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Vocabulary, Grammar, and English Use Experience in Adult Online EFL Learners' Comprehension: An SEM Approach

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ABSTRACT

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This study, using structural equation modeling and multiple regression analyses, investigated the contribution of vocabulary and grammar to adult online EFL learners' listening and reading comprehension. It also examined how their English use experience impacts proficiency in these four areas. Additionally, it explored which subcomponents of vocabulary, grammar, and English use experience significantly influence specific language skills. The main findings are as follows: first, grammar contributed more to L2 comprehension than vocabulary for these generally low-level English learners. Second, their English use experience was quite limited, showing a significant but minimal impact only on vocabulary and grammar. Third, among the four vocabulary levels (Basic and Levels 1~3), Level 2 vocabulary was the strongest predictor for both listening and reading, while different grammar subcomponents were identified as significant for each. Lastly, among the various aspects of English use experience, time spent viewing audiovisual materials and interacting with native speakers were included in the final regression models across language skills. Theoretical and practical implications of these findings were discussed to offer valuable insights into adult online EFL learners, an emerging English learner population.

KEYWORDS

adult online EFL learners, linguistic knowledge, vocabulary, grammar, listening and reading comprehension, English use experience

1. Introduction

The significance of vocabulary and grammar knowledge in second language (L2) comprehension has been a central focus in L2 acquisition research for decades, as highlighted by numerous meta-analyses (e.g., Choi and Zhang 2021, In'nami et al. 2022, Jeon and Yamashita 2022, Zhang and Zhang 2022). This focus is particularly relevant in contexts where English as a foreign language (EFL) is taught primarily through formal education rather than everyday communication. In these settings, learners typically receive explicit instruction in vocabulary and grammar from an early stage, relying on this linguistic knowledge to comprehend written and spoken discourse (Mecartty 2000). However, only a limited number of studies have explored the relative importance of vocabulary and grammar knowledge in EFL reading comprehension (e.g., Chen and Mei 2024, Kim and Cho 2015, Shiotsu and Weir 2007, Zhang 2012), and even fewer have specifically addressed listening comprehension (e.g., Mecartty 2000, Vafaee and Suzuki 2020). Thus, examining the interplay among L2 vocabulary, grammar, and comprehension remains an important area of further research across various educational levels and learner populations, offering both theoretical insights and practical implications for foreign language education.

With the growth of online education, particularly among adult learners, L2 learning contexts have expanded beyond traditional classroom settings. As lifelong learning becomes increasingly important, many adults are turning to online educational programs to learn English or other foreign languages, attracted by the flexibility and convenience of online learning (Hartnett 2016). Unlike traditional students, adult online English learners represent a diverse demographic, varying in age, educational background, and life experience. These learners come from a range of English learning contexts, from formal education to less structured environments such as homeschooling or living overseas (Song et al. 2017). Therefore, it is crucial to include this diverse group in research to deepen our understanding of how fundamental linguistic knowledge, such as vocabulary and grammar, affects L2 comprehension across different learner populations. Notably, to the author's knowledge, no study has yet specifically addressed this issue among adult online EFL learners.

Furthermore, given the diverse backgrounds of adult online learners in an EFL context, their English use experiences are likely to vary greatly, which makes it essential to explore how these experiences influence their English proficiency. Research on incidental L2 learning has shown that learners can improve their language skills through repeated exposure to comprehensible input (e.g., Chang and Renandya 2017, Pigada and Schmitt 2006). Common sources of out-of-school English exposure for EFL learners include Internet surfing, watching videos, listening to songs, reading books, or engaging in communication with native English speakers (Lindgren and Muñoz 2013). As adult learners, they may repeatedly engage in various authentic English use activities depending on their individual circumstances. These learner-related factors could influence the incidental learning of different aspects of English knowledge and skills, warranting further investigation.

This study uses structural equation modeling (SEM) as the main analysis method to examine the relationships among five key factors—vocabulary, grammar, listening, reading, and English use experience—based on adult online EFL learners' test performance and questionnaire responses. Unlike traditional methods such as correlation or regression, SEM incorporates both observed and latent variables, enabling the modeling of complex relationships among them (Ullman 2006). Additionally, given that vocabulary (e.g., Nation 2001) and grammar (e.g., Purpura 2004) are multidimensional constructs, this study investigates which of their subcomponents significantly contribute to adult online EFL learners' listening and reading comprehension. Furthermore, it examines which aspects of English use experience influence these learners' linguistic knowledge and comprehension skills. By focusing on specific subcomponents, these analyses aim to identify key areas for targeted instruction. The findings will support online learners in their self-directed learning and assist educators in

designing curricula tailored to their needs. To achieve these goals, this study addresses the following research questions:

1) How do vocabulary and grammar knowledge contribute to adult online EFL learners' listening and reading comprehension?
2) How does adult online learners' English use experience influence their proficiency in vocabulary, grammar, listening, and reading?
3) Which subcomponents of vocabulary and grammar significantly contribute to adult online EFL learners' listening and reading comprehension?
4) Which aspects of English use experience significantly contribute to adult online learners' proficiency in vocabulary, grammar, listening, and reading?

2. Literature Review

2.1 The Relative Contributions of Vocabulary and Grammar to L2 Reading Comprehension

Since Alderson's (1984) seminal discussion of whether L2 reading difficulties arise from language issues or reading problems, research has consistently focused on the relationship between L2 linguistic knowledge—specifically vocabulary and grammar—and reading comprehension. These two components of linguistic knowledge are widely recognized as the strongest predictors of L2 reading performance (Jeon and Yamashita 2022, Zhang 2012). Various studies have examined their relative contributions, employing both simple correlations (e.g., Guo and Roehrig 2011, Jeon 2012) and more advanced techniques like regression analysis and SEM (e.g., Kim and Cho 2013, Shiotsu and Weir 2007). However, findings remain inconsistent: some research highlights the stronger impact of vocabulary knowledge (e.g., Guo and Roehrig 2011, Mecartty 2000, Zhang 2012), while others emphasize the importance of grammar knowledge (e.g., Nergis 2013, Shiotsu and Weir 2007). Moreover, several studies indicate more nuanced results when considering learner-related factors (e.g., Lee 2016, Raeisi-Vanani and Baleghizadeh 2022).

For instance, Zhang's (2012) SEM study explored the relationships among Chinese EFL college students' vocabulary knowledge (breadth and depth), grammar knowledge (implicit and explicit), and reading comprehension (coherence, inference, and gist). The findings revealed that vocabulary knowledge was significantly associated with reading comprehension, whereas grammar knowledge had a minimal impact after controlling for vocabulary knowledge. Similarly, Mecartty's (2000) study showed that vocabulary knowledge in breadth was more strongly associated with L2 Spanish learners' reading comprehension than grammar knowledge. Vocabulary knowledge remained a significant predictor even after controlling for grammar, whereas grammar knowledge did not have a unique effect once vocabulary was considered.

Conversely, Shiotsu and Weir (2007) conducted a series of SEM studies. Across all studies, the findings consistently demonstrated the relative superiority of syntactic knowledge over vocabulary breadth in predicting English reading comprehension performance. Likewise, Nergis (2013) explored how vocabulary depth, syntactic awareness, and metacognitive awareness contributed to Turkish EFL undergraduates' reading comprehension. The findings indicated that compared to vocabulary depth, syntactic awareness had a stronger correlation with reading comprehension. A subsequent multiple regression analysis further showed that syntactic awareness was a significant predictor of academic reading comprehension, while vocabulary depth did not independently contribute

to the prediction.

A recent study by Chen and Mei (2024) reported mixed findings among English majors in China. Results from the multiple regression analyses indicated that grammar knowledge had a greater influence on reading comprehension than vocabulary knowledge, both at the construct and subskill levels. However, the path analysis provided a complementary perspective on the relationship between vocabulary, grammar, and reading comprehension. It revealed a mediation pattern where vocabulary acts as the starting point for reading comprehension, with grammar exerting a smaller direct impact on reading comprehension than vocabulary in this model.

Several studies on Korean EFL learners across various educational levels have yielded mixed results. For instance, Shin and Kim (2012), using SEM analysis, found that vocabulary was a stronger predictor of reading performance than grammar knowledge among Korean college students. Similarly, Huh (2014) observed a stronger relationship between vocabulary knowledge and reading comprehension in Korean middle schoolers. However, Kim and Cho (2013), employing multiple regression analysis, reported that grammar knowledge had greater predictive power than vocabulary for reading comprehension among Korean high school male students.

Finally, studies considering L2 proficiency further underscore the complexity of this relationship. Raeisi-Vanani and Baleghizadeh (2022) used multi-group structural equation modeling to compare the relationships among vocabulary, grammar, and reading comprehension between more and less proficient EFL college students in Iran. Vocabulary had a stronger impact on reading comprehension for the more proficient group, while grammar worked better for the less proficient group. Similarly, Lee (2016) found that, among Korean EFL college students, vocabulary was more strongly associated with reading comprehension in the higher-level group, whereas grammar was more predictive in the lower-level group. However, Kim and Cho (2015) reported contrasting findings among Korean high school students: grammar was the key predictor of reading performance in the high proficiency group, while vocabulary played that role in the intermediate group. Neither was significant for the low proficiency group.

2.2 The Contribution of Vocabulary and Grammar to L2 Listening Comprehension

L2 listening comprehension has received less research attention compared to reading, partly due to challenges in observing cognitive processes involved in listening and the complexity of spoken language, such as accents and speech rates (e.g., Buck 2001, Vandergrift and Goh 2012). Nonetheless, research generally supports Hulstijn's (2019) core-peripheral model, which posits that core linguistic knowledge correlates more strongly with L2 listening performance than peripheral factors, such as cognitive and affective factors (e.g., Satori 2022, Wang and Treffers-Daller 2017). For instance, Kim et al. (2022) investigated the effects of L2 linguistic knowledge (as a combination of vocabulary and grammar knowledge) and cognitive abilities such as working memory capacity on L2 listening comprehension, confirming the pivotal role of linguistic knowledge in predicting L2 listening comprehension. Similarly, Wang and Treffers-Daller (2017) found that vocabulary size was the strongest predictor of Chinese EFL adult learners' listening comprehension, followed by general language proficiency, with metacognitive awareness playing a smaller role.

Vocabulary has been widely studied in relation to L2 listening, with most research focusing on vocabulary breadth measured in the written modality (Vafaee and Suzuki 2020). Studies consistently emphasize the importance of vocabulary breadth in L2 listening (e.g., Stæhr 2008, Wang and Treffers-Daller 2017). For instance, Stæhr (2008) and Mecartty (2000) found a strong correlation between vocabulary breadth and L2 listening comprehension. Some research has examined both breadth and depth. Stæhr (2009) reported significant correlations between both dimensions and advanced EFL learners' listening comprehension (r = 0.70 for breadth,

r = 0.65 for depth). Conversely, Luo et al. (2021) found that the impact of breadth and depth varies by L2 listening measure: neither predicted performance on a test of literal comprehension, but vocabulary depth alone predicted inferential comprehension.

Unlike vocabulary knowledge, the role of grammar or syntactic knowledge in L2 listening has received limited empirical attention (Vafaee and Suzuki 2020). Furthermore, most related studies have examined grammar knowledge alongside vocabulary knowledge rather than focusing on grammar in isolation. For example, Mecartty (2000), investigating both listening and reading comprehension, found that while both vocabulary and grammar were significantly correlated with L2 listening, grammar knowledge did not independently predict listening comprehension when vocabulary effects were accounted for. Vafaee and Suzuki (2020), using SEM analysis, demonstrated that both vocabulary and grammar significantly contributed to L2 listening comprehension, although vocabulary had nearly twice the effect size of grammar. Similarly, Oh and Lee (2014) indicated the unique contribution of grammar knowledge to L2 listening in both bottom-up and top-down listening tasks, even when controlling for other linguistic variables.

Some studies have taken L2 learners' proficiency levels into account. For example, Matthews (2018) examined the relationship among three levels of aural vocabulary knowledge (AVK), L2 listening comprehension, and overall L2 proficiency. Levels 1 and 2 represented high-frequency words, while Level 3 covered mid-frequency words. Regression analysis showed that AVK across all levels uniquely predicted L2 listening comprehension for the entire group. However, for the high proficiency learners, only Levels 2 and 3 were predictive, while Level 1 was significant for the lower proficiency learners. Similarly, Satori (2022) found that vocabulary and metacognitive knowledge were more strongly linked to L2 listening in higher-proficiency learners, suggesting that skilled listeners rely on knowledge-based resources to construct a mental representation of the text (Vandergrift and Goh 2012).

2.3 L2 Learning Through Authentic Language Use Experiences

An increasing body of L2 research has explored the benefits of exposing learners to authentic language use experiences, such as viewing audiovisual materials, reading books, listening to news and lectures, or participating in study abroad programs, particularly for incidental vocabulary and grammar learning through different input modes (e.g., Çekiç 2024, Muñoz et al. 2023, Pavia et al. 2019).

Audiovisual material has gained significant attention in recent research. Muñoz et al. (2023) examined the role of exposure frequency, subtitles, and captions, as well as the influence of L2 proficiency on language acquisition. They found positive correlations between repeated exposure and learning gains, with captions benefiting adults with upper-intermediate proficiency more than adolescents with elementary proficiency. These findings suggest a proficiency threshold beyond which learners benefit more from supports. Similarly, Pattemore and Muñoz (2020) found that intermediate learners (B1-B2) gained more from captioned audiovisual exposure than advanced learners (C1-C2), emphasizing the importance of selecting appropriate audiovisual materials and the role of comprehensible input in L2 learning (e.g., Chang and Renandya 2017, Pigada and Schmitt 2006).

Research on extensive reading for L2 learning highlights its effectiveness in improving reading ability, vocabulary, grammar, and overall proficiency (e.g., Aka 2019, Elley and Mangubai 1983). However, these effects take time to manifest. Yamashita (2008) found that general reading skills improved relatively quickly, but gains in linguistic abilities were slower, likely because linguistic forms are less salient to L2 readers. Similarly, studies on vocabulary acquisition through extensive reading show that gains require a wide range of encounters, from 6 to over 20 (e.g., Waring and Takaki 2003, Webb 2007), underscoring the slow, cumulative effect of extensive

reading on language acquisition.

Fewer studies have examined listening as a source of incidental L2 learning, primarily focusing on vocabulary acquisition (e.g., van Zeeland and Schmitt 2013, Vidal 2003). Listening requires more encounters for vocabulary learning than reading, with estimates ranging from 4–5 (Vidal 2003) to over 15, and in some cases, up to 50 or more (Brown et al. 2008). Studies comparing listening with reading revealed that reading is generally more effective for vocabulary learning (Brown et al. 2008), with L2 proficiency significantly influencing vocabulary gains (Vidal 2003). In listening, L2 proficiency plays a greater role than frequency, likely due to the difficulty of inferring meaning from fleeting auditory input (van Zeeland and Schmitt 2013).

Studying abroad is widely considered one of the most effective environments for L2 gains due to high-quality and abundant input (Borràs and Llanes 2021). Research has focused on general proficiency, specific skills, and vocabulary and grammar gains. Xu's (2019) meta-analysis found that study abroad had a greater impact on oral and lexical complexity than on written and syntactical complexity. Tseng et al. (2024) found that speaking, writing, and receptive vocabulary benefited most, with moderate listening gains, but no significant improvements in grammar or reading. Regarding proficiency, Tseng et al. (2024) found that both beginners and advanced learners showed greater gains than intermediate learners, although some studies suggest lower-proficiency learners benefit more due to having more room for improvement (Li 2014).

So far, key findings from previous studies on three topics relevant to the current research have been discussed. This body of work suggests that the inconsistent results across studies may be due to various moderating factors. These include learner-related variables, such as L2 proficiency, L1 background, and educational level, as well as instrument-related factors, like differing definitions of vocabulary and grammar or variations in the types and difficulty of the measures used. Given the diverse backgrounds of adult online learners, it is essential to investigate how their vocabulary and grammar knowledge influences their English comprehension, particularly in relation to their varied English use experiences.

3. Method

3.1 Participants

The participants in this study were adult English learners enrolled in five English courses—conversation, listening, reading, writing, and grammar—at a cyber university in Seoul, South Korea, during the Fall semester of 2022. Out of the 479 students enrolled, 163 voluntarily participated in the study, completing four modules (vocabulary, grammar, listening, and reading) from a diagnostic English assessment battery developed by Song et al. (2017) and responding to a survey on their English use experiences. The majority of participants were native Korean speakers, with a very small number of native speakers of other languages residing in Korea. The participants spanned a broad age range, with the majority in their 20s (40%), 30s (30%), and 40s (25%). Around two-thirds of the participants were women. Regarding their academic majors, approximately 75% were studying in the departments of Practical Foreign Languages, Child English, or Teaching Korean to Speakers of Other Languages, while the remaining 25% were from other majors.

As noted earlier, adult online learners are a diverse and heterogeneous group, varying in age, educational background, and English learning contexts. For instance, some students enrolled in the online university after passing a high school equivalency exam, while others returned to expand their knowledge and skills long after graduating from college. Additionally, some students had previously studied abroad but returned home to complete

their degrees, whereas others were living abroad during enrollment. This diversity naturally results in a wide range of English proficiency levels with varying strengths and weaknesses across different language skills (Song et al. 2017). Despite these differences, many adult online learners perceive their English skills as insufficient, which is often the case. This perception is frequently due to neglecting the language during formal education or having limited exposure to structured English instruction, leading them to seek more formal and systematic learning through online education. Based on the researcher's teaching experience and the American Council on the Teaching of Foreign Languages (ACTFL) Proficiency Guidelines, most participants' English proficiency levels are estimated to range between Novice-High and Intermediate-Mid, with a few exceptions (Song et al. 2017).

3.2 Instruments and Data Collection

The instruments used in this study include five modules—vocabulary, grammar, listening, reading, and a survey—derived from the English diagnostic assessment battery, as previously mentioned. Designed to evaluate students' readiness for English learning at the cyber university, the assessment is administered to incoming students each semester on a voluntary basis. Based on the results of each module, participants receive feedback on their strengths and weaknesses in English proficiency, along with recommendations for English courses that align with their levels (Song et al. 2017). Below are the descriptions of test specification for each module.

Vocabulary. The vocabulary module consists of 60 items, divided into three levels (1, 2, and 3). To develop the vocabulary items, a total of 89,567 words from the materials used in 10 English courses at the cyber university were analyzed in terms of frequency and range, using the BNC-COCA25 list developed by Nation and Webb (2011) as a reference. As a result of the analysis, 3,797 words were extracted and categorized into four levels (Basic, 1, 2, and 3). The first 300 words, which appeared in all 10 course materials with a frequency of over 40, were excluded from item development. Level 1 1000 words appeared in 4 to 8 course materials with a frequency of 6 to 35. Level 2 1000 words appeared in 2 to 4 materials with a frequency of 2 to 6, and Level 3 words appeared only once. Twenty words were carefully selected from each level for item development. The items were presented in a multiple-choice format, requiring participants to select a synonym or paraphrase, focusing on measuring vocabulary breadth.

Grammar. The grammar module consists of 33 multiple-choice items covering 11 subcomponents of grammar knowledge, focusing on key areas commonly addressed in high school English textbooks published in Korea. The subcomponents were selected reflecting Purpura's (2004) definition of grammar focusing on form (e.g., verb tenses, parts of speech, word order) and meaning (e.g., modality, conditionals, negation). The test includes 12 error correction items and 21 sentence completion items, all presented in decontextualized simple sentences and developed in a multiple-choice format.

Listening. The listening module was developed based on the 2015 Revised National English Curriculum (Ministry of Education 2015) to define the subskills to be measured. This curriculum was selected for its comprehensive coverage of L2 listening subskills. It was assumed to serve as a standard for assessing Korean adult online learners' readiness for English learning at the cyber university, aligning with the national standards at the Korean high school level. As a result, the listening module focuses on everyday English use, excluding academic or English for Specific Purposes (ESP) domains. Ten subskills were selected, such as understanding main ideas, identifying details, and inferring speakers' feelings. For each subskill, three to five multiple-choice items were developed, resulting in a total of 38 test items. Notably, to accommodate adult EFL learners with limited exposure to spoken language, lower-level subskills such as discriminating sounds and recognizing isolated words or phrases were included. This follows research recommendations to integrate basic skills into diagnostic tests (Harding et al.

2015, Hughes 2003). The items targeting low-level subskills were presented as individual words or sentences, while the other items featured short passages with three to six turns, each based on a one-passage-one-item format.

Reading. The reading module was also developed using the 2015 Revised National English Curriculum as a reference. However, unlike the listening module, the reading module includes more advanced tasks aligned with the national standards, including five lengthy expository texts (250-300 words) and five shorter practical texts (100-150 words) on a wide range of topics. The module consists of nine subskills, such as identifying major/minor details and inferring the meaning of unfamiliar words. Three items were developed for each subskill, resulting in a total of 27 multiple-choice items.

Survey. In addition to the four language modules, a brief survey consisting of eight multiple-choice items was developed to inquire about participants' English learning and use experiences. The survey covers aspects such as time spent in formal and private education, time spent in English-speaking regions, and time spent engaging in various English use activities per week.

Data collection. The developed test modules and the survey were administered through an online assessment system of the cyber university. The system remained open for three weeks, allowing students to access it at any time during that period to take the tests. Students were allowed to complete each test module within 50 minutes. Students were not required to take all the modules at once; instead, they could log into the site with their accounts and take each module whenever they wished. As a result, the number of final test-takers varied by module. In this study, only the data from 163 students who completed all five modules were included in the analysis. All the English items were automatically scored with 1 point for a correct response and 0 points for an incorrect response. The test specifications for the five modules are presented in Table 1.

Table 1. Test Specification of the Five Modules

Module	# of Subskills/Subcomponents	# of Total Items	Item Type	Time Allotment
Vocabulary	3	60 (20)	Multiple-choice	50 min.
Grammar	11	33 (3)		
Listening	10	38 (3~5)		
Reading	9	27 (3)		
Survey	--	8		5 min.

Note. The number of items targeting each subskill or subcomponent is shown in parentheses.

3.3 Data Analysis

3.3.1 Statistical Analyses Employed in the Study

The main statistical analyses used in this study are as follows. To address the first research question, which examines the effects of vocabulary and grammar knowledge on English comprehension among adult online EFL learners, structural equation modeling (SEM) was employed, utilizing four latent language factors (vocabulary, grammar, listening, and reading) along with their observed variables. For the second research question, which explores the effects of English use experience on learners' proficiency in linguistic knowledge and comprehension, a separate SEM analysis was performed to assess the structural relationships among the four language factors and the English use experience factor, including their respective observed variables. To address the third research question, which aims to identify significant subcomponents of vocabulary and grammar for listening and reading comprehension, stepwise regression analyses were conducted. Vocabulary and grammar subcomponents served as predictors, while total listening and reading scores were the dependent variables. Similarly, for the fourth research question, which investigates significant aspects of English use experience on the four language factors,

stepwise regression analyses were performed using English use experience variables as predictors and total scores for each language factor as the dependent variables. By supplementing SEM analyses with multiple regression, this study combines the strengths of both methods: SEM captures broader relationships among latent factors, while regression identifies specific subcomponents that directly contribute to observed outcomes. The data were analyzed using SPSS Version 21 and EQS Version 6.1 (Bentler and Wu 2002).

3.3.2 Creating Observed Variables for SEM Analyses

As shown in Table 1, each module contains between 8 and 60 items, designed to measure 3 to 11 subskills or subcomponents. Given the relatively small sample size of 163 participants for SEM analyses, item parceling was conducted to address the issue of having too many observed variables. This process involved combining several items or subcomponents into fewer observed variables per language factor, in line with standard SEM guidelines, which recommend 5 to 10 subjects per variable (Bentler and Chou 1987). While item parceling can be controversial in SEM, it is generally accepted when researchers thoroughly understand the dimensionality of the items (Little et al. 2002). In this study, parceling was conducted following established recommendations to combine conceptually similar items that assess the same construct (Kishton and Widaman 1994). The detailed procedure is described below.

For vocabulary, each level, defined by frequency and range, was treated as a distinct construct, as the level distinctions were based on the BNC-COCA25 list developed by Nation and Webb (2011). The scores for 20 items at each level were then combined, resulting in three observed variables labeled VOCA1, VOCA2, and VOCA3.

The grammar items were reclassified using Purpura's (2004) framework of grammatical knowledge, which emphasizes both form and meaning. This study focused on morphosyntactic forms, further divided into 'morphological form' and 'syntactic form', as well as 'grammatical meaning', following the distinctions made by Chen and Mei (2024). Morphological form refers to grammatical categories that involve morphological variations, such as plural "-s" or past tense "-ed." In contrast, syntactic form pertains to grammatical categories that connect components of simple or complex sentences (Chen and Mei 2024). Grammatical meaning relates to how grammatical structures, like tense or modality, convey meaning within context. For example, the knowledge required to choose the correct form of a verb in the sentence, "*Mike, stop _____ a bike here. It's too dangerous*," demonstrates an understanding of syntactic form. In contrast, selecting the appropriate connective for the sentence, "*I went to sleep early, _____ I was tired*," reflects an understanding of grammatical meaning. After a thorough content analysis of the 33 grammar items based on these categories, each item was classified into one of the three subcomponents. The scores for items within each subcomponent were then combined, resulting in three observed variables: GMORF (morphological form), GSYNF (syntactic form), and GMEAN (grammatical meaning).

For reading, the nine subskills, initially selected for item development, were reclassified based on a taxonomy of comprehension subskills identified by previous empirical studies, distinguishing between the comprehension of explicit and inferential meaning (e.g., Song 2008). Comprehending inferential meaning was further divided into global and local inferencing (e.g., Cain and Oakhill 2014, Long and Chong 2001). Consequently, identifying major and minor details were categorized as comprehending explicit meaning. Inferencing the main idea, author's purpose, and mood or tone were classified under global inferencing, while inferencing the meaning of unfamiliar words, intended meaning, logical relationships, topics by filling in the gaps were categorized as local inferencing. This resulted in three observed variables: REXP (explicit comprehension in reading), RGLOB (global inferencing in reading), and RLOCAL (local inferencing in reading).

The reclassification of the 10 listening subskills differed slightly. Given the simplicity of the topics, linguistic complexity, and length of the aural texts in the listening module, distinguishing between global and local

inferencing was deemed impractical. Therefore, the listening subskills were grouped into sound discrimination, explicit comprehension, and inferential comprehension, resulting in three observed variables: LDIS (discriminating sounds in listening), LEXP (explicit comprehension in listening), and LINF (inferential comprehension in listening).

Lastly, for the English use experience factor (abbreviated as EUSE), item parceling was applied to some of the eight survey questions. Responses to the questions regarding the time spent receiving formal and private English education were combined to create a variable called EDU, representing the total time spent in English education. Similarly, responses to the questions about the length of stay in English-speaking regions and the time spent conversing with English speakers per week were combined to create a variable labeled NATIVE, which relates to the experience of interacting with English speakers. Other survey questions remained as individual variables, resulting in a total of six observed variables. All 18 observed variables, along with their definitions and descriptive statistics, are provided in Table 3.

3.3.3 Preliminary Statistical Analyses

The descriptive statistics for the total scores of each language module and the 18 observed variables are presented in Tables 2~3. Based on the percentage mean values presented in Table 2, the difficulty level of the modules, in order, was reading, grammar, vocabulary, and listening. In other words, participants in this study performed the poorest in the reading module (54.68%) and the best in the listening module (87.78%). This mean value is notably high and exhibited a highly skewed and peaked score distribution. For the English use experience variables, which were all measured on ordinal scales, the median values are more appropriate than the means for interpreting the central tendency. Regardless of the scale unit for each variable, a median value of 0 signifies "None," indicating no experience with that activity. This suggests that for EWORD, EWRITE, and EREAD, the central tendency reflects no engagement in those activities on average. Overall, the very low median or mean values further indicate that that participants' overall engagement in these aspects of English use was minimal.

Table 2. Descriptive Statistics for Total Scores of Each Language Module (*N*=163)

Module	# of Items	Min-Max	Mean (% score)	*S.D.*	Skewness	Kurtosis
Vocabulary	60	11-60	44.018 (73.36)	11.730	-.972	.088
Grammar	33	3-33	21.436 (64.95)	7.443	-.403	-.824
Listening	38	8-38	33.356 (87.78)	6.178	-2.358	5.924
Reading	27	4-25	13.669 (54.68)	5.120	-.007	-.935

In this study, a series of nested SEM models were tested to address Research Questions 1 and 2. The models analyzing the relationships among the four language factors (vocabulary, grammar, listening, and reading) included 12 observed variables. Models examining the effects of English use experience on these factors added six more variables, resulting in 18 observed variables (see Table 3). To select an appropriate estimation method, normality was evaluated using skewness, kurtosis, and Mardia's normalized multivariate kurtosis. Table 3 shows that some language variables, especially the three listening subskills, deviated from normality. For the 12-variable model, Mardia's kurtosis exceeded 6, violating the multivariate normality assumption. For the 18-variable model, Mardia's kurtosis was 3.7, indicating moderate non-normality (Bentler 2004). Based on these normality assessments, the Robust Maximum Likelihood (RML) estimation method was selected for both SEM models to account for the observed deviations from normality (Bentler 2004). Finally, as shown in Table 4, the reliability estimates for both variable sets were approximately 0.9, which is satisfactory, especially given the relatively small number of variables included in each set.

Table 3. Descriptive Statistics for 18 Observed Variables (*N*=163)

Variable	Definition	Min-Max	Mean	*S.D.*	Skewness	Kurtosis
VOCA1	Vocabulary Level 1	0-20	16.374	3.194	-1.575	2.423
VOCA2	Vocabulary Level 2	0-20	14.552	4.747	-1.129	.228
VOCA3	Vocabulary Level 3	0-20	13.092	5.010	-.463	-.815
GMORF	Morphological form in grammar	0-5	2.902	1.532	-.187	-1.043
GSYNF	Syntactic form in grammar	0-18	12.785	4.582	-.339	-.952
GMEAN	Grammatical meaning	0-8	5.749	1.938	-.782	-.117
LDIS	Discriminating sounds in listening	0-10	8.779	1.540	-1.708	3.246
LEXP	Explicit comprehension in listening	0-14	13.963	2.802	-2.192	5.184
LINF	Inferential comprehension in listening	0-14	10.614	2.234	-2.477	6.345
REXP	Explicit comprehension in reading	0-6	3.252	1.500	-.294	-.691
RGLOB	Global inferencing in reading	0-9	3.626	1.722	.207	-.116
RLOCAL	Local inferencing in reading	0-12	6.791	2.960	.091	-.968
EVIEW	Time spent viewing audiovisual materials	0-3	1.055(1)	.964	.642	-.504
EWORD	Time spent memorizing vocabulary	0-2	.522(0)	.622	.775	-.384
EWRITE	Time spent writing (e.g., emails, online posts)	0-2	.417(0)	.692	1.375	.463
EREAD	Time spent reading (e.g., books, articles)	0-2	.417(0)	.665	1.329	.480
NATIVE	Time spent interacting with native speakers	0-5	1.221(1)	1.511	1.063	.041
EDU	Time spent receiving English education	0-5	2.546(2)	1.532	.089	-1.070

Note. The median values for the English use experience variables are presented in parentheses.

Table 4. Multivariate Kurtosis and Reliability Estimates for Each Variable Set

	12 Language Variable Set	18 Variable Set (12 Language + 6 English Use Experience)
Mardia's Normalized Multivariate Kurtosis	6.0783	3.7137
Cronbach's α	.899	.889

4. Results

4.1 Testing SEM Models

The adequacy of the hypothesized SEM models was evaluated using several fit indices. A non-significant chi-square indicates a strong model fit. The chi-square to degrees of freedom ratio (χ^2/df) should be below 1.5, though values up to 2.5 are acceptable (Kline 1998). Additionally, the Comparative Fit Index (CFI) should be greater than .90 for a good fit (Bentler 1990). Finally, the Root Mean Square Error of Approximation (RMSEA), accounting for model complexity, should be below .05 for a good fit, with values between .05 and .08 considered acceptable (Browne and Cudeck 1992).

4.1.1 The Language Factor Models

To explore the structural relationships among the four language factors—vocabulary, grammar, listening, and reading—two nested models were tested. The first model, labeled the four-language-factor model, included four first-order latent factors (Figure 1), where vocabulary and grammar, correlated with each other, were hypothesized to directly predict listening and reading, respectively. The second model, referred to as the five-language-factor model, expands upon the previous one by introducing a second-order latent factor, labeled 'COMP,' which

represents L2 comprehension. This higher-order factor directly predicts the listening and reading comprehension factors, creating a structure with one second-order factor and four first-order factors (Figure 2). In this model, vocabulary and grammar directly predict COMP, while they influence listening and reading indirectly through it. The inclusion of a common comprehension factor in this second-order model is grounded in both theoretical and empirical evidence, which suggests that L2 listening and reading share many common characteristics, functioning as distinct comprehension skills in different modalities (e.g., Buck 2001, Song 2008).

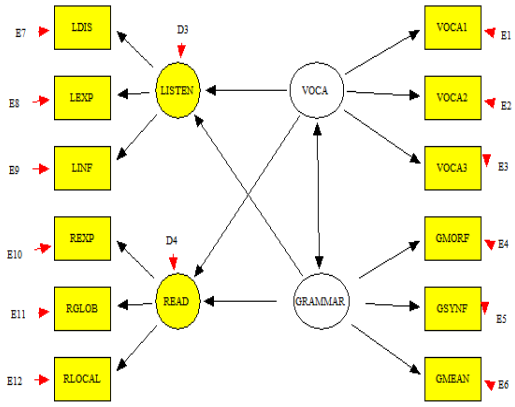

Figure 1. Four-Language-Factor Model

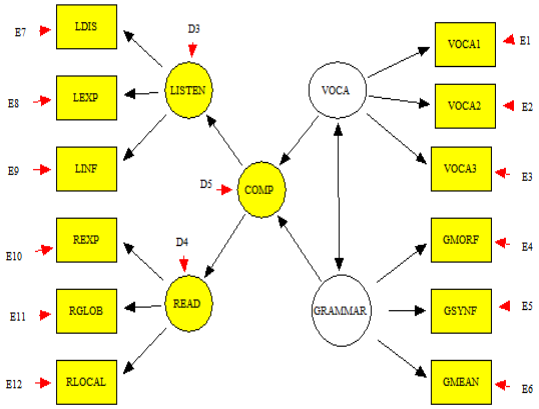

Figure 2. Five-Language-Factor Model

As shown in Table 5, both models fit the data well, but the four-language-factor model fits slightly better. Although the chi-square statistics for both models are significant (p = .00026 and .00001, respectively), the four-factor model has a lower chi-square to degrees of freedom ratio (χ^2/df = 1.84) compared to the five-factor model (χ^2/df = 2.11). The CFI is higher for the four-factor model (.948 vs. .931), and its RMSEA (.073) indicates an acceptable fit, while the five-factor model's RMSEA (.084) suggests a less adequate fit. Therefore, the four-language-factor model, which directly links the four language factors without a comprehension factor, is better suited for this dataset and was selected for further analysis.

Table 5. Fit Indices for Language Factor Models

	χ^2 (p)	χ^2/df	CFI	RMSEA
4-language-factor model	92.1707 (p = .00026)	1.8434	.948	.073
5-language-factor model	107.4910 (p = .00001)	2.1077	.931	.084

The standardized parameter estimates of the four-language-factor model are presented in Table 6. All parameter estimates, except that from vocabulary to the listening factor, were significant at the $p < .05$ level. This suggests that each observed variable serves as a reliable indicator of its associated underlying factor. The vocabulary factor (VOCA) demonstrated high loadings across its observed variables, with VOCA2 showing the strongest relationship (loading = .957), followed by VOCA3 and VOCA1 (loading = .831 and .789, respectively), both contributing substantially to the vocabulary factor. Similarly, the grammar factor (GRAMMAR) exhibited strong loadings, especially for GSYNF (loading = .928), indicating that syntactic knowledge plays a significant role in grammar proficiency. The listening factor exhibited consistently high loadings across its three observed variables, reflecting the factor's strong internal consistency. For the reading factor, both REXP (explicit comprehension) and RLOCAL (local inferencing) were strong indicators, while RGLOB (global inferencing) had a significant but comparatively weaker relationship with the factor (loading = .506). For the listening and reading factors as

dependent variables, both were good indicators of the grammar factor, but only reading showed a small yet significant relationship with the vocabulary factor, while listening had no significant relationship with it. In other words, for the present dataset, grammar plays a more substantial role in both L2 listening and reading, whereas vocabulary has a very small influence on both factors. Furthermore, grammar had a stronger association with listening than with reading, as indicated by path coefficients of .751 and .555, respectively.

Table 6. Standardized Parameter Estimates of the Four-Language-Factor Model

Dependent Variable		Independent Variable			
Status	Label	VOCA	GRAMMAR	LISTEN	READ
Observed	VOCA1	.789			
	VOCA2	.957			
	VOCA3	.831			
	GMORF		.777		
	GSYNF		.928		
	GMEAN		.866		
	LDIS			.852	
	LEXP			.861	
	LINF			.869	
	REXP				.840
	RGLOB				.506
	RLOCAL				.929
Latent	LISTEN	*.110*	.751		
	READ	.179	.555		

Note. The italicized parameter was not statistically significant at the $p < .05$ level.

4.1.2 The English Use Experience (EUSE) Model

An additional SEM model with 18 observed variables was tested to explore the impact of adult online learners' English use experience on their linguistic knowledge and comprehension skills. As shown in Figure 3, this model added the English use experience factor (EUSE) and six observed variables to the previously selected four-language-factor model. Most indices indicated that this model fit the data well, with a chi-square to degrees of freedom ratio of 1.676, a CFI of .937, and an RMSEA of .065. The parameter estimates for the language factors and their observed variables were similar to those in the earlier model. Therefore, the discussion here will focus on the English use experience factor (EUSE) and its associated observed variables, which are uniquely measured in this model.

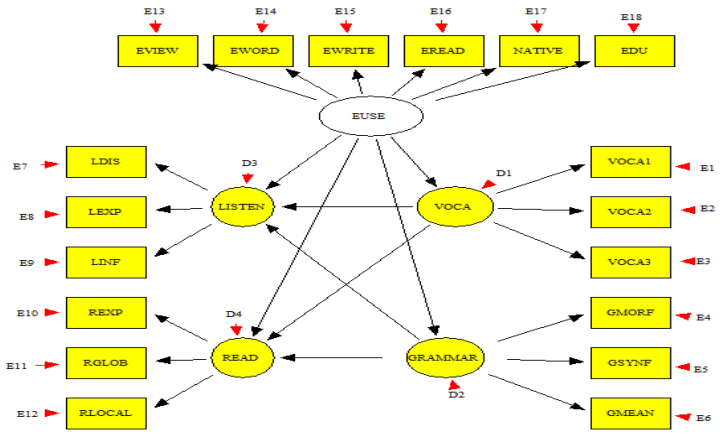

Figure 3. English Use Experience (EUSE) Model

As shown in Table 7, the six observed variables were significant indicators of EUSE. However, EWORD (time spent memorizing words) and EDU (time spent in English education) had weaker relationships, with low factor loadings of .259 and .199, indicating they were not strong measures of English use experience. This suggests that other activities better represent the participants' overall English use experience. Overall, the relationships between EUSE and its observed variables were weaker than those between other language factors and their indicators.

In terms of EUSE's effects on other language factors, it showed significant path coefficients for vocabulary and grammar, but not for listening or reading. Furthermore, its influence on vocabulary and grammar was relatively small, as reflected in the modest path coefficients of .518 and .433, with a slightly stronger association with vocabulary. In summary, while English use experience has a significant, though modest, impact on vocabulary and grammar knowledge, it contributes little to listening and reading comprehension.

Table 7. Standardized Parameter Estimates of EUSE Model (excerpt focusing on EUSE)

Dependent Variable		Independent Variable		
Status	Label	VOCA	GRAMMAR	EUSE
Observed	EVIEW			.703
	EWORD			.259
	EWRITE			.688
	EREAD			.782
	EDU			.199
	NATIVE			.624
Latent	LISTEN	*.206*	.602	*.011*
	READ	.253	.629	*.092*
	VOCA			.518
	GRAMMAR			.433

Note. The italicized parameters were not statistically significant at the $p < .05$ level.

4.2 Multiple Regression Analyses

4.2.1 Vocabulary and Grammar Subcomponents Predicting L2 Comprehension

To identify the significant subcomponents of vocabulary and grammar contributing to L2 comprehension, stepwise regression analyses were conducted, with vocabulary and grammar subcomponents as predictors, with listening and reading comprehension, measured by total test scores, as the dependent variables. As shown in Table 8, among the three vocabulary subcomponents, VOCA2 (Level 2) and VOCA1 (Level 1) were included in the final model of listening and reading, with VOCA2 emerging as the stronger predictor. Specifically, VOCA2 had a stronger influence on reading (β = .381) compared to listening (β = .283).

Table 8. Stepwise Regression for L2 Comprehension with Vocabulary Subcomponents (*N*=163)

Dependent Variable	Model	Unstandardized		Standardized	*t*	*Sig.*	Multicollinearity[1]	
		B	*S.E.*	β			Tolerance	VIF
Listening	VOCA2	.369	.137	.283	2.686	.008	.412	2.428
(R^2 = .267)	VOCA1	.516	.204	.267	2.527	.012	.412	2.428

1 Some scholars, like Allison (1999), recommend stricter multicollinearity thresholds (tolerance < 0.40, VIF > 2.50), but the widely accepted criteria are tolerance < 0.1 and VIF > 10.

Reading	VOCA2	.411	.110	.381	3.734	.000	.412	2.428
(R^2 = .314)	VOCA1	.340	.164	.212	2.082	.039	.412	2.428

Regarding the significant grammar subcomponents for L2 comprehension, stepwise regression analyses identified different sets of predictors for listening and reading, as shown in Table 9. For listening, GMEAN (grammatical meaning) and GSYNF (syntactic form) were included in the final model, showing similar strengths of association with listening (β = .360 and .328, respectively). In contrast, GSYNF and GMORF (morphological form) remained in the final model for reading, showing considerably different contributions to reading (β = .538 and .199, respectively).

Table 9. Stepwise Regression for L2 Comprehension with Grammar Subcomponents (*N*=163)

Dependent Variable	Model	Unstandardized		Standardized	*t*	*Sig.*	Multicollinearity	
		B	*S.E.*	β			Tolerance	VIF
Listening	GMEAN	1.147	.314	.360	3.649	.000	.370	2.704
(R^2 = .425)	GSYNF	.443	.133	.328	3.330	.001	.370	2.704
Reading	GSYNF	.602	.094	.538	6.430	.000	.457	2.190
(R^2 = .488)	GMORF	.666	.280	.199	2.380	.019	.457	2.190

4.2.2 English Use Experience Variables Predicting L2 Linguistic Knowledge and Comprehension

To identify the significant English use experience variables contributing to L2 linguistic knowledge and comprehension, stepwise regression analyses were conducted, with the six English use experience variables as predictors and the total test scores from each of the four language factors (vocabulary, grammar, listening, and reading) as the dependent variables. The results are summarized in Table 10. For vocabulary, EVIEW (time spent viewing audiovisuals) and NATIVE (time spent interacting with native speakers) remained in the final model. For grammar, NATIVE, EDU (time spent receiving English education), and EVIEW were included, with NATIVE emerging as the strongest predictor. Notably, only NATIVE remained in the final model for listening. For reading, both EVIEW and NATIVE were retained. Overall, three of the six English use experience variables—NATIVE, EVIEW, and EDU—remained in the final models across the four language factors, with NATIVE and EVIEW consistently being the best or second-best predictors for all, while EDU was included only for grammar.

Table 10. Stepwise Regression with English Use Experience Variables (*N*=163)

Dependent Variable	Model	Unstandardized		Standardized	*t*	*Sig.*	Multicollinearity	
		B	*S.E.*	β			Tolerance	VIF
Vocabulary	EVIEW	2.524	.992	.207	2.544	.012	.834	1.198
(R^2 = .112)	NATIVE	1.489	.633	.192	2.353	.020	.834	1.198
Grammar	NATIVE	1.529	.378	.311	4.049	.000	.824	1.213
(R^2 = .229)	EDU	.898	.347	.185	2.591	.010	.952	1.050
	EVIEW	1.248	.594	.162	2.102	.037	.820	1.219
Listening	NATIVE	1.308	.305	.320	4.287	.000	1.000	1.000
(R^2 = .102)								
Reading	EVIEW	1.210	.429	.228	2.823	.005	.834	1.198
(R^2 = .130)	NATIVE	.686	.273	.202	2.508	.013	.834	1.198

5. Discussion and Conclusion

5.1 Contributions of Vocabulary and Grammar to L2 Comprehension

The first research question of this study aimed to investigate the contributions of vocabulary and grammar knowledge to adult online EFL learners' comprehension in listening and reading. The results of the SEM analysis for the four-language-factor model, presented in Table 6, indicated that grammar knowledge contributed more to both listening and reading comprehension than vocabulary knowledge. Furthermore, vocabulary knowledge had a small but significant effect on reading comprehension, while its effect was not significant in listening comprehension. These findings are discussed in relation to relevant previous studies, as well as the participants' test performance and the characteristics of the test instruments used in this study.

Regarding the relative role of vocabulary and grammar knowledge in L2 reading comprehension, this study supports the view that grammar contributes more to reading comprehension than vocabulary (e.g., Chen and Mei 2024, Kim and Cho 2013, Nergis 2013, Shiotsu and Weir 2007). Additionally, as Zhang (2012) suggests, the relationship between vocabulary, grammar, and reading comprehension may depend on learners' proficiency levels. For advanced EFL learners, vocabulary plays a more critical role in reading comprehension, while grammar could be a more decisive factor for low level learners (e.g., Lee 2016, Raeisi-Vanani and Baleghizadeh 2022). In this study, the participants are primarily lower-level English learners as described in the Participants section. Thus, the finding that grammar plays a more significant role than vocabulary in their reading comprehension aligns with previous research. Furthermore, this study also reveals that the impact of vocabulary knowledge is more robust in reading comprehension than in listening comprehension. This observation also reflects earlier studies (e.g., Mecartty 2000, Reves and Levine 1988), which have found that while vocabulary knowledge is important for both reading and listening, it is more strongly connected to reading.

However, the finding that grammar knowledge, rather than vocabulary knowledge, plays a greater role in English listening comprehension contrasts with previous research, which typically emphasizes the importance of vocabulary in L2 listening (e.g., Mecartty 2000, Vafee and Suzuki 2020). To better understand this discrepancy, it is helpful to consider the comparative contributions of the four language factors to the participants' general English proficiency. A supplementary SEM analysis revealed that grammar was the strongest indicator of their general English proficiency. The path coefficient from general English proficiency to grammar (β = .943, R^2 = .890) suggests that grammar serves as a foundational skill for adult online learners' English proficiency. In contrast, vocabulary contributed the least to general proficiency (β = .719, R^2 = .517), which may help explain why it played a relatively minor role in predicting listening comprehension.

Furthermore, as shown in Table 2, the listening test was the easiest for participants (mean score = 87.78%), followed by the vocabulary test (mean score = 73.36%). The ease of the listening test created a ceiling effect, where most participants scored near the top, reducing the variability needed to detect the influence of both vocabulary and grammar. However, the ceiling effect may have caused a more pronounced impact on vocabulary, since as it was already the weakest contributor to general English proficiency, leaving less room for it to influence listening scores under these conditions. In contrast, grammar, being the strongest indicator of overall proficiency, maintained its influence despite the limitations of the test design.

To sum up, regarding the impact of vocabulary and grammar knowledge on L2 comprehension, this study supports previous findings that grammar knowledge plays a more prominent role in reading comprehension for

low-proficiency L2 learners, specifically adult online EFL learners in this case. Additionally, vocabulary knowledge appears to play a more significant role in reading comprehension than in listening comprehension, which also aligns with previous research. However, the finding that grammar plays a more significant role than vocabulary in L2 listening may be influenced by the specific test instruments and participant characteristics in this study. Therefore, caution is needed in drawing definitive conclusions from this result.

5.2 Contributions of Language Use Experience to L2 Proficiency

The second research question investigates how adult online learners' English use experience influences their proficiency in vocabulary, grammar, listening, and reading. The SEM analysis for the English use experience (EUSE) model, shown in Table 7, indicates that time spent memorizing English vocabulary (EWORD) and receiving formal English education (EDU) were weak indicators of the participants' English use experience. This suggests that these activities do not represent their authentic English use experience effectively. Instead, the participants' English use in this study primarily reflects real-world activities, such as viewing audiovisual materials, interacting with native speakers, and using English for daily reading and writing.

The findings indicate that adult online learners' English use experience has a small but significant effect on vocabulary and grammar knowledge, with a slightly stronger link to vocabulary (β = .518 and .443, respectively). This generally aligns with previous research suggesting that repeated exposure to authentic input across various modes contributes to linguistic gains, particularly in vocabulary (e.g., Muñoz et al. 2023, Vidal 2003, Yamashita 2008). Given that prior studies emphasize the long-term, repeated exposure required to improve linguistic knowledge through authentic language use (e.g., Waring and Takaki 2003, Webb 2007), the modest effect observed in this study is understandable, as most participants' engagement in authentic English use activities seems insufficient, as suggested by the low median values in Table 3.

As adults from diverse backgrounds, adult online learners likely have varied English use experiences. However, for most, the amount of English use experience may be limited, making it challenging to develop proficiency through unstructured, casual activities such as watching audiovisual materials, reading, or writing emails. With insufficient exposure to authentic input, especially for low-proficiency learners, these activities may lead to incidental gains in basic linguistic knowledge but are unlikely to significantly improve more integrated skills, such as listening and reading comprehension. As previous studies highlight the importance of comprehensible input for incidental learning gains (e.g., Chang and Renandya 2017, Pattemore and Muñoz 2020), low-proficiency adult online learners may not fully benefit from authentic input in various modes, particularly in developing more complex skills like listening and reading.

5.3 Significant Vocabulary and Grammar Subcomponents for L2 Comprehension

The third research question examines which subcomponents of vocabulary and grammar knowledge significantly predict adult online EFL learners' listening and reading comprehension. Table 8 shows that Level 2 vocabulary (VOCA2) and Level 1 vocabulary (VOCA1) were significant predictors of both listening and reading scores, with VOCA2 being the strongest for both. This highlights the substantial influence of Level 2 vocabulary on performance in these areas. As Table 6 indicates, VOCA2 has the highest factor loading for general vocabulary knowledge (β = .957), followed by VOCA3 (β = .831). The exclusion of VOCA3 from the final reading model is likely due to multicollinearity with VOCA2 (r = .765**), meaning VOCA3 did not provide additional predictive value once VOCA2 was included.

From another perspective, as described in the Instruments section, vocabulary levels were categorized based on frequency and range in the cyber university's course materials. An additional analysis of text coverage (tokens) showed that the 300 basic words (excluded from the test) covered 68.41% of the total, Level 1 covered 16.17%, Level 2 covered 4.03%, and Level 3 covered 1.42%, resulting in a total text coverage of 90.03%. Given this, excluding the rarely used Level 3, the combination of the basic 300 words, Level 1, and Level 2 seems sufficient for comprehending the passages in the reading module. Thus, it is understandable that VOCA2 demonstrated the strongest explanatory power for reading comprehension (β = .381), followed by VOCA1, which had a lower but still significant effect (β = .212). For listening scores, though Level 1 vocabulary seems more directly associated with the listening passages due to the simplicity of the listening module, VOCA2 still had a slightly greater impact on listening comprehension. This suggests that comprehending the listening materials requires more than just basic vocabulary knowledge directly tied to the content. It implies that participants with a broader, higher-level vocabulary (i.e., Level 2) are at an advantage, as reflected in the similar explanatory power of VOCA2 and VOCA1 (β = .283 and .267, respectively).

Regarding the significant grammar subcomponents for listening and reading scores, GMEAN (grammatical meaning) and GSYNF (syntactic form) were included in the final regression model for listening (β = .360 and .328, respectively), while GSYNF and GMORF (morphological form) were included in the final model for reading (β = .538 and .199, respectively), as shown in Table 9.

GSYNF reflects knowledge of grammatical categories that link the components of a sentence. Since grammar instruction in EFL settings often focuses on sentence structure, it makes sense that GSYNF plays a key role in learners' overall grammar knowledge, as confirmed by its highest loading coefficient of .928 in Table 6, and consequently, in their general English proficiency. This also explains why GSYNF significantly predicts both listening and reading comprehension among adult online EFL learners. Additionally, the emphasis on grammatical analysis in EFL reading instruction, often tied to the grammar-translation method, accounts for GSYNF being the strongest predictor of reading comprehension, with a notable association with reading scores (β = .538).

Another important finding is that GMEAN, which measures the ability to understand the contextual meaning of grammatical structures and logical relationships, was the strongest predictor of listening scores. This supports previous research showing that L2 learners prioritize meaning (content words) over syntactic form during listening tasks (e.g., Field 2010, Vandergrift 2011). In contrast, GMORF, which reflects knowledge of grammatical forms and morphological variations, was significant only for reading comprehension. This type of knowledge is less important for listening, where learners focus on meaning, but it plays a small yet significant role in reading comprehension and serves as an indicator of overall grammar knowledge.

5.4 Significant Aspects of Language Use Experience for L2 Proficiency

The fourth research question examines which aspects of English use experience significantly impact adult online EFL learners' proficiency in vocabulary, grammar, listening, and reading. As shown in Table 10, EVIEW (time spent viewing audiovisual materials) and NATIVE (time spent interacting with native speakers) are significant predictors across all areas except grammar, where EDU (time spent receiving English education) also plays a significant role. Previous studies on study abroad effects often identified grammar and reading as areas with the least impact (e.g., Tseng et al. 2024, Xu 2019). However, this study found that interacting with native speakers is a key predictor even in these areas. In contrast, activities like EREAD (reading in English) and EWORD (memorizing words) were not significant predictors of related skills, suggesting that adult online learners' engagement in authentic English use activities is insufficient to substantially improve their skills, even in areas directly related to those activities.

More specifically, only EVIEW and NATIVE remained in the final model for vocabulary (semi-partial $r = .197^{*}$ and $.183^{*}$, respectively), while EWORD and EDU, despite their significant correlations with vocabulary, were excluded because their unique contributions were not significant after controlling for the effects of other variables, as indicated by their insignificant semi-partial correlations (semi-partial $r = .144$ and .154, respectively). Similarly, EREAD and EDU were excluded from the final model for reading for the same reason, even though they each had significant correlations with reading.

Notably, for grammar, EDU was the second-best predictor in the final model, likely due to the emphasis on explicit grammar instruction in both public and private education in Korea. For listening, only NATIVE remained in the final model. As previously discussed, the ease of the listening test may have caused a ceiling effect, making it difficult to detect the influence of other variables. Despite this, NATIVE remained, indicating that its effect for listening was substantial enough to be detected.

As previously discussed, the overall impact of adult online learners' English use experience on their English proficiency is relatively weak, likely due to their limited exposure to authentic English use activities and their low proficiency levels. Apart from viewing audiovisual materials and interacting with native speakers, the other activities were not significant predictors. Even the two significant activities demonstrated only modest explanatory power across the four language factors, as indicated by the small R^2 values in Table 10. This reaffirms the significant yet minimal impact of English use experience for adult online EFL learners.

6. Conclusions and Implications

With the rise of online higher education for adult learners, there is an urgent need to better understand the characteristics of adult online EFL learners. However, systematic, evidence-based research on this group remains limited, and little is known about their learning outcomes and processes. To address this gap, this study applied structural equation modeling (SEM) and multiple regression analyses to explore how vocabulary and grammar contribute to adult online EFL learners' listening and reading comprehension. Furthermore, the study assessed the influence of English use experience on proficiency across vocabulary, grammar, listening, and reading. The analysis also identified which specific subcomponents of vocabulary, grammar, and English use experience most significantly impact specific language skills.

First, regarding the relative role of vocabulary and grammar for L2 reading comprehension, this study supported the superior role of grammar over vocabulary among adult online EFL learners. As many researchers point out (e.g., Raeisi-Vanani and Baleghizadeh 2022, Shiotsu and Weir 2007, Zhang 2012), there may be a certain threshold level up to which grammar plays a more pivotal role in L2 reading comprehension, but beyond that, its influence may decrease compared to vocabulary as the proficiency level increases. Thus, the relative contributions of vocabulary and grammar may vary depending on the learner's current stage of L2 development. It is reasonable to suggest that the adult online EFL learners in this study are at a developmental stage where they rely more on their grammar skills than on their vocabulary knowledge. For pedagogical applications, this finding suggests that educators should assess learners' proficiency levels to determine whether grammar or vocabulary requires greater focus and adjust their teaching strategies accordingly. As learners' proficiency level advances, instruction should gradually shift from emphasizing grammar toward developing a broader vocabulary and exposing them to texts with greater lexical variety, helping them transition smoothly as their linguistic needs evolve.

Second, regarding the relative role of vocabulary and grammar in L2 listening comprehension, the findings indicate that grammar has a more influential effect than vocabulary. This does not align with previous studies,

which consistently emphasize the superior role of vocabulary in L2 listening. As discussed earlier, the simplicity of the listening test used in this study could be one possible reason for this contradictory finding. Additionally, the strong relationship between grammar and the general English proficiency of adult online EFL learners may have contributed to the result. Therefore, rather than drawing a definitive conclusion about the relative roles of vocabulary and grammar in adult online EFL learners' listening comprehension, it is more reasonable to consider learner- and instrument-specific factors to provide a more nuanced interpretation of the results.

Third, regarding the role of adult online learners' English use experience, the association between various aspects of English use and their skills was generally weak, with minimal but significant relationships observed for vocabulary and grammar. This likely reflects the limited type and amount of English use typical of adult online EFL learners. Additionally, the limited impact of traditional EFL learning methods, such as formal education or vocabulary memorization, on these learners' proficiency suggests that they may not be particularly efficient or adept learners in conventional learning environments. Instead, those who engage in everyday activities, such as viewing audiovisual materials or interacting with native speakers, may gain more benefit from these informal, leisure-oriented contexts. In conclusion, adult online English learners who have not experienced much success in traditional English study methods and are unsure of effective learning strategies may benefit more from regularly watching English audiovisual materials or reading articles on topics they enjoy, with various types of support, such as subtitles and captions (Muñoz et al. 2023, Pattemore and Muñoz 2020). To maximize these benefits, educators should encourage learners to use authentic and engaging English resources aligned with their personal interests. Teachers can provide structured guidance, such as suggesting suitable content (e.g., TED talks, podcasts, or articles) and offering tools like glossaries or comprehension questions to aid understanding. Learners should also be encouraged to integrate these activities into their daily routines, gradually increasing both the frequency and variety of their exposure. By fostering a relaxed and interest-driven approach, educators can help learners build confidence and proficiency in more natural and meaningful ways.

Regarding the significant subcomponents of vocabulary, Level 2 vocabulary was observed to be the strongest predictor of the participants' English comprehension in this study. Although the vocabulary list developed for item creation was based on the course materials at the cyber university, the English courses are targeted for typical online adult EFL learners, reflecting their general proficiency levels and interests. Therefore, the approach employed in this study may work for general adult online EFL learners as well. From a practical perspective, the result of this study suggests that there is a need to emphasize and expose students to Level 2 vocabulary more frequently through online lecture content, rather than just providing students with a vocabulary list. Teachers can incorporate Level 2 vocabulary into engaging contexts, such as multimedia content, task-based learning, or interactive quizzes, to enhance exposure and retention.

Similarly, the finding that knowledge of the grammatical meaning of various syntactic structures is crucial for listening comprehension suggests that students could benefit from an explicit focus on this grammar knowledge in listening courses. Generally, grammar is not explicitly addressed in most listening lessons. However, based on the results of this study, placing more emphasis on the grammatical meaning of different structures may prove beneficial for adult online EFL learners. Teachers can design listening tasks that highlight the role of grammar in meaning-making, such as sentence completion activities, grammar-based listening comprehension exercises, or discussions on how grammatical structures influence meaning in spoken contexts.

Lastly, from a language assessment perspective, the finding that grammar knowledge plays a superior role as a strong predictor of adult online learners' English comprehension and general proficiency suggests that a carefully designed grammar test, ensuring validity, reliability, and practicality, could serve as an effective tool for measuring their readiness for English learning. Given the learners' limited experience in specific language skills such as

listening and reading, a well-structured grammar test could provide comparatively accurate information about their current English proficiency in a cost-effective way.

While this study offers both theoretical and practical insights into the characteristics of adult online EFL learners, it is not without limitations and calls for further investigation. As noted earlier, the simplicity of the listening test used in this study may have influenced the results, underscoring the need for tests with more balanced difficulty levels to assess the relative contributions of grammar and vocabulary. This would enable a more valid comparison of their impact on adult online EFL learners' comprehension. Additionally, contrary to initial expectations, the learners' English use experience was quite limited despite their diverse characteristics. Therefore, it is crucial to examine how various demographic factors, such as educational level or age, affect their English proficiency and learning strategies. Given that little is currently known about this group, more research is needed to better understand adult online EFL learners, provide tailored instruction, and support their self-directed learning.

References

Aka, N. 2019. Reading performance of Japanese high school learners following a one-year extensive reading program. *Reading in a Foreign Language* 31(1), 1-18.

Alderson, J. C. 1984. Reading in a foreign language: A reading problem or a language problem. In J. C. Alderson and A. H. Urquhart, eds., *Reading in a Foreign Language*, 1-24. Longman.

Allison, P. D. 1999. *Multiple Regression: A Primer*. Pine Forge Press.

Bentler, P. M. 1990. Comparative fit indexes in structural equation models. *Psychological Bulletin* 107, 238-246.

Bentler, P. M. 2004. *EQS 6 Structural Equations Programs Manual*. Multivariate Software.

Bentler, P. M. and C. P. Chou. 1987. Practical issues in SEM. *Sociological Methods and Research* 16, 78-117.

Bentler, P. M. and E. Wu. 2002. *EQS for Windows: User's Guide*. Multivariate Software.

Borràs, J. and À. Llanes. 2021. Re-examining the impact of study abroad on L2 development: A critical overview. *The Language Learning Journal* 49(5), 527-540.

Brown, R., R. Waring and S. Donkaewbua. 2008. Incidental vocabulary acquisition from reading, reading-while-listening, and listening to stories. *Reading in a Foreign Language* 20(2), 136-163.

Browne, M. W. and R. Cudeck. 1992. Alternative ways of assessing model fit. *Sociological Methods & Research* 21(2), 230-258.

Buck, G. 2001. *Assessing Listening*. Cambridge University Press.

Cain, K. and J. Oakhill. 2014. Reading comprehension and vocabulary: Is vocabulary more important for some aspects of comprehension? *L'Année Psychologique* 114, 647–662.

Çekiç, A. 2024. Incidental L2 vocabulary learning from audiovisual input: The effects of different types of glosses. *Computer Assisted Language Learning* 37(4), 896-923.

Chang, A. C. and W. A. Renandya. 2017. Current practice of extensive reading in Asia: Teachers' perceptions. *The Reading Matrix: An International Online Journal* 17(1), 40-58.

Chen, H. and H. Mei. 2024. How vocabulary knowledge and grammar knowledge influence L2 reading comprehension: a finer-grained perspective. *European Journal of Psychology of Education* 39, 3767-3789.

Choi, Y. and D. Zhang. 2021. The relative role of vocabulary and grammatical knowledge in L2 reading comprehension: A systematic review of literature. *International Review of Applied Linguistics in Language Teaching* 59(1), 1-30.

Elley, W. B. and F. Mangubhai. 1983. The impact of reading on second language learning. *Reading Research*

Quarterly 19(1), 53-67.
Field, J. 2010. Listening in the language classroom. *ELT Journal* 64(3), 331-333.
Guo, Y. and A. D. Roehrig. 2011. Roles of general versus second language (L2) knowledge in L2 reading comprehension. *Reading in a Foreign Language* 23(1), 42-64.
Harding, L., J. C. Alderson and T. Brunfaut. 2015. Diagnostic assessment of reading and listening in a second or foreign language: Elaborating on diagnostic principles. *Language Testing* 32(3), 317-336.
Hartnett, M. 2016. The importance of motivation in online learning. In M. Hartnett, *Motivation in Online Education*, 5-32. Springer.
Hughes, A. 2003. *Testing for Language Teachers* (2nd ed.). Cambridge University Press.
Huh, Y. J. 2014. The relative predicting power of vocabulary depth and grammar in Korean EFL learners' reading comprehension. *Korean Journal of Applied Linguistics* 30(3), 3-25.
Hulstijn, J. H. 2019. An individual-differences framework for comparing nonnative with native speakers: Perspectives from BLC theory. *Language Learning* 69 (S1), 157-183.
In'nami, Y., R. Koizumi, E. H. Jeon and Y. Arai. 2022. L2 listening and its correlates. In E. H. Jeon and Y. In'nami, eds, *Understanding L2 P*roficiency, 29-86. John Benjamins Publishing Company.
Jeon, E. 2012. Oral reading fluency in second language reading. *Reading in a Foreign Language* 24 (2), 186-208.
Jeon, E. H. and J. Yamashita. 2022. L2 reading comprehension and its correlates. In E. H. Jeon and Y. In'nami, eds, *Understanding L2 P*roficiency, 235-283. John Benjamins Publishing Company.
Kim, J. and Y. Cho. 2013. Relative roles of vocabulary and grammar knowledge in second language reading. *Korean Journal of English Language and Linguistics* 13(3), 497-520.
Kim, J. and Y. Cho. 2015. Proficiency effects on relative roles of vocabulary and grammar knowledge in second language reading. *English Teaching* 70(1), 75-96.
Kim, M., Y. Nam and S. A. Crossley. 2022. Roles of working memory, syllogistic inferencing ability, and linguistic knowledge on second language listening comprehension for passages of different lengths. *Language Testing* 39(4), 593-617.
Kishton, J. M. and K. F. Widaman. 1994. Unidimensional versus domain representative parceling of questionnaire items: An empirical example. *Educational and Psychological Measurement* 54(3), 757-765.
Kline, R. B. 1998. *Principles and Practice of Structural Equation Modeling* (1st ed.). The Guilford Press.
Lee, J. W. 2016. The role of vocabulary and grammar in different L2 reading comprehension measures. *English Teaching* 71(3), 79-97.
Li, L. 2014. Language proficiency, reading development, and learning context. *Frontiers: The Interdisciplinary Journal of Study* 24(1), 73-92.
Lindgren, E. and C. Muñoz. 2013. The influence of exposure, parents, and linguistic distance on young European learners' foreign language comprehension. *International Journal of Multilingualism* 10(1), 105-129.
Little, T. D., W. A. Cunningham, G. Shahar and K. F. Widaman. 2002. To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling* 9(2), 151-173.
Long, D. L. and J. L. Chong. 2001. Comprehension skill and global coherence: A paradoxical picture of poor comprehenders' abilities. *Journal of Experimental Psychology* 27(6), 1424–1429.
Luo, Y., H. Song, L. Wan and X. Zhang. 2021. The effect of vocabulary depth and breadth on English listening comprehension can depend on how comprehension is measured. *Frontiers in Psychology* 12, 657573.
Matthews, J. 2018. Vocabulary for listening: Emerging evidence for high and mid-frequency vocabulary knowledge. *System* 72, 23-36.
Mecartty, F. H. 2000. Lexical and grammatical knowledge in reading and listening comprehension by foreign

language learners of Spanish. *Applied Language Learning* 11(2), 323-348.
Ministry of Education. 2015. *The 2015 Revised National English Curriculum*. MOE Report 2015-74, Supplement 14. Ministry of Education.
Muñoz, C., G. Pujadas and A. Pattemore. 2023. Audio-visual input for learning L2 vocabulary and grammatical constructions. *Second Language Research* 39(1), 13-37.
Nation, I. S. P. 2001. *Learning Vocabulary in Another Language*. Cambridge University Press.
Nation, I. S. P. and S. Webb. 2011. *Researching and Analyzing Vocabulary*. Heinle Cengage Learning.
Nergis, A. 2013. Exploring the factors that affect reading comprehension of EAP learners. *Journal of English for Academic Purposes* 12(1), 1-9.
Oh, E. and C. M. Lee. 2014. The role of linguistic knowledge and listening strategies in bottom-up and top-down processing of L2 listening. *English Teaching* 69(2), 149-173.
Pattemore, A. and C. Muñoz. 2020. Learning L2 constructions from captioned audio-visual exposure: The effect of learner-related factors. *System* 93, 102303.
Pavia, N., S. Webb and F. Faez. 2019. Incidental vocabulary learning through listening to songs. *Studies in Second Language Acquisition* 41(4), 745-768.
Pigada, M. and N. Schmitt. 2006. Vocabulary acquisition from extensive reading: A case study. *Reading in a Foreign Language* 18(1), 1-28.
Purpura, J. E. 2004. *Assessing Grammar*. Cambridge University Press.
Raeisi-Vanani, A. and S. Baleghizadeh. 2022. The contributory role of grammar vs. vocabulary in L2 reading: An SEM approach. *Foreign Language Annals* 55(2), 559-585.
Reves, T. and A. Levine. 1988. The FL receptive skills: Same or different? *System* 16(3), 327-336.
Satori, M. 2022. Effects of field independence, metacognitive knowledge, and vocabulary knowledge on second language listening comprehension. *International Journal of Listening* 36(3), 254-267.
Shin, Y. and Y. Kim. 2012. Assessing the relative roles of vocabulary and syntactic knowledge in reading comprehension. *Korean Journal of Applied Linguistics* 28(2), 169-198.
Shiotsu, T. and C. J. Weir. 2007. The relative significance of syntactic knowledge and vocabulary breadth in the prediction of reading comprehension test performance. *Language Testing* 24(1), 99-128.
Song, M. Y. 2008. Do divisible subskills exist in second language (L2) comprehension? A structural equation modeling approach. *Language Testing* 25(4), 435-464.
Song, M. Y., S. Cho and J. Kim. 2017. Developing and applying diagnostic English tests for e-Learners. *Journal of Research in Curriculum & Instruction* 21(5), 551-563.
Stæhr, L. S. 2008. Vocabulary size and the skills of listening, reading and writing. *Language Learning Journal* 36(2), 139-152.
Stæhr, L. S. 2009. Vocabulary knowledge and advanced listening comprehension in English as a foreign language. *Studies in Second Language Acquisition* 31(4), 577-607.
Tseng, W. T., Y. T. Liu, Y. T. Hsu and H. C. Chu. 2024. Revisiting the effectiveness of study abroad language programs: A multi-level meta-analysis. *Language Teaching Research* 28(1), 156-200.
Ullman, J. B. 2006. Structural equation modeling: Reviewing the basics and moving forward. *Journal of Personality Assessment* 87(1), 35-50.
Vafaee, P. and Y. Suzuki. 2020. The relative significance of syntactic knowledge and vocabulary knowledge in second language listening ability. *Studies in Second Language Acquisition* 42(2), 383-410.
Vandergrift, L. 2011. Second language listening: Presage, process, product, and pedagogy. In E. Hinkel, ed, *Handbook of Research in Second Language Teaching and Learning*, 455-471. Routledge.

Vandergrift, L. and C. Goh. 2012. *Teaching and Learning Second Language Listening: Metacognition in Action*. Routledge.

van Zeeland, H. and N. Schmitt. 2013. Lexical coverage in L1 and L2 listening comprehension: The same or different from reading comprehension? *Applied Linguistics* 34(4), 457-479.

Vidal, K. 2003. Academic listening: A source of vocabulary acquisition? *Applied Linguistics* 24(1), 56-89.

Wang, Y. and J. Treffers-Daller. 2017. Explaining listening comprehension among L2 learners of English: The contribution of general language proficiency, vocabulary knowledge and metacognitive awareness. *System* 65, 139-150.

Waring, R. and M. Takaki. 2003. At what rate do learners learn and retain new vocabulary from reading a graded reader? *Reading in a Foreign Language* 15(2), 130-162.

Webb, S. 2007. The effects of repetition on vocabulary knowledge. *Applied Linguistics* 28(1), 46-65.

Xu, Y. 2019. Changes in interlanguage complexity during study abroad: A meta-analysis. *System* 80, 199-211.

Yamashita, J. 2008. Extensive reading and development of different aspects of L2 proficiency. *System* 36(4), 661-672.

Zhang, D. 2012. Vocabulary and grammar knowledge in second language reading comprehension: A structural equation modeling study. *The Modern Language Journal* 96(4), 558-575.

Zhang, S. and X. Zhang. 2022. The relationship between vocabulary knowledge and L2 reading/listening comprehension: A meta-analysis. *Language Teaching Research* 26(4), 696-725.

Examples in: English
Applicable Languages: English
Applicable Level: Second or Tertiary

