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Article Title

Evaluating the Roles of Breadth and Depth of Aural Vocabulary Knowledge in Listening Comprehension of EFL Learners: An Investigation Applying Auditory Measures

Authors' Details

Author 1: Dongjing Han (Dr.)

Affiliation： Shenzhen Polytechnic University, Shenzhen, China

ORCID ID: 0000-0003-4850-215X

Email： 13106504g@connect.polyu.hk

Author 2: David D. Qian (Professor, Corresponding Author)

Affiliation/Address of correspondence: Research Centre for Professional Communication in English, Department of English and Communication, The Hong Kong Polytechnic University, Hong Kong, China

ORCID ID: 0000-0002-2915-4746

Email: david.qian@polyu.edu.hk

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Abstract

The present study evaluates the relationship between aural vocabulary knowledge and listening comprehension in English as a foreign language (EFL), which is under-researched. In particular, the study has a focus on the importance of the phonological properties of vocabulary knowledge to detect the role of vocabulary knowledge in listening comprehension among 137 EFL learners in China. A newly developed auditory version of Vocabulary Levels Test (VLT) (Schmitt, Schmitt, & Clapham, 2001) and the Word Associates Test (WAT) (Read, 1998) were adopted in the study. A TOEFL listening subtest was used to measure the EFL learners' listening performance. Biovariate correlations and hierarchical regression analyses were conducted to examine the associations between listening performance and aural vocabulary knowledge encompassing both breadth and depth dimensions. It was found that aural vocabulary knowledge plays a crucial role in listening performance. The breadth of aural vocabulary knowledge appears to be a more significant predictor of listening performance than the depth of vocabulary knowledge. These findings highlight the role of the aural dimensions of vocabulary knowledge in determining listening success. Specifically, it draws our attention to the contribution of aural vocabulary knowledge to the quality of listening comprehension.

Keywords: breadth of aural vocabulary knowledge, depth of aural vocabulary knowledge, listening comprehension

1. Introduction

Listening comprehension which is widely recognized as an indispensable language skill like reading, writing and speaking, lies in the heart of learning English as a foreign language (EFL) (Vafaee & Suzuki, 2020). It is through listening that learners are exposed to authentic language use, including vocabulary, grammar, and pronunciation. Research has consistently shown that strong listening skills are closely linked to overall language proficiency. Several previous studies have examined the relationship between listening comprehension and language learning. For example, Goh and Vandergrift (2021) conducted a meta-analysis of 35 studies and found a significant positive correlation between listening comprehension and overall language proficiency. They concluded that listening comprehension is a reliable predictor of language learning success. In another study, Ly and Nga (2020) investigated the impact of extensive listening on receptive vocabulary acquisition. The findings revealed that learners who engaged in extensive listening practice showed significant improvement in their vocabulary knowledge compared to those who did not engage in extensive listening activities. Those studies highlight the importance of listening comprehension in language learning and provide evidence of its positive effects on various aspects of language proficiency.

Vocabulary knowledge has been extensively researched in relation to other language skills, including reading, writing, and speaking. In terms of reading, studies have consistently shown that learners' vocabulary knowledge plays a pivotal role in their ability to comprehend written texts. For instance, Nation (2022) discovered that learners typically need to be familiar with at least 95% of the words in a text to understand it well. Consequently, learners with a larger vocabulary are better equipped to comprehend a wider range of texts and extract meaning more effectively. In the realm of writing, vocabulary knowledge is indispensable for learners to express their ideas with precision and accuracy (Olinghouse & Wilson, 2013). When it comes to speaking, there is a strong positive correlation between learners' mastery of vocabulary and their speaking proficiency (NR et al., 2022). Thus, vocabulary knowledge is an essential

component of language learning and is intricately linked to various language skills. By actively developing a strong vocabulary, learners can significantly enhance their overall language proficiency and become more effective and confident communicators.

Previous studies have identified vocabulary knowledge as a factor influencing listening performance (Stæhr, 2009; Wallace, 2022). Within the research literature on listening comprehension, a host of variables were found to be involved in the listening process of EFL learners, such as first language (L1) listening ability, auditory discrimination ability, metacognitive awareness of listening skills, working memory capacity (Vandergrift & Baker, 2015; Vandergrift & Goh, 2012), lexical segmentation in second language (L2) listening decoding process (Field, 2008), level of concentration, vocabulary knowledge (Wallace, 2022), and gender and listening strategies (Bacon, 1992; Wolfgramm et al., 2016). Vandergrift and Baker (2015) further identified a number of metacognitive variables, including problem solving, directed attention, and personal knowledge, as secondary-level variables for vocabulary processing in listening comprehension, in addition to general language processing skills such as auditory discrimination and working memory. Lexical segmentation in L2 listening decoding process was also pinpointed as a crucial factor in listening comprehension (Field, 2008). It thus appears that vocabulary knowledge is widely recognized as a key factor in achieving listening success. Recent research on the relationship between vocabulary knowledge and listening performance further indicates that vocabulary knowledge plays an important role in the EFL listening comprehension process (Han, 2020; McLean et al., 2015; Stæhr, 2009; Wallace, 2022). Nevertheless, there is limited research on the role of vocabulary knowledge in listening comprehension in comparison with the abundance of research on the roles of vocabulary knowledge in reading and writing in EFL (Matthews & Cheng, 2015; Qian & Lin, 2020; Vafaee & Suzuki, 2020).

The present study aims to address the research gap by evaluating the relative significance of the dimensions of breadth and depth of aural vocabulary knowledge in listening comprehension. Previous research has primarily focused on written vocabulary knowledge in relation to listening comprehension, with limited attention to aural vocabulary knowledge (Vafaee & Suzuki, 2020). Moreover, the lack of reliable testing instruments for assessing aural vocabulary knowledge has led to conflicting findings in previous studies (Matthews & Cheng, 2015). To bridge this gap, the present study seeks to examine the predictive roles of both breadth and depth dimensions of aural vocabulary knowledge in listening performance among university-level EFL learners. By investigating the specific contribution of aural vocabulary knowledge to listening comprehension, this study will provide a better understanding of the relationship between these variables. The findings will shed light on the importance of aural properties of vocabulary in listening performance and contribute to the development of more accurate and reliable testing instruments for assessing aural vocabulary knowledge.

2. Background

2.1 Vocabulary knowledge in listening comprehension

Vocabulary knowledge has been identified as an important contributing factor to language proficiency (Matthews, 2018). In the lexical approach to second language acquisition (SLA) (Lewis, 1997), vocabulary learning is deemed critical. In the cognitive approach to SLA (Krashen, 1985, 1989), vocabulary knowledge is also regarded as a pre-requisite for language development. In recent decades, there is an increasing amount of research investigating the power of various dimensions of vocabulary knowledge in predicting language skills and a strong association between vocabulary knowledge and reading comprehension has been established (Adolphs & Schmitt, 2003; Qian, 1999, 2002). Orthographic vocabulary knowledge measured in the written form was found to have a positive relationship with reading and listening performances (Stæhr, 2009). Furthermore, it is important to consider the

relationship between different sub-categories of vocabulary knowledge, such as the spoken form of lexical items and the phonological aspects of vocabulary knowledge, as they have also been found to significantly impact listening performance (Zhang & Zhang, 2022). Matthews and Cheng (2015) found that phonological word knowledge has positive and strong correlations with listening comprehension. Investigations were also conducted on the role of orthographic vocabulary knowledge in listening performance (Stæhr, 2008, 2009), but few studies investigated the relationship between aurally encoded vocabulary knowledge and listening comprehension. The present study was therefore motivated to examine the aural dimensions of breadth and depth of vocabulary knowledge to determine their strengths of association with listening performance and to unearth further empirical evidence on the relationship among these variables, with a view to making useful recommendations on the improvement of vocabulary learning and teaching to ultimately enhance EFL learners' listening skills.

Multiple dimensions of vocabulary knowledge have been examined in association with their contributions to learners' language proficiency (e.g. Coxhead, 2018; Harrington, 2018). However, due to the complex nature of word properties, no consensus has been reached on a universally accepted conceptual framework of vocabulary knowledge. Nevertheless, vocabulary researchers have managed to classify the multi-faceted entity of word knowledge into distinct dimensions. For example, on conceptualizing what it means to know a word, Nation (2022) proposed three categories which include word form, meaning, and use, with sub-categories under each of them. He also divided word forms into spoken and written forms. Other frameworks containing different dimensions of vocabulary knowledge, such as breadth of vocabulary knowledge, depth of vocabulary knowledge, lexical organization and automaticity of receptive-productive knowledge, were also proposed (Qian, 2002).

Breadth of vocabulary knowledge refers to superficial knowledge of word meanings and breadth of aural vocabulary knowledge covers in particular the phonetic and phonological properties of words in addition to their forms and primary meanings. For instance, when students hear the word “horse”, they would know the word refers to an animal with four legs but may not know well the grammatical properties of the word, as they lack the depth of knowledge of the word “horse”.

On the other hand, depth of vocabulary knowledge generally refers to the quality of knowledge associated with all lexical characteristics. Compared with breadth of vocabulary knowledge, depth of vocabulary knowledge refers especially to the comprehensive knowledge of a lexical item, which may involve different facets of words, such as phonetics, phonology, orthography, morphology, syntax, semantics and pragmatics (Qian & Schedl, 2004). Similar to breadth of aural vocabulary knowledge, depth of aural vocabulary knowledge includes specifically the phonological and phonetic properties as primary features of the construct in addition to other lexical properties, such as associations, collocations and grammatical properties, so on and so forth, and both aural dimensions described in this study focus on receptive vocabulary knowledge instead of productive knowledge. Thus, in EFL aural vocabulary knowledge tests, test-takers are not expected to write down the orthographic form of target words but to recognize their meanings in aural forms.

2.2 The predictive power of aural vocabulary knowledge in listening comprehension

Mastery of aural vocabulary knowledge of listeners has been recognized as an important predictor of listening success (Babaei & Ahour, 2016; Siegel, 2016). With the recent increase of multimedia channels for EFL learning, more and more scholars have realized the importance of phonological aspects of vocabulary knowledge in language acquisition, calling for further investigation into the acquisition of aural vocabulary knowledge in EFL learning. In this connection, aural vocabulary knowledge is certainly seen as a significant source of the

receptive dimension of vocabulary knowledge. While orthographic and syntactic aspects of vocabulary knowledge are mainly enhanced in the process of reading development, phonological awareness of vocabulary knowledge is generally nurtured in the listening process (Vafaee & Suzuki, 2020). Given the complexity of words, various aspects of vocabulary knowledge need to be acquired through different modalities. It might be hard to find a single effective way of acquiring vocabulary knowledge, but the listening channel is doubtless a major modality for learning phonological properties of lexical items (Matthews & Cheng, 2015).

Due to the lack of well-developed aural vocabulary knowledge testing instruments, most studies on measuring breadth and depth of vocabulary knowledge had to employ written measures of vocabulary knowledge in their data collection. The adoption of various written instruments investigating the relationship between vocabulary knowledge and listening performance has probably led to divergent results on the role of depth of vocabulary knowledge in listening comprehension. For example, Stæhr (2009) found that vocabulary knowledge in written forms accounted for 51% of variance in listening performance among high proficiency EFL learners in Denmark, but depth of vocabulary knowledge did not make a separate contribution to listening scores above and beyond the variance explained by breadth of vocabulary knowledge in a written form, which was confirmed by a regression analysis. On the other hand, Dabbagh (2016) contended that only depth of vocabulary knowledge, not vocabulary breadth, could provide significant prediction of EFL learners' listening comprehension, based on his research with 73 university EFL students in Iran. In a different context, however, in investigating the listening proficiency of over 150 university EFL students in mainland China, Wang and Treffers-Daller (2017) argued that vocabulary size was a strong predictor of listening performance, but conflicting results were also reported on some studies (e.g., Liu, 2011; Xu, 2009) exploring the roles of breadth and depth of vocabulary knowledge in listening success carried out in similar educational contexts in China. Xu (2009) reported

that breadth of vocabulary knowledge, based on scores from an aural vocabulary breadth test, could explain a larger portion of variance in listening performance than scores on a written depth of vocabulary knowledge while Liu (2011) found that depth of vocabulary knowledge could make better prediction of listening success.

The lack of empirical evidence for better understanding the predicting roles of aural vocabulary knowledge in listening comprehension is obvious. Even though there is a large number of studies exploring the relationship between vocabulary knowledge and language proficiency, few have explored the significance of aural vocabulary knowledge in listening performance (Gottardo et al., 2018). Among the limited number of studies in this area, Cheng and Matthews (2018) examined the relationship between three measures of L2 vocabulary knowledge (breadth, depth, and form) and L2 listening and reading skills. The study also included phonological aspects of vocabulary knowledge in predicting listening performance. Cheng and Matthews found that both breadth and depth dimensions of vocabulary knowledge were positively correlated with L2 listening and reading performance. While form-based vocabulary knowledge (knowledge of word forms and spellings) is important for reading, it may not play as significant a role in listening comprehension. They reported that a partial dictation test (ProPhon) measuring productive vocabulary knowledge correlated strongly with L2 listening (r=.71) among tertiary-level Chinese EFL learners. The study however came short of explaining specific contributions of vocabulary breadth or depth to listening comprehension (Wolfgramm et al., 2016). By building on the findings of Cheng and Matthews (2018), our study aims to further explore the relationship between the dimensions of breadth and depth of vocabulary knowledge and their impact on listening comprehension. This will provide a more comprehensive understanding of the specific dimensions of vocabulary knowledge that contribute to listening comprehension among EFL learners. A recent report based on a meta-analysis of over 100 empirical studies (Zhang & Zhang, 2022) argues that the modality of

vocabulary knowledge measures truly matters in determining the relationship between vocabulary knowledge and reading/listening comprehension as it can significantly affect the strength of correlation between the two variables and that auditory vocabulary measures can provide a better prediction of L2 listening comprehension than written vocabulary measures. However, among the 47 studies covering listening comprehension in this meta-analysis, only 16 used auditory measures for data collection, among which just 5 contained a depth of vocabulary knowledge dimension. In comparison, the same investigation included 110 eligible studies on the relationship between vocabulary knowledge and L2 reading comprehension. There is a clear gap here calling for more research applying auditory measures with depth of vocabulary dimensions to look into the relationship between vocabulary knowledge and L2 listening comprehension.

As regards the development of auditory vocabulary measures, Milton and Hopkins (2006) designed an A-Lex aural vocabulary size knowledge test in a digital Yes/No format, in which listeners just needed to judge from a list of real words and pseudo words, and test-takers can listen to the target words for as many times as they would like to. However, guessing effects were likely for a test in this form. In another study, Milton, Wade and Hopkins (2010) conducted an investigation into the relationship between vocabulary size scores and results of the International English Language Testing System (IELTS). The study involved both orthographic and phonological vocabulary knowledge respectively in the X-Lex and the A-Lex tests. They found the test results of orthographic vocabulary size correlated significantly with both reading comprehension (r=.70) and listening comprehension (r=.48), but for scores on aural vocabulary, only the phonological dimension of vocabulary knowledge (A-Lex) correlated significantly with listening performance (r=.67).

McLean, Kramer and Beglar (2015) developed the Listening Vocabulary Levels Test (LVLT), which was an auditory vocabulary test adopting the multiple-choice form of the

written Vocabulary Size Test (VST) (Beglar, 2010; Nation & Beglar, 2007). The LVLT, containing 150 items, was developed to measure aural vocabulary knowledge on the first five 1000-word frequency levels based on the British National Corpus (BNC) and the Academic Word List (Coxhead, 2000). In this study, the multiple-choice contents were visible in written form and listeners were supposed to hear the target word and sentence(s) providing contextual cues in English. However, the test instructions were in Japanese, which limited its use within the Japanese EFL context. To date, Vafaee and Suzuki (2020) was probably the only study to incorporate auditory versions of both a vocabulary breadth test (VBT), developed from the VST (Beglar, 2010), and a vocabulary depth test (VDT), developed from the Depth of Vocabulary Test (Qian & Schedl, 2004). However, the instructions of VBT and VDT were in Persian to accommodate their use in the Iranian context. Therefore, as pointed out earlier, more studies using auditory measures covering depth of vocabulary knowledge are needed in order to gather further evidence on the importance of modality in investigating the relationship between aural vocabulary knowledge and listening comprehension.

2.3 Research questions

Traditional written vocabulary knowledge tests are intended to measure the knowledge of meanings and other associated characteristics of words in their written forms. On the other hand, aural vocabulary knowledge tests are designed to specifically assess the knowledge of aural aspects of words' meanings and other associated characteristics. To provide a more comprehensive picture on the relationship between vocabulary knowledge and listening comprehension, this study aims to determine the extent to which aural vocabulary knowledge can contribute to listening comprehension with two research questions. Aiming to develop a set of aural forms of vocabulary knowledge measurement and evaluate the role of aural vocabulary knowledge in listening comprehension, the two research questions explored

respectively the relationships between the breadth and depth of vocabulary knowledge and listening performance:

1. What is the role of breadth of aural vocabulary knowledge in listening comprehension?
2. What is the role of depth of aural vocabulary knowledge in listening comprehension?

3. Method

3.1 Participants

A total of 137 EFL learners (average age: 21; male: 34 and female: 103), who had on average 13 years of EFL learning experience and were studying at a university in southern China, were recruited as volunteers for this research. They were all second-year business English majors from four intact classes. In reference to the standards of China's National Matriculation English Test (NMET) for university admissions, the participants may be deemed as low-intermediate level English listeners, as shown by the mean score of their TOEFL listening comprehension (LC) test (Table 1 below). The selection of participants for the study took into consideration their academic performance and language proficiency. It was found that second-year students who had successfully completed vocabulary and language-related courses in their first and second years exhibited higher language proficiency in comparison to the first-year students. As the subsequent part of the curriculum focused on business-related disciplinary courses, the second-year students were deemed the most suitable group to assess their language learning outcomes.

Instruments

Since the main concern of the present study was the receptive aspect of aural vocabulary knowledge, the study focused on assessing the ability to segment phonemes from speech and make meaningful mental representations. Therefore, in this study, the TOEFL LC subtest was used together with two specially developed aural versions of receptive vocabulary knowledge

tests, namely, the Breadth of Aural Vocabulary Knowledge Test (BAVK) and the Depth of Aural Vocabulary Knowledge Test (DAVK).

The TOEFL Listening Comprehension subtest was chosen for this research due to its widespread recognition and standardized nature in evaluating listening skills in EFL. This test is specifically designed to assess an individual's comprehension of spoken English in academic contexts. The listening component of the TOEFL Listening Comprehension subtest comprises 50 multiple-choice questions, which are derived from brief conversations, lectures, and academic discussions. To record their answers, participants were provided with answer sheets. The listening test was conducted in an audio room equipped with listening devices such as headphones and computers. The TOEFL Listening Comprehension subtest is scored using a predetermined point system. The total scores are calculated to determine the participants' listening proficiency.

In this study, the aural vocabulary tests used were the same as those in the written version of the Vocabulary Levels Test (VLT), as described by Schmitt et al (2001), and the Word Associates Test, originally developed by Read (1998) and subsequently revised and validated by Qian (1999, 2002). The VLT is a standardized assessment that measures a learner's vocabulary knowledge across various proficiency levels, ranging from 2,000 to 10,000-word levels. It provides a comprehensive evaluation of a learner's vocabulary size. On the other hand, the Word Associates Test assesses the extent to which learners are familiar with the meanings of adjectives commonly used in English and their collocations with other words. It measures learners' ability to make connections between words and understand their nuances and usage in context. Both the VLT and the Word Associates Test have gained widespread recognition in the field of language learning and teaching. For research aiming to compare aural vocabulary knowledge with written vocabulary knowledge, it would be prudent to utilize tests that assess vocabulary in similar formats. This approach would enable direct comparisons and avoid the

need for developing or adapting a new test. By employing the same question items in both the written and aural vocabulary tests, the present study aimed to ensure consistency and comparability of results across different test modalities.

Regarding the pace of delivery in the DAVK, a similar time span of twenty seconds between test items (Vafaee & Suzuki, 2020) was adopted in the current study. But the test-takers were allowed to listen to the target words twice instead of once to allow a better understanding of the target words, considering the test-takers' low-intermediate English proficiency level. To avoid exerting extra cognitive memorizing load on the research participants, paper-based answer sheets for BAVK and DAVK with multiple-choice options printed on them were provided for the test-takers to record their answers. Further details of the two tests are described below.

The BAVK (VLT) consists of five distinct levels, each containing 30 items. These levels include the 2,000-, 3,000-, 5,000-, and 10,000-word level, as well as the academic vocabulary knowledge. The primary objective of the VLT is to assess learners' mastery of vocabulary across these levels. It is important to note that the evaluation of academic vocabulary knowledge, which is derived from a separate frequency list (Coxhead, 2000) and encompasses lexical items across various levels, has been included in this study. In the BAVK test, each word definition was read once from the audio recording and a 5-second interval was provided for the participants to write down their response. The whole test lasted 28 minutes. A sample item of the BAVK test is given below.

Student instruction sheet of the BAVK

This is a vocabulary test. You must choose the right word to go with each meaning. Write the number of that word next to its meaning.

1 business		
2 clock	_____	~~part of a house~~ (aural input only)
3 horse	_____	~~animal with four legs~~ (aural input only)
4 pencil	_____	~~something used for writing~~ (aural input only)
5 shoe		
6 wall		

Figure 1. Sample item used to in the BAVK

Read (1998) emphasizes that the fundamental design concept of the vocabulary depth test is word association. In the present study, an aural form of the depth of vocabulary test was utilized, requiring test takers to identify the relevant word associates for 40 displayed stimulus adjectives. The test aims to examine the in-depth meaning of selective words from a frequency list, with each stimulus adjective in each item followed by eight potentially associated words. Each item has a stimulus adjective as its headword. EFL learners are expected to select four words as responses from the eight potential associates provided. It is assumed that learners with in-depth knowledge of the stimulus words would be able to recognize the various constructs of target words on paradigmatic, syntagmatic, and analytic levels through the aural input mode. Most of the test words were chosen from Barnard's Second and Third Thousand Word Lists, covering some high-frequency academic vocabulary (Qian, 1999). In the DAVK test, each stimulus word was recorded twice to decrease the difficulty level for less proficient listeners, and 20 seconds were spaced between each two of the eight words provided in each item. The test takes approximately 18 minutes to complete.

Student instruction sheet for the DAVK

This is a test of how you know the meaning of the adjectives that are commonly used in English. Each item looks like this:

~~beautiful~~ (aural input only)

enjoyable expensive free loud	education face music weather
The words here on the left side may help to explain the meaning of "beautiful"	The words here on the right side are nouns that may come after "beautiful" in a phrase or a sentence.

Figure 2. Sample item used in the DAVK

An English teacher with English as L1 and a PhD degree holder was invited to voice over for both the auditory vocabulary breadth and depth tests. Even though the target audience of the tests was Chinese EFL learners, the whole tests were recorded in English for possible future applications in a wider context. Pilot studies of the aural vocabulary knowledge tests were conducted for improving test validity. In particular, analyses on reliability (see Table 1 below) and concurrent validity were conducted. The concurrent validity was checked between the written and aural forms of the breadth and depth of vocabulary knowledge tests to ensure that there were differences as well as similarities in the constructs between the written and spoken versions of the same measures. The written Vocabulary Levels Test (Schmitt et al., 2001) was used as the criterion test for the BAVK (r=.417, p<.00), and the written WAT (Read, 1998) for DAVK (r=.572, p<.00). These moderate but significant correlations suggest that the aural and written forms of the two sets of the vocabulary knowledge tests actually measure somewhat different constructs due to their different modes of input, even though their contents and formats generally look the same.

3.2 Data collection procedure

As mentioned earlier, this research design was implemented among the participants who were business English majors. The administration of the three tests, which included two aural versions of the vocabulary knowledge tests and the TOEFL listening comprehension subtest, took place consecutively over three days within a single week. The tests were conducted in an audio-equipped classroom. The administration of the LC lasted approximately 30 minutes, BAVK 28 minutes and DAVK 19 minutes. The total data collection session lasted for about 1.5 hours, including teachers' explanations of the test requirements given between the tests. All the three measures were scored using a dichotomous system of zero and one.

3.3 Data analysis

To answer the two research questions, descriptive statistics were first conducted to show the overall scores of the three tests, namely, LC, BAVK and DAVK, which provided a general profile of the language proficiency levels of the participants. Following this, Pearson product moment correlations were performed among various variables to show the associations between the LC, BAVK and DAVK. Hierarchical regression analyses were also carried out to determine the relationships between various variables and their related variances for predicting listening performance, in order to address the research questions on the respective roles of breadth and depth of aural vocabulary knowledge in listening comprehension.

4. Results

In this section, results of descriptive statistics, bivariate correlations and hierarchical regression analyses are reported to address the two research questions. The predictive powers of the BAVK and DAVK are also examined in the regression models reported in Table 3.

4.1 Descriptive statistics

Table 1·

Means, standard deviations and reliabilities of LC, DAVK and BAVK (N=137)

Variables	MPS	M	SD	Reliability (Cronbach alpha)
LC	50	20.05	6.75	0.732
DAVK	160	91.79	23.16	0.728
BAVK	150	72.28	19.68	0.757

Notes:

1. *MPS: Maximum Possible Score*
2. *LC: Scores on the Listening Comprehension Test; DAVK: Scores on the Depth of Vocabulary Knowledge Test; BAVK: Scores on the Breadth of Vocabulary Knowledge Test*

In this research, the Cronbach alpha reliabilities of the three tests were all well above 0.70, suggesting that the measures used in the study were reliable. The mean score of the LC was 20.05 or approximately 40%, out of the maximum possible score (MPS) of 50, suggesting that the LC was a bit difficult for the participants. The mean score of DAVK was 91.79, or about

57%, out of 160 score points. The mean score of BAVK was 72.28, or around 48%, out of an MPS of 150. The standard deviations of the three sets of scores all showed reasonable, though varying, spreads.

4.2 Correlation Matrix

Table 2.

Pearson Correlations between LC, BAVK and DAVK (N=137)

	AVK2K	AVK3K	AWL	AVK5K	AVK10K	BAVK	DAVK
LC	.447**	.437**	.310**	.447**	.271**	.494**	.237**
AVK2K		.591**	.589**	.512**	.325**	.794**	.213*
AVK3K			.629**	.507**	.414**	.822**	.244**
AWL				.523**	.398**	.831**	.286**
AVK5K					.574**	.788**	.268**
AVK10K						.642**	.222**
BAVK							.316**

Notes:

1. ***: p <.01 (two-tailed); *: p <.05 (two-tailed)*
2. *LC: Scores on the Listening Comprehension Test; AVK2K: Scores on the 2000-word level of BAVK; AVK3K: Scores on the 3000-word level of BAVK; AVK5K: Scores on the 5000-word level of BAVK; AWL: Scores on the Academic Word List of BAVK; AVK10K: Scores on the 10000-word level of BAVK; BAVK: Scores on the Breadth of Aural Vocabulary Test; DAVK: Scores on the Depth of Aural Vocabulary Knowledge Test*

Table 2 displays the matrix of Pearson Product Moment Correlations between the test scores on LC, DAVK and BAVK, as well as the five individual word levels of the BAVK. As shown in Table 2, there is a significant but fairly weak correlation between the DAVK and BAVK (r= 0.316, p < .01), when the scores on all those individual aural vocabulary size levels are combined as one entity named BAVK. The correlations between DAVK and the individual levels of BAVK were also significant but weak, ranging from .213 to .286 (p<.01). This suggests that the strength of correlation between the DAVK and BAVK was generally weak though statistically significant, making it reasonable to distinguish the constructs of the BAVK and DAVK. Further, the 2000-, 3000-, 5000-, 10000-word levels and Academic Word Level of the BAVK also produced weak to moderate correlations ranging from .271 to .447 (p < .01)

respectively with the LC, and a significant but moderate correlation was also found between the BAVK and LC (r= 0.494, p < .01). Finally, a significant but weak correlation was detected between the DAVK and LC (r= 0.237, p < .01). It is thus worth noticing that the correlation between the BAVK and LC was stronger than that between the DAVK and LC.

4.3 Hierarchical regression

To investigate the respective contributions of the two dimensions of aural vocabulary knowledge, namely, breadth and depth of vocabulary knowledge, the present study further examined the magnitude of the R-squared value of each independent variable of BAVK and DAVK in the hierarchical regression analyses.

Table 3·

Hierarchical regression analyses with BAVK and DAVK as predictor variables and LC as criterion variable (N=137)

Step	Variable(s) in Model	r	R^2	ΔR^2	F	Sig.
			Model 1			
1	BAVK[a]	.494	.244	.244	43.524	.000
2	DAVK[b]	.501	.251	.007	22.469	.000
			Model 2			
1	DAVK	.237	.056	.056	8.069	.005
2	BAVK	.501	.251	.195	22.469	.000

Notes:
1. *Criterion Variable: LC=Scores on the Listening Comprehension Test*
2. *Predictor Variables:*
   a. BAVK=Scores on Breadth of Aural Vocabulary Knowledge Test
   b. DAVK=Scores on Depth of Aural Vocabulary Knowledge Test

Model 1 in Table 3, obtained using a forced-entry procedure, indicates the extent to which the scores on the two dimensions of aural vocabulary knowledge can explain the variance in listening performance. The model produced an r of .494 (p<.01) between the BAVK and LC, and indicated that the BAVK was an effective predictor of listening proficiency (R^2 =.244, p<.01). However, the added contribution of DAVK to the explanation of variance in the LC was non-significant (ΔR^2=.007, p>.05), suggesting that the DAVK was unable to provide

additional explanation of the variance in LC as a second predictor variable following the entry of BAVK.

To verify this result, the two predictor variables of BAVK and DAVK were entered in a reverse order in Model 2. The lower part of Table 3 shows the details of the second regression model using a forced-entry procedure, in which the DAVK was first entered in the model, producing an r of .237 (p<.01) between DAVK and LC and an R^2 of .056 (p<.01). Subsequently, the BAVK was entered as the second predictor variable, resulting in an aggregated r of .501 and an R^2 of .251 ((ΔR^2=.195, p<.01). The results based on the above two hierarchical regression models suggest that BAVK was a much more powerful predictor of LC than DAVK.

5. Discussion

Regarding the two research questions on the roles of breadth and depth of vocabulary knowledge in listening comprehension, the results show some insights for addressing the initially proposed research questions for the present study.

RQ1: What is the role of breadth of aural vocabulary knowledge in listening comprehension?

RQ2: What is the role of depth of aural vocabulary knowledge in listening comprehension?

Results from the Pearson product moment correlations and hierarchical regression analyses based on scores on the BAVK, DAVK and LC suggest that the BAVK is a much more powerful variable in predicting the test-taker performance on listening comprehension than the DAVK, which can provide only very limited prediction about learners' performance on listening comprehension. Specifically in the context of the present study, the BAVK played a relatively important role in determining the quality of listening comprehension among low-intermediate EFL listeners, as compared to DAVK, whose role in this respect was very limited. In the second model of the hierarchical regression analyses (Table 3), BAVK predicted 25% variance of

listening comprehension over and above the 5.6% prediction provided by DAVK. In contrast, no additional significant explanation of variance in listening performance was provided by DAVK in Model 1 after BAVK was entered as the first independent variable. The results thus confirm that, with regard to the two dimensions of aural vocabulary knowledge, the breadth dimension plays a much more robust role in predicting listening performance than does the depth dimension.

This finding provides a valuable implication for EFL classrooms. In teaching listening comprehension to low-intermediate level EFL learners, teachers may want to encourage the learners to focus more on the expansion of breadth of aural vocabulary knowledge than the depth of aural vocabulary knowledge at this stage of learning. Researchers on L2 listening emphasize phonological aspects of vocabulary knowledge when investigating the relationship between vocabulary knowledge and listening comprehension. Stæhr (2009) argues that correlation studies between vocabulary breadth and listening performance should be ideally based on listening forms of vocabulary breadth tests involving hearing the target words instead of reading them in the written form. Milton and associates (2010) offer evidence on the significance of aural vocabulary knowledge in predicting listening performance to verify the critical assumptions about the importance of aural vocabulary knowledge in listening comprehension. Results of the present study corroborate findings from Milton et al. (2010) that significant and positive correlations exist between aural vocabulary knowledge and listening comprehension and that breadth of aural vocabulary knowledge in particular contributes in an important way to the level of listening performance.

In addition to the breadth of aural vocabulary knowledge, depth of aural vocabulary knowledge was also found to be significantly and positively correlated with listening comprehension and have provided a small but unique portion of variance in predicting listening performances among low-intermediate EFL listeners, even though the correlation (r=0.28,

p<.01) found between the DAVK and LC was somewhat weak. This conforms to previous findings (e.g., Stæhr, 2009; Vafaee & Suzuki, 2020) that recognition of words' superficial meanings serves as the fundamental dimension of vocabulary knowledge and depth of vocabulary knowledge plays a smaller role. The weak correlation between scores on the DAVK and LC might be attributed to three reasons: first, given the fast and automatic information processing nature of listening comprehension, there is little time left for EFL listeners to process the in-depth meanings of target words. The second reason might be the different difficulty levels of the two forms of depth of vocabulary tests. The depth of vocabulary test in the written form is admittedly easier for EFL learners to get the accurate answers than the aural form. Even though participants could get a higher score on a listening comprehension test, it is not easy for them to get a similar high score on the listening version of a vocabulary depth test. Third, the vocabulary used in spoken texts is usually simpler than that used in written discourse. In other words, in paragraphs in a listening comprehension test, it is usual that only the first or primary meaning of a word is used. That is probably why the DAVK is not very closely associated with the LC. Nevertheless, with increasing lexical density and upgrading levels of sophistication of aural texts in a listening comprehension measure, a stronger correlation may be found between the DAVK and LC.

6. Conclusion

6.1 Theoretical considerations

The utilization of aural vocabulary knowledge measures in this study holds promise for further investigations into the impact of aural vocabulary knowledge on language skill development, particularly in listening comprehension. Aural vocabulary levels tests, as they were used in the present study to represent the breadth and depth of vocabulary knowledge, involve acoustic properties of vocabulary knowledge as part of their construct. Such properties focus more on assessing EFL learners' capacity of phonological recognition than spellings and

written meanings of selected lexical items, which are usually not reflected in a written form of the same tests. A number of listening studies contend from a theoretical perspective that knowing the written word does not necessarily mean that EFL learners would be able to recognize the same word in the corresponding acoustic form while listening. The present research, which aimed to provide specific evidence in this respect by adopting aural versions of vocabulary tests, has produced results that can testify to the significant and positive relationship between aural vocabulary knowledge and listening comprehension.

Vocabulary knowledge is important in the process of listening comprehension. During the speech processing and lexical search, word segmentation and meaning recognition form the basis for aural comprehension (Field, 2013; Rost, 2013). In the context of assessing the roles of breadth and depth of aural vocabulary knowledge of low-intermediate EFL learners, the following finings can be tentatively reached. First, breadth of aural vocabulary knowledge serves a major role in determining listening proficiency. Second, depth of aural vocabulary knowledge can make only a small contribution to the success of EFL learners' listening performance. Breadth of vocabulary knowledge, defined as the ability to recognize words and assign at least a superficial meaning to them, should be considered the most fundamental aspect of lexical knowledge in aural comprehension. Deeper word knowledge that involves various other aspects of vocabulary knowledge, such as word forms, lemmas, parts of speech and collocations, also plays a significant role in successful aural comprehension (Rost, 2013), though to a lesser extent for low-intermediate level EFL listeners. One possible reason might be that the aural version of a depth of vocabulary knowledge test, like its written version, measures only a small proportion of the words in the lexicon, and is unlikely to be very representative of the words in texts for the listening tasks. On the other hand, a breadth of vocabulary knowledge test, whether in the aural or written form, usually contains many more words and is more likely to be representative for the vocabulary of the same texts.

6.2 Pedagogical implications

In teaching EFL listening, emphasis should also be placed on the building of aural lexicon instead of focusing merely on written lexical forms and meanings. The present study shows that phonological knowledge, as represented by aural forms of vocabulary tests, can serve as an important contributing factor in determining listening success. In the present research, breadth of aural vocabulary knowledge was found to be a valid predictor of listening performance. These findings suggest that, unlike teaching reading comprehension, L2 teaching practitioners should place greater emphasis on the phonological aspects of vocabulary knowledge when teaching listening comprehension. In particular, it is essential to prioritize the teaching of acoustic aspects alongside written meanings and spellings of lexical items. Meanwhile, it is necessary to encourage students to focus on recognizing spoken texts through aural input rather than solely relying on written input.

The empirical findings from the present study also shed light on the relationship between specific dimensions of vocabulary knowledge and listening comprehension, and offer practical guidelines for incorporating aural vocabulary knowledge in listening instruction. In addition to prioritizing the phonological properties of vocabulary knowledge in EFL listening practice, it is crucial to focus on expanding aural vocabulary size before deepening the understanding of aural lexical word associations. This is because a broad aural lexicon plays a more significant role in the listening success of low-intermediate-level EFL learners than deep aural vocabulary knowledge.

6.3 Implications for future research

With regard to the complex nature of listening comprehension, which often involves assimilation, vague articulation, incomplete spoken segments and unclassified stream of speech in spoken discourse, foreign language learners may fail to recognize known lexical items through aural input. Therefore, it is necessary to apply multiple ways of measuring

vocabulary knowledge to offer a more comprehensive picture of how vocabulary knowledge can contribute to listening comprehension. For instance, given the ephemeral nature of listening, we might expect that the automaticity of vocabulary retrieval can potentially serve as a strong predictor of listening comprehension. However, most known empirical vocabulary studies have only examined breadth and depth of vocabulary knowledge without observing automaticity. This therefore might be an interesting but challenging area for future research.

6.4 Limitations of the study

Regardless what insights have been provided in the present study, there were limitations in its design and conceptualization. In particular, even though the present study investigated two macro dimensions (breadth and depth) of aural vocabulary knowledge, the elements assessed were limited as the measures used have only partial construct coverage. Researchers investigating the construct of vocabulary knowledge conceptualize the construct as containing a number of sub-dimensions, such as awareness of word characteristics including phonology and phonetics, as well as process and automaticity. These sub-dimensions and their related elements may also play important roles in their own ways in listening success. Therefore, more comprehensive and refined dimensions of vocabulary knowledge should be conceptualized, operationalized and measured in estimating listening performance in future research.

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Author Statements

Declarations of Competing Interest

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Author Contributions

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