من إتقانها قبل أن تبدأ استراتيجيات القراءة في المساهمة في تحقيق فهم واستيعاب المادة المقروءة.

*الكلمات المفتاحية:* المتحدثون باللغة العربية، النموذج المعرفي، القراءة الجامعية، مهارة فك الرموز لقراءة الكلمات، اللغة الإنجليزية كلغة أجنبية، تعلّم اللغة الإنجليزية، متعلمو اللغة الإنجليزية، اللغة الإنجليزية كلغة ثانية، المهارات النحوية، الوعي ما وراء المعرفي باستراتيجيات القراءة، مهارات الفهم والاستيعاب في القراءة، اكتساب اللغة الثانية والأجنبية، الطلاقة في القراءة الصامتة، معرفة المفردات اللغوية

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**Can Vocabulary and Grammar Hold the Doorway for College Reading Success? The Case of Arabic Learners of English**

Reading comprehension is without doubt one of the most important precursors for college success, and reading comprehension proficiency can predict college success given that learning and reading comprehension use the same cognitive processes (Behrman & Street, 2014; Williams et al., 2007). Developing students' reading comprehension competence therefore should be at the heart of any college program. Yet, the sources of reading success may not always be obvious to language educators of adult students because academic reading is usually done independently. Tailoring college programs to students' needs might not be a straightforward venture because reading comprehension is a complex and interactive process which encompasses multiple component skills (Guo et al., 2011). Accordingly, it is important to identify the extent to which cognitive sub-skills contribute to reading achievement when designing college language development programs. Nevertheless, most of the studies available today which explored cognitive bases of reading comprehension differences have been based on school aged children, especially at the primary level, leaving a gap in knowledge about the adult population (Curtis, 2002; Landi, 2010). The gap is even wider when it comes to second language (L2) speakers as opposed to English native (L1) speakers (Nassaji, 2014). The present study sought to look into cognitive predictors of English reading comprehension success among adult Arabic speakers.

The most prominent theory for explaining the cognitive components of successful reading comprehension is the Simple View of Reading (SVR) by Gough and Tunmer (1986) and Hoover and Gough (1990) which proposed that reading comprehension is a product of decoding and language comprehension (also referred to as linguistic or listening comprehension). Decoding is the process of converting letters to their corresponding sounds, and then blending these sounds together to read a word, while language

comprehension refers to the reader's ability to understand words at the spoken level. The prerequisite role of decoding and language comprehension for reading comprehension success has been established through empirical studies among English speakers, attributing about 40% to 80% of variance in reading comprehension to decoding and language comprehension among children (Catts et al., 2006; Hoover & Gough, 1990; Joshi & Aaron, 2000; Share & Stanovich, 1995; Torgesen & Burgess, 1998). Further, the developmental pattern between reading achievement and decoding ability for L2 children appears to be overall in sync with L1 children (Geva & Wang, 2001; Gottardo & Mueller, 2009; Jongejan et al., 2007), although there are findings suggesting that decoding is not significantly related to reading comprehension among some groups (O'Brien & Wallot, 2016). The relationship between decoding and reading comprehension is less straightforward however among adult readers (Braze et al., 2007). While some researchers found decoding to be an important and independent variable which accounted for independent variability in reading comprehension achievement among adult readers (Bell & Perfetti, 1994; Cunningham et al., 1990; Lundquist, 2004; Talwar et al., 2020), others posited that most of the variance in reading comprehension among adult students is primarily due to listening comprehension, and that decoding is not a good predictor of reading comprehension among adult readers (Braze et al., 2007; Jackson, 2005; Landi, 2010; Perfetti & Hart, 2002). Still, various studies demonstrated a reverse relationship between age and decoding skill indicating that decoding accounts for much of the variance in reading comprehension among children, and for much less variance among adult readers; and that the relative importance of language comprehension to reading comprehension increases when comparing children who are beginning readers with advanced adult readers (García & Cain, 2014; Gough et al., 1996; Gough & Wren, 1998; Lonigan et al., 2018). Essentially, García and Cain (2014) pointed out in a meta-analysis involving more than 4,000

readers ages 5 to 53 that while the strength of the relationship between decoding and reading comprehension decreases with increasing age, there is no point in which this correlation becomes negligible. The relationship between decoding and reading comprehension is even more complex and under researched for adult L2 readers. As Jeon and Yamashita (2014) pointed out, unlike children, adult L2 readers are influenced by the decoding experience they possess from their L1, and their cognitive maturation and experience with language is fundamentally different from young readers – such factors may result in greater variability among adult L2 readers from different language backgrounds than that found in children. Hence, findings about English learners from one language background may not be generalizable to learners from other language backgrounds, and it is important to investigate each population independently.

Other models recognize that there is more to the reading process than what was outlined by the SVR. For example, the Rope Model by Scarborough (2001) further explained the complexity of the reading process by using a metaphor of a rope to illustrate that skilled reading is made up of many strands that are woven together. There are two major strands, language comprehension and word recognition, with each having its own set of smaller strands. Language comprehension encompasses background knowledge, vocabulary, language structure, verbal reasoning, and literacy knowledge; while word recognition encompasses phonological awareness, decoding, and sight word recognition. Vocabulary and grammar knowledge are among the prominent subcomponents of the language comprehension strand that must be considered in relation to reading comprehension. Vocabulary refers to the knowledge of meanings of words and the ability to understand and use words in context. Grammar knowledge (also referred to as syntactic awareness) is a broad term which refers to linguistic knowledge of structure of phrases and sentences (Jeon & Yamashita, 2014). College students who demonstrate higher reading abilities have been shown to

outperform their lower reading abilities counterparts in vocabulary and grammar knowledge (Martino & Hoffman, 2002). Without knowledge of the meanings of words on a page, it is not possible to comprehend a text. While vocabulary may arguably be considered as an indicator of language comprehension rather than an independent contributor to reading comprehension (Braze et al., 2016), some researchers have argued that vocabulary contributes to reading comprehension variance above and beyond listening comprehension and decoding skill (Babayiğit & Shapiro, 2020; Braze et al., 2007; Cunningham et al., 1990; Ransby & Swanson, 2003), have suggested extending the SVR to include vocabulary knowledge (Braze et al., 2007), and have even suggested a causal relationship between vocabulary and reading comprehension (Lesaux et al., 2010). As a matter of fact, some researchers have argued that the most important component of reading comprehension is vocabulary knowledge (Alderson, 2000; Laflamme, 1997). The importance of vocabulary knowledge holds true for both children (NICHD, 2005; Tannenbaum et al., 2006) and adults (Braze et al., 2007; Guo et al., 2011; Landi, 2010; Stanovich & Cunningham, 1992). Similarly, grammar is essential for reading comprehension because it allows readers to analyze and synthesize information at the phrase, clause, and sentence levels (Jeon & Yamashita, 2014), and while it can arguably be considered as an indicator of language comprehension rather than an independent contributor to reading comprehension, grammar has actually been found to be an independent contributor to reading comprehension in both L1 and L2 (Babayiğit & Shapiro, 2020). Research has documented that higher grammar awareness predicts better reading comprehension scores among children (Babayiğit & Shapiro, 2020; Brimo et al., 2018; Tunmer et al., 1987) and adults (Cupples & Holmes, 1992; Guo et al., 2011; Taylor et al., 2012); and some studies have even suggested a causal relationship between grammar and reading comprehension (Kennedy & Weener, 1973; Layton et al., 1998). Grammar knowledge is also important for comprehension among

children (Farnia & Geva, 2011; Gottardo et al., 2018) and adult English language learners (Nergis, 2013; Zhang, 2012), especially for academic reading (Nergis, 2013). The reliance on grammar and vocabulary knowledge in achieving reading comprehension increases as automaticity is approached, meaning that the correlation between vocabulary/grammar knowledge and reading comprehension is higher for adults than children. Braze et al. (2007) explained that adult texts usually incorporate challenging contexts and vocabulary, and therefore, the demands on vocabulary and grammar knowledge increase as readers become older and they become especially important for achieving reading comprehension among adult readers.

Fluency is also a subcomponent of automatic word recognition in reading models. Fluency, which refers to reading accuracy and rate, is a vital tool for reading comprehension (see NICHD, 2000). With fast and accurate reading, readers are able to free their limited cognitive sources, including attention and working memory, for higher order processes necessary for reading comprehension (Automaticity Hypothesis, LaBerge & Samuels, 1974; Samuels, 2006). Poor readers on the other hand use their limited cognitive resources for decoding and word recognition, which impedes reading comprehension. Reading fluency is a moderate to a strong predictor of reading comprehension. This has been demonstrated in studies which measured fluency using oral reading fluency tasks in which notes were made about participants' reading accuracy and speed (Jenkins et al., 2003), and studies which measured fluency using silent reading fluency measures such as the maze task (Kim et al., 2015). Additionally, studies have demonstrated a relationship between reading fluency and reading comprehension for both measures utilizing connected texts (Jenkins et al., 2003; Silverman et al., 2013) and isolated word lists (Jenkins et al., 2003; Kim et al., 2012). The pattern of relationship between silent reading fluency and reading comprehension can vary based on participants' age, and whether English is

L1 or L2. For example, while this relationship was shown to be strong for native English speakers in upper elementary grades (Espin et al., 2010; Wiley & Deno, 2005), the relationship was only moderate for English language learners in upper elementary grades (Wiley & Deno, 2005) and for native speakers in grades 8-12 (McMaster et al., 2006). Similarly, Kim et al. (2015) found that the relationship between silent reading fluency and reading comprehension was stronger for earlier grade levels in comparison to higher grade levels among their grades 3-10 participants (also see Kim et al., 2011, 2012).

The Cognitive Model by McKenna and Stahl (2009) – which is meant to help English language teachers pinpoint and remedy areas of reading struggles – also acknowledges automatic word recognition (encompassing fluency in context, decoding and sight word knowledge, phonological awareness, and print concept) and language comprehension (encompassing background knowledge, vocabulary, and knowledge of text and sentence structure) as prominent subcomponents of reading comprehension, but also adds a new domain to the two major cognitive domains put forth by the SVR and the Rope Model, which is strategic knowledge. Strategic Knowledge refers to the reader's ability to use different reading comprehension strategies to tackle a text. This domain outlines reading comprehension as a complex cognitive process that requires the reader to go beyond decoding the words on the page and knowing their meanings. Effective reading requires the use of automatic and strategic cognitive processes which enable readers to create mental representations of the text (van den Broek et al., 2012). Metacognitive reading involves the reader taking an active and conscious part in constructing meaning while reading a text. This includes, for example, previewing a text and making predictions about it prior to reading it to get a general idea about its structure, noticing when comprehension breaks and doing something for remedy (e.g., rereading), self-questioning, making connections between the new information

acquired from a text and background knowledge, summarizing to ensure understanding, visualizing, analyzing, making inferences, evaluating the content and language of a text, and so forth. These are some examples of intentional techniques which readers can use to tackle texts to better understand them. Good readers differ from poor readers in their ability to tackle texts strategically. While good readers utilize a range of strategies to facilitate the meaning making process while reading, poor readers cannot use or select such strategies to support reading comprehension (Horner & Shwery, 2002; Marzola, 2011). In one study that supports this notion, Cain et al. (2004) found that component skills of reading comprehension (identified as inference making, comprehension monitoring, and story structure knowledge) contributed unique variance to reading comprehension, after controlling for word reading ability, vocabulary knowledge, and verbal ability. Similarly, Dermitzaki et al. (2008) found statistically significant differences in the use of cognitive strategies between high achieving and low achieving students, and the use of reading strategies correlated positively with reading comprehension. Poor readers lack various strategic reading skills including planning, comprehension monitoring, analyzing, and prioritizing (NICHD, 2000).

The present study sought to identify cognitive sources of reading success among adult Arabic speaking English language learners. The study was conceptualized primarily on McKnenna and Stahl's (2009) Cognitive Model, looking into automatic word recognition (measured by decoding skill and silent reading fluency), language comprehension (measured by vocabulary/grammar knowledge), and strategic knowledge (measured by metacognitive awareness of reading strategies). The main research question was: What are the relative contributions of vocabulary/grammar knowledge, silent reading fluency, decoding skill, and metacognitive awareness of reading strategies to English reading comprehension among college students whose L1 is Arabic? The author hypothesized that language

comprehension will account for the largest predictive power for reading comprehension success, followed by metacognitive awareness of reading strategies, then silent reading fluency, and finally decoding skill (given that the study was geared towards adult students). Implications of the present study are meant to support educators in catering to adult language learners' needs for improving reading comprehension achievement, which in turn can support overall college academic success.

## Method

### Participants

One hundred and seventy-six adult students participated in this study (23.30% males, 75% females, the data for three participants were not identifiable). The participants came from somewhat similar middle class socio-economic backgrounds, and all of them had recently entered university upon graduation from school. The participants were not assigned a specialization at the time of data collection, but they were all enrolled in a language foundation program proceeding a bachelor's degree program. The data were collected in the beginning of the academic year. The participants were native speakers of Arabic who had been formally engaged in learning English as a L2 throughout their schooling years.

### Measures

The assessments took place across two sessions, one involving the administration of the Aptis test, and the second involving the administration of all other measures. All measures were computer based. The Aptis test was administered as part of the foundation program requirements for all students. The remaining measures were administered specifically for the present study. Participation in the present study was voluntary, and it required giving consent for using participants' Aptis scores and the completion of the remaining measures. Validity was verified by having three

independent researchers review the measures. Reliability was verified using measures of internal consistency (results are reported below).

### *Aptis*

Aptis is a computer-based reliable assessment tool developed by the British Council; it is used worldwide to measure communication ability of English language skills (British Council, 2020, 2021). The exam has five subtests (speaking, writing, listening, reading, and vocabulary/grammar) which measure the language proficiency of test takers against the Common European Framework of Reference for Languages (CEFR). Only the reading and vocabulary/grammar subtests were used for the present study. The reading components measured comprehension at both the sentence and text levels; while the vocabulary/grammar component measured grammar and vocabulary skills using sentence completion tasks, word matching, word definitions, and word combinations (for more details, see British Council, 2021). The reported reliability for the reading component is $\alpha = 0.91$ (British Council, 2020).

### *Silent Phonological Decoding Measure*

This measure was developed by Olson et al. (1994). The measure entailed presenting participants with sets of three nonsense words, with one word from each set sounding like a real word. The participants had to identify the word that sounded like a real word in each set. For example, for the set of words *pake*, *kake*, and *dake*, the nonsense word *kake* sounds like the real word *cake*. Participants were presented with an example, followed by three practice sets, followed by 25 assessed sets. Reliability is $\alpha = 0.81$. This test is highly correlated with the Woodcock Johnson Word Attack Measure, which is one of the most popular decoding measures used across literature (Braze et al., 2007).

### *Silent Reading Fluency Measure*

This measure was developed by the author, and it entailed having the participants silently read the largest number of sentences they could in one

minute. To ensure the participants' engagement in reading the sentences, they were requested to select a missing word from three alternatives for each of the sentences. All of the answers were obvious. Examples include: "*My gloves are in my _____*. A- *handbag*, B- *purple*, C- *mouse", "My favorite sport is _____. A- spring, B- tennis, C- sky".* There were five practice items, followed by 25 items which were timed. Scores were calculated based on the number of correct completed answers in one minute. Split-half reliability is $r = 0.94$. Although the predictive power between oral reading fluency and silent reading fluency can be unique (Jenkis et al., 2003; Silverman et al., 2013; Wiley & Deno, 2005), a silent reading fluency measure was utilized in the present study for two reasons. First, adult readers – who are the participants of the present study – do most of their extensive reading silently. Second, a silent reading measure is more practical for a large number of participants. Additionally, a context-free task remains a significant predictor of reading comprehension (Jenkins et al., 2003) and may be less bias than context measures for English language learners.

***Metacognitive Awareness of Reading Strategies Inventory-Revised (MARI-R)***

This measure was developed by Mokhtari et al. (2018) and it consists of fifteen statements describing strategies or actions readers use when reading academic materials (for example, *having a purpose in mind when I read*, *previewing the text to see what it is about before reading it*). Participants had to rate these statements using a Likert-scale, with 1 indicating never having heard of the strategy before, and 5 indicating knowing the strategy quite well and using it often. Reliability is $\alpha = 0.90$.

***Socio-Economic Status (SES)***

To control for SES, participants were asked to rate their parents' educational level from 1 to 4 (1 = below secondary school, 2 = secondary school, 3 = bachelor's degree, 4 = graduate degree). Each participant was given an average score based on both parents' educational level.

## Results

All statistical analyses were computed using SPSS (version 26). First, descriptive statistics were computed. The results are presented in Table 1, which presents the means, standard deviations, and correlations of the study's variables. Next, data were analyzed using multiple regression. This statistical procedure allows for looking into the overall fit of the entire model, and the relative contribution of each of the dependent variables to the total variance explained (Laerd, 2015). Laerd Statistics (2015) was used as a reference for checking that the data met the assumptions required for multiple regression, and for writing the results below.

**Table 1**

*Descriptive statistics: Means, standard deviations, and correlations for the study's variables*

| | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1. Reading | 0.55 | 0.22 | – | 0.74** | 0.70** | 0.52** | 0.23** | 0.08 |
| 2. Vocabulary/Grammar | 0.49 | 0.16 | | – | 0.68** | 0.49** | 0.14* | 0.10 |
| 3. Fluency | 0.43 | 0.17 | | | – | 0.55** | 0.40** | 0.16* |
| 4. Decoding | 0.58 | 0.22 | | | | – | 0.34** | 0.07 |
| 5. Strategies | 0.64 | 0.20 | | | | | – | 0.11 |
| 6. SES | 0.52 | 0.18 | | | | | | – |

*N* = 176. * $p = 0.05$. ** $p < 0.001$.

The multiple regression model statistically significantly predicted reading comprehension achievement $F(6, 161) = 45.19$, $p < 0.001$, $R^2 = 0.63$, adjusted $R^2 = 0.61$ (a large effect size according to Cohen, 1988). Only three variables added statistically significantly to the prediction, $p = 0.05$ (decoding) and $p < 0.001$ (silent reading fluency and vocabulary/grammar knowledge). Regression coefficients and standard errors can be found in Table 2. A second multiple regression model was run to predict reading comprehension achievement after removing the not statistically significant variable (metacognitive awareness of reading strategies). The multiple regression model statistically significantly predicted reading comprehension achievement $F(4, 163) = 68.55$, $p < 0.001$, $R^2 = 0.63$, adjusted $R^2 = 0.62$ (a large effect size according to Cohen, 1988). Regression coefficients and standard errors for the second model can be found in Table 3.

**Table 2**

*Multiple regression results for predictors of reading comprehension achievement (Model 1)*

| Reading Comprehension | *B* | 95% CI for *B* | | *SE B* | β | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|
| | | LL | UL | | | | |
| Model 1 | | | | | | 0.63 | 0.61** |
| Constant | 0.01 | -0.13 | 0.14 | 0.07 | | | |
| SES | 0.04 | -0.16 | 0.08 | 0.06 | -0.03 | | |
| Vocabulary/Grammar | 0.62** | 0.44 | 0.81 | 0.10 | 0.46** | | |
| Fluency | 0.44** | 0.25 | 0.64 | 0.10 | 0.34** | | |
| Decoding | 0.12* | -0.00 | 0.23 | 0.06 | 0.12* | | |
| Strategies | -0.01 | -0.13 | 0.11 | 0.06 | -0.01 | | |

* $p = 0.05$. ** $p < 0.001$.

**Table 3**

*Multiple regression results for predictors of reading comprehension achievement (Model 2)*

| Reading Comprehension | *B* | 95% CI for *B* | | *SE B* | β | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|
| | | LL | UL | | | | |
| Model 2 | | | | | | 0.63 | 0.62** |
| Constant | 0.02 | -0.07 | 0.10 | 0.05 | | | |
| SES | -0.04 | -0.16 | 0.08 | 0.06 | -0.03 | | |
| Vocabulary/Grammar | 0.62** | 0.44 | 0.80 | 0.09 | 0.46** | | |
| Fluency | 0.44** | 0.25 | 0.62 | 0.09 | 0.33** | | |
| Decoding | 0.11* | 0.00 | 0.23 | 0.06 | 0.12* | | |

* $p = 0.05$. ** $p < 0.001$.

## Discussion and Conclusions

Given that adult L2 readers may be influenced by L1 language experiences, readers from different L1 backgrounds may exhibit unique characteristics when it comes to reading in English as a L2, and may accordingly have their own specific needs for instruction. The present study examined the contributions of automatic word recognition (measured by decoding skill and silent reading fluency), language comprehension (measured by vocabulary/grammar knowledge), and strategic knowledge (measured by metacognitive awareness of reading strategies) to English language reading comprehension achievement among Arabic college

students. Findings demonstrate that the strongest predictor of reading comprehension achievement was vocabulary/grammar knowledge, followed by silent reading fluency, and then decoding skill. On the other hand, strategic knowledge did not statistically significantly contribute to reading comprehension achievement within this study's model.

Consistent with the hypothesis of the present study, vocabulary/grammar accounted for the most variance explained in the model. This finding is consistent with previous findings about the relationship between L1 adults' vocabulary knowledge and reading achievement (Braze et al., 2007; Cunningham et al., 1990; Landi, 2010, Perfetti & Hart, 2001), and previous findings about the relationship between L1 adults' grammar knowledge and reading achievement (Guo et al., 2011; Kemp et al., 2008; Martino & Hoffman, 2002); and supports the conclusion that vocabulary and grammar are the strongest predictors of reading success among adult L2 readers of various language backgrounds (Jeon & Yamashita, 2014). The correlation between vocabulary/grammar and reading comprehension ($r = 0.74$) found in this study is comparable to the ones found in Jeon and Yamashita's meta-analysis which investigated L2 reading comprehension ($r = 0.85$ for grammar and $r = 0.79$ for vocabulary). The results are also in line with the Lexical Quality Hypothesis, which specifies that successful reading comprehension depends on the quality of the reader's lexical representations of words (Perfetti & Hart, 2002). Taken together, the findings demonstrate that English L2 adult Arabic speakers seem to primarily draw on their vocabulary and grammar skills when tackling a reading comprehension task, skills that are language specific to L2.

The finding about the contribution of silent reading fluency to reading comprehension achievement coincides with previous findings from studies that noted a moderate to a strong relationship between silent reading fluency and reading comprehension among both children and adult L1s and L2s. For example, such findings were noted by Kim et al. (2015) who

investigated native English speakers from grades 3-10; McMaster et al. (2006) with grades 8-12 native speakers of English; O'Brien and Wallot (2016) with grades 3-5 Mandarin, Malay, and Tamil bilingual children; Crosson and Lesaux (2010) with grade 5 Spanish speaking children; Wiley and Deno (2005) with English language learners in upper elementary grades; and Jeon (2012) with high school students from South Korea. The present findings with adult Arabic speaking English language learners demonstrate a moderate relationship between silent reading fluency and reading comprehension, with silent reading fluency being the second strongest variable in the model. The two variables also have a strong correlation. Taken together alongside previous research findings, the statistically significant relationship between silent reading fluency and reading comprehension appears to be constant for both children and adults, for both L1s and L2s from various language backgrounds. The present study extends such findings to adult Arabic speakers.

Consistent with evidence demonstrating that decoding skill continues to account for unique variance in reading comprehension among adult L1s (Cunningham et al., 1990; Lundquist, 2004), the present study demonstrates that decoding is a unique variable which accounts for reading comprehension among English L2 Arabic speakers. Yet, decoding has emerged as the smallest contributor to reading comprehension in the present study's model in contrast to studies conducted on children (Hoover & Gough, 1990; Koda, 1998). This finding supports the notion that the relationship between decoding and reading comprehension decreases with increasing age, a conclusion observed by García and Cain (2014) in a meta-analysis which included readers ages 5 to 53.

Jeon and Yamashita (2014) argued that the relationship between decoding and reading comprehension among the L2 population is fundamentally different from L2 children because adult readers may be heavily influenced by their L1 orthography and L1 reading experiences. In

the present study, the moderate correlation between decoding and reading comprehension found for the Arabic speakers more closely resembles the moderate correlation documented for speakers whose L1 is alphabetic (e.g., Nassaji & Geva, 1999; van Gelderen et al., 2004) as opposed to the weak correlation which was noted for speakers whose L1 is logographic or semi-logographic (e.g., Jiang et al., 2012; Kato, 2009). To contextualize this finding, one must consider the unique nature of the Arabic language, which is the L1 of the present study's participants. Arabic language can appear in two forms, highly transparent when diacritical marks are present (which is the case for children's textbooks), and somewhat opaque in adult texts with the absence of diacritical marks. The alphabet of Arabic itself is different from the English alphabet. Yet, the correlation between decoding and reading comprehension in the present study is nearly equivalent to the one noted among Dutch speakers in van Gelderen et al.'s (2004) study and the one noted among Farsi speakers in Nassaji & Geva's (1999) study. Taken together, one can conclude that even with the somewhat opaque nature of the Arabic language that adults deal with when reading texts without diacritical marks, and even with the fact that the Arabic alphabet system is different from the English alphabet system, the relationship between decoding and reading comprehension in English among Arabic L1 speakers is comparable to adults whose L1 is an alphabetic language which employes the same alphabet system as English. This finding adds to the limited body of research available about L2 adult speakers of English, especially in terms of the relationship between L1 and L2 orthography and the extent to which L1 orthography relates to L2 decoding skill.

In contrast to the author's hypothesis, strategic knowledge did not statistically significantly contribute to reading comprehension in the present study's model. This finding is also not in line with previous research which demonstrated that skilled readers tend to use reading comprehension strategies more than their less skilled counterparts. In various previous

studies on adult bilingual and L2 English readers, higher levels of using reading comprehension strategies were associated with higher levels of reading comprehension achievement, and less skilled readers were less likely to use reading comprehension strategies among Arabic, Chinese, Farsi, French, and Vietnamese speakers (Alfarwan, 2021; Cai & Lei, 2021; Do & Phan, 2021; Frid & Friesen, 2021; Guo, 2018; Taki, 2016). Various studies which investigated interventions and programs for developing reading comprehension strategies among English L2 adults from various language backgrounds (Korean, Pakistani, Persian, Taiwanese, Thai) noted that the development of knowledge of reading comprehension strategies contributed to better reading comprehension achievement (Akkakoson, 2013; Chin, 2019; Cho & Ma, 2020; Qanwal & Karim, 2014; Talebi, 2012). The contradiction in findings can possibly be explained by the Language Threshold Hypothesis (Cummins, 1981, 2000) which indicates that L2s need to reach a certain level of proficiency, or threshold, in their L2 before they are able to gain cognitive benefits in L2, and in order for cognitive skills to transfer from L1 to L2. Hence, it is possible that the participants of the present study had not reached the threshold which would have enabled them to implement their knowledge of reading strategies effectively. Another possible explanation can be tied to instructional procedures. Stahl (2008) found that although the development of some reading strategies had a positive effect on reading comprehension, the participants' efficiency in using their strategic knowledge seemed to be influenced by the extent to which the teacher scaffolded the instructional procedures. In the present study, the participants were not instructed to use their strategic knowledge as part of the procedures. An additional explanation might be the self-reported measure used in the present study, which may have led to bias in pushing the scores to overestimate the participants' knowledge and use of reading strategies. Note that a similar finding was reported by Kasemsap and Lee (2015) who found no statistically significant difference between the

higher and lower level proficient English L2 Thai students in terms of their overall use of reading comprehension strategies (excluding the retrieval strategy), Darjito (2019) who studied students attending a regional university in Indonesia and reported no statistically significant relationship between their English academic reading skills and metacognitive reading awareness, and Feller et al. (2020) who reported a negative association between the self-reported use of support strategies and reading proficiency. All in all, this finding necessitates further research.

The findings of the present study can be helpful for informing university language educators about which skills they need to focus on to support their English language learners' reading comprehension achievement in general, especially those who are teaching Arabic speakers. Based on the findings of this study, building college students' language reservoir (vocabulary and grammar) should be at the heart of English language programs. It is also important to continue to develop adult students' silent reading fluency and decoding skill without presuming that students have mastered these skills entirely during their early school years and prior to entering university, given that these skills are generally not tackled at the university level. While intervention research on L2 adult learners is scarce, there are some studies showing promising findings for interventions targeting vocabulary knowledge (e.g., AlRamadhan, 2020; Chang, 2011; Knaak et al., 2021; Masrai & Milton, 2018; van den Ven et al., 2019; Zhang & Graham, 2020), grammar knowledge (e.g., Ebadi et al., 2014; Lucas & Yiakoumetti, 2019; Tsai, 2020), decoding (e.g., Booth & Brennan, 2015; Coats et al., 2017), and fluency (Ari, 2011, 2015). Yet, there is still no consensus about the best practices for developing these skills among English L2 speakers.

Limitations of this study include the researcher's inability to separate the contribution of vocabulary knowledge from the contribution of grammar knowledge to reading comprehension achievement, given how these two

constructs were tested in one assessment. Additionally, the data does not allow for formulating a conclusive idea about why strategic knowledge did not demonstrate statistically significant contributions to reading comprehension achievement among the study's participants. Future research should look into the most effective interventions for boosting L2 college students' vocabulary knowledge, grammar, fluency, and decoding skill among English L2s from various language backgrounds and find specific strategies that lead to superior results unique to English learners from each language background.

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The author declares no conflict of interest to disclose.

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