



The Effects of Phonemic Awareness Instructions on L2 Listening Comprehension: A Meta-Analysis

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This study examines the effect of phonemic awareness instruction on listening comprehension ability in learning English as a second language or foreign language (L2). The searching procedures were carried out using *Publish or Perish* with discreetly selected keywords. Eight studies with 13 samples published between 2000 and 2020 were obtained. Hedges' g was calculated, leveraging *Comprehensive Meta-Analysis* (CMA) software. The overall effect size of phonemic awareness instruction on listening skills was found to be large (Hedges' $g = 0.99$, lower bound = 0.82, upper bound = 1.61). The result demonstrated that phonemic awareness instructions to beginners (Hedges' $g = 0.86$) or primary school students (Hedges' $g = 3.67$) might have a large effect on enhancing their listening skills. Furthermore, research that conducted phonemic awareness instructions (Hedges' $g = 1.43$) showed a much larger effect size than phonics instructions (Hedges' $g = 0.45$), suggesting the need for a more focused phonemic instruction for L2 learners. Lastly, the effectiveness of phonemic awareness instruction was better assessed when using intensive listening measurements (Hedges' $g = 1.43$) rather than selective ones (Hedges' $g = 0.80$). These results collectively indicate that phonemic awareness instructions could be both effective and practical for helping L2 learners improve listening skills.

Keywords: meta-analysis, phonemic awareness, L2 listening comprehension

Introduction

The term, phonemic awareness, must be more related to 'listening' than 'reading' ability because the term includes the root 'phone,' meaning 'sound,' in it. Surprisingly, however, the effects of phonemic awareness have been more widely investigated in reading instruction than in listening (Ahn, 2007; Deshler, Hock, Ihle, & Mark, 2011; Koda, 1998). Such a seemingly unbalanced phenomenon may exist, at least in part, because phonemic awareness has been investigated more in the first language (L1) learning context (Ehri et al., 2001). In an L1 learning context, children are expected to have developed sufficient listening ability by the time they start school. Through schooling, they learn how to transfer their listening ability to a new language skill, i.e., reading ability. Thus, a phonemic awareness instruction in the L1 context comes into play in the process of helping L1 children develop reading ability.

Such a description does not hold in the context of second language (L2) learning, no matter whether the learning takes place in English as a second language (ESL) or English as a foreign language (EFL) contexts. L2 learners cannot be assumed to have the same level of listening ability as L1 learners at the same age. In L2 learning, unlike L1 students who can automatically process listening materials, beginning-level L2 listeners put more effort into the details of the speech (Segalowitz, 2003; Vandergrift, 2004, 2007). Therefore, in the initial stage of their L2 learning, more emphasis tends to be given on developing listening ability, for which phonemic awareness instruction is hypothesized to be effective. Such a hypothesis is investigated in this present study through a meta-analytic method. Meta-analysis is a method that systematically synthesizes a body of previous research examining the same topic to derive a better understanding of the phenomenon of interest by integrating quantitative results from multiple studies. A meta-analytic research method has yet to be applied to investigate the relationship between phonemic awareness and L2 listening skills to the authors' best knowledge. Therefore, the main goal of this study is to examine the effectiveness of phonemic awareness instruction on L2 learners' listening ability through a systematic, quantitative synthesis of previous studies looking into the topic.

Literature Review

Definition of Phonemic Awareness

The term 'phonemic awareness' is sometimes interchangeably used with the two terms that are related to but distinct from it. These two terms are 'phonological awareness' and 'phonics.' The three terms are related to one another because they are all concerned with the sounds within words (Gillon, 2018). However, they are also different from each other. Delineating the differences between these three constructs is essential for understanding the exact nature of sound-related instruction reported in the literature. The relationship between the three constructs is visually represented in Figure 1.

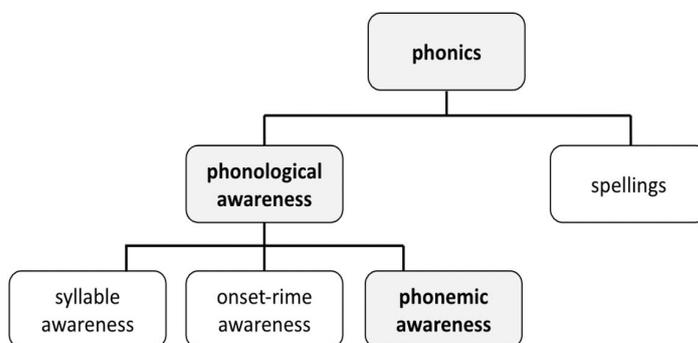


Figure 1. Relationship between phonemic awareness, phonological awareness, and phonics.

Firstly, 'phonics' is the broadest construct among the three related terms because it concerns more than sounds and is about knowledge of sound-letter associations (i.e., spellings). On the other hand, phonological and phonemic awareness deals with sounds of a word itself, i.e., phonemes (Gillon, 2018). Therefore, phonics can be understood as embracing phonological and phonemic awareness as a part. Secondly, 'phonological awareness' is a superset containing phonemic awareness as one of its three comprising levels, as represented in Figure 1. Gillon (2018) defines phonological awareness as "the understanding that spoken words can be broken down into smaller parts" (p. 12). Last, 'phonemic awareness,' the focus of this paper, can then be understood as "an understanding that speech is composed of a series of individual sounds" (Yopp, 1992, p. 696). This definition seems straightforward because a phoneme, the essence of phonemic awareness, is a basic minimal sound unit of a language. For example,

a person equipped with phonemic awareness of English knows that *pen* can be segmented into a succession of sounds as /p/, /ɛ/, and /n/. Therefore, phonemic awareness lays a foundation on which phonological awareness and then phonics can develop. In light of this, this study examines the effectiveness of phonemic awareness instructions on L2 listening comprehension. Previous studies that investigated phonics instructions are also included in our analysis as phonemic awareness is frequently dealt with in relation to letters in language classes (Ehri, 2004).

Phonemic Awareness Instruction in the L2 Classroom

For successful, effortless listening comprehension, linguistic information collected from bottom-up and top-down processing operates in parallel so that listeners can form a mental representation of the given speech (Brown, 2001; Vandergrift & Goh, 2012). Generally, these two processes coordinate rapidly and efficiently in L1 listening, under the condition that bottom-up skills are automatized (Vandergrift & Goh, 2012). In other words, for a native speaker of a language, this automatized decoding processing during listening comprehension is underway with minimal attention to specific linguistic codes.

On the other hand, L2 listening comprehension may not proceed as smoothly as L1 listening comprehension. L2 listeners who have not automatized L2 lower-order linguistic skills can have difficulty in understanding L2 speech, mainly because of the transient characteristics of the aural discourse. For this reason, linguistic knowledge serves as an essential building block for the L2 listening comprehension process (Vandergrift & Goh, 2012). Having sufficient linguistic knowledge is essential in two ways. First, when linguistic knowledge becomes automatized, it can greatly facilitate the listening comprehension process. Next, this knowledge can also be utilized for resolving comprehension problems when the smooth and unconscious comprehension process is hindered. Phonemic awareness instruction is assumed to be useful to help L2 learners develop the fundamental L2 lower-order linguistic skills. Given this hypothesized important role of phonemic awareness on L2 listening comprehension, it is imperative to investigate whether instruction containing phonemic awareness components indeed leads to improved listening comprehension.

Instructions of phonemic awareness consist of activities that engage children in discriminating and identifying phonemes that comprise words (Blevins, 1997). Examples of such activities include (i) categorizing phonemes into rhyming groups (Torgesen & Bryant, 2004); (ii) matching phonemes (Wagner, Torgesen, Rashotte, & Pearson, 1999); (iii) isolating a specific phoneme from given words (Stahl & Murray, 1994); (iv) deleting a phoneme (Semel, Wiig, & Secord, 2006); and (v) blending phonemes and telling what the word sounds (Wagner, Torgesen, Rashotte, & Pearson, 2013). Phonemic awareness is sometimes addressed along with orthographic reading skills in class, which is known as 'phonics' instructions. The instructions of sound-letter relation at the early stage of L2 learning appear to be natural because basic literacy is one of the essential and fundamental skills that must be acquired.

In the next section, previous studies will be reviewed that investigated the effects of phonemic awareness instruction on L2 listening ability.

Effects of Phonemic Awareness Instructions on L2 Listening Ability

The research interest in the effects of phonemic awareness instruction on L2 listening is relatively recent when compared with the quantity of research investigating the influence of phonemic instruction on L1 reading (Ehri, 1979; Perfetti, Beck, Bell, & Hughes, 1987; Yopp, 1992). The research on the relationship between phonemic awareness instruction and L2 listening ability started appearing in the literature in the mid-2010s (e.g., Afsharrad & Nafchi, 2015; Ahangari, Rahbar, & Maleki, 2015; Al Omari, 2019; Gokgoz-Kurt, 2016; Hwang, 2016; Khaghaninejad & Maleki, 2015; Siegel & Siegel, 2015; Thajakan & Sucaromana, 2014). These studies examined whether various types of phonemic awareness interventions are useful for improving listening skills in L2 contexts. For example, Ahangari et al. (2015) reported that pronunciation practices could improve listening skills. Likewise, Siegel and Siegel (2015)

concluded bottom-up instructions could enhance listening skills. Afsharrad and Nafchi (2015) corroborate the conclusions from Ahangari et al. (2015) and Siegel and Siegel (2015) by showing that transcribing exercises had a positive influence on beginners' listening skills. Although phonemic awareness instruction has generally been found to have positive impacts on L2 learner's listening ability, a more systematic synthesis of the previous studies is necessary to understand the exact nature of the relationship because of the following reasons.

Firstly, studies on phonemic awareness in L2 contexts have dealt with diverse age or proficiency groups. Age groups investigated range from primary school students (Thajakan & Sucaromana, 2014) to secondary school students (Afsharrad & Nafchi, 2015; Khaghaninejad & Maleki, 2015), then to university students (Ahangari et al., 2015; Al Omari, 2019; Gokgoz-Kurt, 2016; Hwang, 2016; Siegel & Siegel, 2015). Even among the studies that targeted the university level, the specific proficiency level each study investigated varied from the beginner level (Hwang, 2016), the lower-intermediate level (Siegel & Siegel, 2015), to the intermediate level (Ahangari et al., 2015; Gokgoz-Kurt, 2016). There was also a study that included students of mixed proficiency levels (Al Omari, 2019). Given this diversity in the age and proficiency levels targeted in the previous literature, it would be worth investigating the extent to which the influence of phonemic instruction varies across age groups and proficiency levels.

Secondly, the previous studies also varied in the specific instructional activity implemented. The activities reported in the literature include dictation (Al Omari, 2019), transcribing (Afsharrad & Nafchi, 2015; Khaghaninejad & Maleki, 2015; Siegel & Siegel, 2015), shadowing (Hwang, 2016), and a program utilizing multimedia (Gokgoz-Kurt, 2016; Thajakan & Sucaromana, 2014). These teaching and learning activities can be divided into two categories depending on the scope of the target construct. One type is the activity that focused on phonemic awareness only, while the other type targeted a broader construct, phonics, in the intervention (see Figure 1). The number of studies investigating the effects of phonics (Afsharrad & Nafchi, 2015; Al Omari, 2019; Gokgoz-Kurt, 2016; Khaghaninejad & Maleki, 2015; Siegel & Siegel, 2015) was slightly larger than that of focusing on phonemic awareness (Ahangari et al., 2015; Hwang, 2016; Thajakan & Sucaromana, 2014), among the empirical studies selected for the present meta-analysis. It is, then, intriguing to examine which type of teaching activity is more conducive to L2 listening ability.

Next, the duration of treatment was different across the studies. Previous meta-analytic studies on second language acquisition reported that long-term instruction showed generally larger effects than short-term instruction (Jeon & Kaya, 2006; Lee, Jang, & Plonsky, 2015; Saito, 2012). Likewise, other meta-analyses on the effectiveness of the language training also revealed that there is a general tendency that the longer the learners receive instructions, the more effective the interventions tend to be (Lyster & Saito, 2010; Plonsky, 2011). Thus, it would be worthwhile to examine whether the result of the current meta-analysis study follows the trend that was observed in the previous studies.

Fourthly, the operational definition of listening ability varied across studies. Some studies gathered evidence of listening ability by checking students' ability to discern discrete sound units (i.e., phonemes) (Gokgoz-Kurt, 2016; Siegel & Siegel, 2015; Thajakan & Sucaromana, 2014). Other studies administered a listening comprehension test to check students' understanding of the information in a passage (Afsharrad & Nafchi, 2015; Ahangari et al., 2015; Al Omari, 2019; Hwang, 2016; Khaghaninejad & Maleki, 2015; Siegel & Siegel, 2015). The measure of listening ability that directs a listener to a specific sound feature is categorized as 'intensive' listening while listening to understand the information delivered in an aural text is classified as 'selective' listening (Brown, 2001). Intensive listening can be understood as assessing bottom-up skills and selective listening as assessing top-down skills. Given this difference in the focus in intensive and selective listening, the choice of one over the other can lead to a different conclusion about the effectiveness of phonemic instruction. Therefore, it would be interesting to investigate whether the effect sizes differed by listening measurement types administered (i.e., intensive vs. selective).

Finally, some limitations in statistical reporting were also noticed in the previous literature. Some studies (Siegel & Siegel, 2015; Thajakan & Sucaromana, 2014) did not report effect sizes or consider

them in interpreting the results. Arguing that the p -value, the sole criterion for the significance testing of the null hypothesis, is often arbitrary and unreliable, Plonsky (2015) strongly recommends taking effect sizes into account when interpreting statistical results. Besides, Siegel and Siegel's (2015) study did not conduct a group comparison between the control and experimental groups. A between-group comparison would have provided a more definite answer to the influence of phonemic awareness instruction on L2 listening in their study.

The above arguments point to why a meta-analytic study is needed to better understand the effects of phonemic awareness instruction on improving L2 listening skills. Moreover, this study further examines the relationship between the effectiveness of phonemic awareness instruction and different moderating variables. The specific research questions addressed in this study are as follows:

1. How effective is phonemic awareness instruction on L2 listening acquisition?
2. To what extent do its effects differ across L2 learning settings, learner characteristics, the types and duration of instruction, and listening measures?

Methodology

Data Collection and Coding

The meta-analysis reported in the current paper included quantitative studies satisfying the following eligibility criteria: (a) instructions on phonemic awareness, (b) inclusion of listening measurements, (c) participants studying English as a second or foreign language, and (d) the between-group design studies comparing control and treatment groups. Thus, the articles were all excluded from the analysis if they were without phonemic awareness instructions or listening measurement; not about L2 English learning; or with insufficient treatment.

The search process was carried out with carefully chosen keywords based on the inclusion and exclusion criteria presented above. *Publish or Perish* (version 7.25.2877) (Harzing, 2007), a software that retrieves studies under the set conditions, was used to search articles. The keywords used in the search were "listening comprehension," "listening," "phonemic awareness," "phoneme," "phonemic," "pronunciation," "teaching," "intervention," "instruction," "training," "English," and "L2." Two search engines were selected — *Google Scholar* and *Crossref*. The *Year of publication* was set to between 2000 and 2020. Out of the 723 papers retrieved from the search, eight articles (1.10%) were finally identified to meet the eligibility criteria.

Three out of the eight selected studies (Hwang, 2016; Siegel & Siegel, 2015; Thajakan & Sucaromana, 2014) reported more than one statistical result by using different outcome listening measures. When a study reported multiple statistical results, they were distinguished with lower-case alphabets attached to the author name(s), such as 'Hwang (2016)^a' and 'Hwang (2016)^b.' Therefore, a total of 13 samples from the eight studies were used for the meta-analysis. These studies were then organized into a database and coded to understand the general characteristics of the studies by benchmarking the coding scheme from Plonsky (2011). The variables finally selected for investigation and the specific codes for each variable are summarized in Table 1. The coding was done independently by the first two authors of this paper. Discrepancies in the coding between the two coders were resolved through discussion. The coding results of the included studies are presented in Table 2.

TABLE 1
Data Coded from Primary Studies

Variable	Values			
Identification				
Author (Year)				
Context				
Second or Foreign language	Second	Foreign		
Educational institution	Primary	Secondary	University	
Proficiency level	Beginner	Lower intermediate	Intermediate	Mixed
Treatment				
Instructions conducted ^a	A	B		
Length of treatment	≤ 5 hours	> 5 hours		
Outcome				
Dependent variable ^b	I	S		
Measure/Instrument				
Statistical tests used				

Notes. ^a A=Phonemic awareness, B=Phonics; ^b I=Intensive listening, S>Selective listening

TABLE 2
Included Studies

Study ¹	Setting	Institution	Proficiency level	Length of Treatment	Instruction ²	Measurement ³
Afsharrad and Nafchi (2015)	Foreign	Secondary	Lower intermediate	> 5 hours	B	S
Ahangari et al. (2015)	Foreign	University	Intermediate	> 5 hours	A	S
Al Omari (2019)	Second	University	Mixed	> 5 hours	B	S
Gokgoz-Kurt (2016)	Second	University	Intermediate	≤ 5 hours	B	I
Hwang (2016) ^a	Foreign	University	Beginner	> 5 hours	A	S
Hwang (2016) ^b	Foreign	University	Beginner	> 5 hours	A	S
Hwang (2016) ^c	Foreign	University	Beginner	> 5 hours	A	S
Khaghaninejad and Maleki (2015)	Foreign	Secondary	Intermediate	> 5 hours	B	S
Siegel and Siegel (2015) ^a	Foreign	University	Lower intermediate	> 5 hours	B	I
Siegel and Siegel (2015) ^b	Foreign	University	Lower intermediate	> 5 hours	B	S
Thajakan and Sucaromana (2014) ^a	Foreign	Primary	Mixed	> 5 hours	A	I
Thajakan and Sucaromana (2014) ^b	Foreign	Primary	Mixed	> 5 hours	A	I
Thajakan and Sucaromana (2014) ^c	Foreign	Primary	Mixed	> 5 hours	A	I

Notes. ¹ Separate samples in one study with different outcomes are distinguished with lower-case letters; ² A=Phonemic awareness, B=Phonics; ³ I=Intensive listening, S=Selective listening

Calculation and Interpretation of Effect Size

We utilized *Comprehensive Meta-Analysis* version 3 (Borenstein, Hedges, Higgins, & Rothstein, 2013) to conduct a meta-analysis and subsequent subgroup analyses. Hedges' g (Hedges, 1981) is similar to Cohen's d in that both of them "represent the effect size in standard-score units (i.e., z scores)" (Rosnow & Rosenthal, 2003, p. 223), but there exist some differences between them. Firstly, unlike Cohen's d , which is calculated based on the estimated 'population' standard deviation, Hedges' g is calculated based on the 'sample' standard deviations (Rosnow & Rosenthal, 2003). As the available information from the included studies is all about 'samples,' we concluded that Hedges' g is more appropriate for our study. In addition, Hedges' g is recommended for use in a meta-analysis dealing with small samples because it "corrects for bias with small samples" (Lakens, 2013, p. 5). Several studies included in our meta-analysis were conducted with small samples with smaller than 20 in the treatment group (e.g., Afsharrad & Nafchi, 2015; Al Omari, 2019; Khaghaninejad & Maleki, 2015; Siegel & Siegel, 2015). Therefore, it seems to be more reasonable to choose Hedges' g over Cohen's d in terms of the characteristics of our selected studies.

Effect sizes are known to be best understood when they are interpreted in the contextualized variables in regard to the particular discipline (Valentine & Cooper, 2003). Thus, the effect sizes from our study should be interpreted according to the guidelines that have been reported in previous L2 research. To our knowledge, the only available benchmark for L2 research is about Cohen's d , which is suggested by Plonsky and Oswald (2014). Therefore, the following guidelines suggested by Plonsky and Oswald (2014) were considered when interpreting effect sizes: 0.4 for a small, 0.7 for a medium, and 1.0 for a large effect for between-group comparisons (p. 889).

Results and Discussion

Because studies investigating the relationship between phonemic awareness and L2 listening have emerged recently in the L2 research literature, the number of studies identified from the literature search was fewer than we first expected. Despite the small number of studies, some noteworthy results were found in the meta-analysis of the selected studies. First of all, the overall effect size for the collected studies is large (Hedges' $g = 0.99$, lower limit = 0.82, upper limit = 1.61), suggesting phonemic awareness instruction has a positive effect on learners' listening skills in L2 contexts. See Table 3 and Figure 2 for the effect sizes for all individual samples and the overall mean effect size. The overall effect size, 0.99, indicates that the students who received phonemic instruction scored approximately one standard deviation higher than the students who did not.

TABLE 3
Summary of All Individual Samples

Study ^a	n ^b	Hedges' <i>g</i>	95% CI		Strength ^c
			Lower	Upper	
Afsharrad and Nafchi (2015)	31	1.50	0.72	2.28	Large
Ahangari et al. (2015)	42	1.01	0.38	1.65	Large
Al Omari (2019)	25	0.35	-0.42	1.12	Small
Gokgoz-Kurt (2016)	58	0.05	-0.46	0.56	Small
Hwang (2016) ^a	72	0.93	0.25	1.22	Large
Hwang (2016) ^b	72	1.09	0.59	1.59	Large
Hwang (2016) ^c	72	0.78	0.30	1.27	Medium
Khaghaninejad and Maleki (2015)	38	0.71	0.07	1.35	Medium
Siegel and Siegel (2015) ^a	44	0.39	-0.21	0.98	Small
Siegel and Siegel (2015) ^b	44	0.25	-0.34	0.85	Small
Thajakan and Sucaromana (2014) ^a	50	4.30	3.30	5.31	Large
Thajakan and Sucaromana (2014) ^b	50	3.40	2.54	4.26	Large
Thajakan and Sucaromana (2014) ^c	50	3.48	2.60	4.35	Large
Overall	648	0.99	0.82	1.61	Large

Notes. ^a Samples with different outcomes from one study are distinguished with lower-case letters; ^b All participants in both the control and experimental groups are included; ^c Interpretations referring to the standards by Plonsky & Oswald (2014)

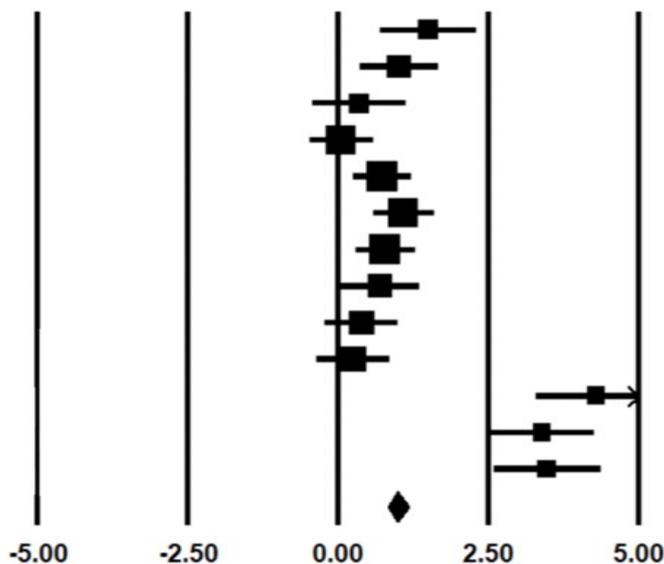


Figure 2. A forest plot for each sample.

By referring to Hall, Tickle-Degnen, Rosenthal, and Mosteller (1994), Plonsky (2011) underscored that one of the primary objectives of conducting a meta-analysis is not only to summarize the selected studies but also to add new knowledge in the domain. Thus, the influences of moderator variables were investigated, in addition to the overall effect size, to seek for a more in-depth understanding of the relationship between phonemic awareness instruction and L2 listening skills. In this respect, subgroup analyses were conducted to address the second research question, investigating the extent to which the effectiveness of phonemic instruction varied in terms of context, treatment, and measurement. Three contextual variables, two treatment-related variables, and one outcome variable were assessed with regards to their effectiveness of phonemic awareness instructions on listening skills. The results of the subgroup analyses are summarized in Table 4 and Figure 3.

TABLE 4
Effectiveness of Phonemic Awareness Instruction by Subgroups

Group	Subgroup	Value	M (Hedges' g)	K ₁ ^a	K ₂ ^b	N ^c	SE	95% CI	
								Lower	Upper
Context	Setting	Second	0.14	2	2	47	0.22	-0.28	0.57
		Foreign	1.15	6	11	250	0.10	0.97	1.34
	Institution	Primary	3.67	1	3	75	0.27	3.15	4.19
		Secondary	1.03	2	2	35	0.25	0.53	1.52
		University	0.61	5	8	187	0.10	0.41	0.80
	Proficiency	Beginner	0.86	1	3	84	0.14	0.58	1.15
		Lower intermediate	0.58	2	3	52	0.19	0.21	0.95
		Intermediate	0.51	3	3	72	0.17	0.17	0.85
Treatment	Instructions conducted ^d	Mixed	2.62	2	4	89	0.22	2.19	3.06
		A	1.43	3	7	179	0.12	1.20	1.66
	Length of treatment	B	0.45	5	6	118	0.13	0.19	0.70
		≤ 5 hours	0.05	1	1	33	0.26	-0.46	0.56
		> 5 hours	1.11	7	12	264	0.09	0.93	1.29
		I	1.43	3	5	126	0.16	1.12	1.74
Outcome	Dependent variable ^e	S	0.80	6	8	171	0.11	0.59	1.00

Notes. ^a the number of the studies; ^b the number of the samples; ^c the number of participants in the experimental group; ^d A=Phonemic awareness, B=Phonics; ^e I=Intensive listening, S>Selective listening

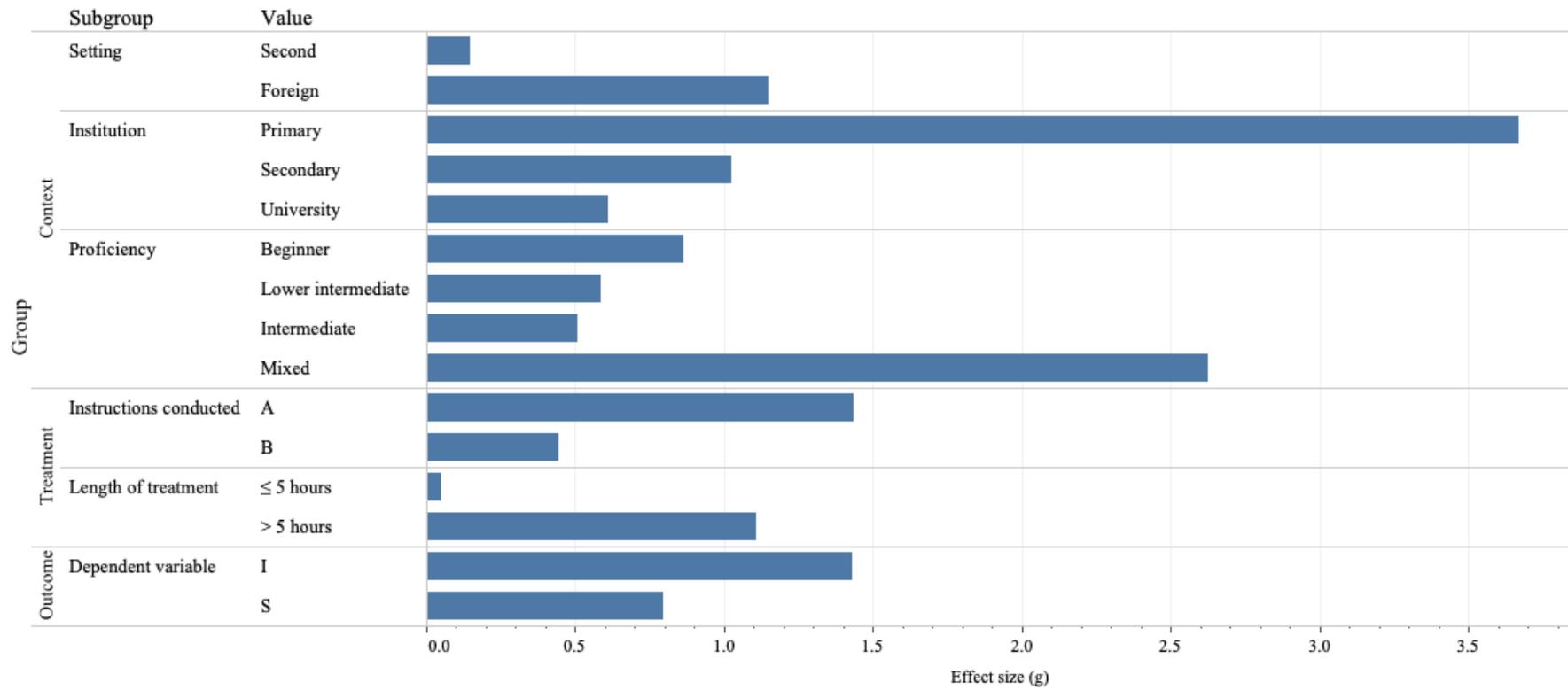


Figure 3. Effect sizes for subgroups by moderating variables.

As for the L2 learning settings, the studies conducted in the EFL contexts showed a large effect size (Hedges' $g = 1.15$, lower limit = 0.97, upper limit = 1.34) compared to those in the ESL contexts. Students learning English in an EFL setting generally have limited exposure to English phonemes in their everyday lives, and therefore, they must be benefited more from phonemic instruction. Also, some phonemes in English do not exist in a student's first language and may be recognized as meaningless sound combinations rather than the sounds of a language in connected speech. Thus, activities helping learners raise phonemic awareness about L2 phonemes might contribute to improving EFL students' listening skills. Notably, both studies conducted in ESL contexts (e.g., Al Omari, 2019; Gokgoz-Kurt, 2016) implemented phonics instruction while studies in EFL contexts targeted phonemic awareness either with or without letters. It can be inferred that a greater emphasis was put on phonemic awareness in EFL contexts, and the instruction was effective.

Regarding learner characteristics, phonemic awareness instructions have a considerable effect size when it was provided to primary students (Hedges' $g = 3.67$, lower limit = 3.15, upper limit = 4.19). However, this result should be interpreted with caution, given a small number of samples targeting primary-school students. Still, the result is in line with the literature that young children's sensitivity to phonemes of a language is directly linked to their subsequent ability to understand a series of sounds as meaningful units (Kuhl, Conboy, Padden, Nelson, & Pruitt, 2005). Besides, examining the relationship between proficiency levels and the effectiveness of instruction indicates that students of the beginner level (Hedges' $g = 0.86$, lower limit = 0.58, upper limit = 1.15) revealed a higher effect size than those of higher levels did. This result is comparable to the results of previous research that beginning L2 listeners benefit more from bottom-up processing in comprehending listening. They construct meaning by gradually integrating larger units of the meaning from the phoneme-level up to the discourse-level (Davis & Bistodeau, 1993; Li, Cheng, & Kirby, 2015; Lund, 1991).

When it comes to the instruction types, instructions on a sound itself (i.e., phonemic awareness) turned out to be much more effective than phonics instructions when aiming at improving listening comprehension skills. That is, phonemic awareness instructions showed a larger effect size (Hedges' $g = 1.43$, lower limit = 1.20, upper limit = 1.66) than phonics instructions (Hedges' $g = 0.45$, lower limit = 0.19, upper limit = 0.70). It highlights the importance of phonemic awareness as a basic and essential skill in the L2 listening comprehension process in that having the ability to manipulate sound structures allows L2 learners to identify each individual sound from the spoken speech. In the bottom-up process of listening comprehension, Hulstijn (2001) stated L2 listeners are asked to recognize the sounds of a foreign language to form a mental representation of the message (i.e., phonemic awareness). In a similar vein, Field (2003) accentuated the importance of the L2 listeners' ability to perceive sounds of a language in a connected speech by pointing out that they can easily go astray in the middle of speech stream due to minor misperceptions of sounds. Therefore, phonemic awareness instruction can help L2 learners equip with the knowledge of the sound system of the new language, which is necessary for fluent L2 listening.

Concerning the duration of treatment, instructions that lasted longer than five hours yielded a bigger effect size (Hedges' $g = 1.11$, lower limit = 0.93, upper limit = 1.29) than shorter treatments (Hedges' $g = 0.05$, lower limit = -0.46, upper limit = 0.56). This finding indicates that the teaching period influenced listening outcomes among L2 learners and that phonemic awareness instruction needs to last long enough to ensure students' learning. As raising awareness in phonemes of a language requires retaining sound knowledge in memory, it might be advisable to teach phonemic awareness in a sufficient amount of time until it is fully mastered before moving on to the next stage. In interpreting the effect size for the length of treatment in a meta-analysis, the 'practicality' of the interventions should be weighed against what the learners can get from the lesson (Lee et al., 2015; Plonsky & Oswald, 2014). From this point of view, including phonemic elements in class to improve listening skills seems to be quite practical, considering the number of hours spent on phonemic instruction. Among the studies coded with "longer treatment" in Table 4 and Figure 3, large effect sizes began to appear from 10 hours of the treatment — 10 hours (Ahangari et al., 2015); 15 hours (Thajakan & Sucaromana, 2014); 18.3 hours (Hwang, 2016); and 45.8 hours (Afsharrad & Nafchi, 2015). The largest effect sizes were found in Thajakan and Sucaromana

(2014). This result implies that a reasonable amount of time, at least 10 hours, needs to be allocated for the phonemic awareness instruction to ensure its effect on L2 listening ability. The result also suggests that phonemic awareness instruction is both effective and practical for enhancing L2 listening skills.

Last but not least, the effect size for the intensive listening measurements was large (Hedges' $g = 1.43$, lower limit = 1.12, upper limit = 1.74). In contrast, the one for the selective listening was medium to large (Hedges' $g = 0.80$, lower limit = 0.59, upper limit = 1.00), illustrating that the effectiveness of phonemic awareness may be assessed better if measured with intensive listening tests than with selective listening tests. This result suggests that the ability to notice specific, individual sound features, measured in intensive listening measures, might be comparatively easier for L2 learners to develop than the ability to understand the information in a listening passage. It is not a surprising result because the knowledge of individual sounds lays the foundations for a general understanding of L2 spoken text, which, therefore, would require a longer time to develop.

Overall, the results of the meta-analysis and the subsequent subgroup analyses indicate that phonemic awareness instructions can be beneficial for improving L2 learners' listening skills. The instructions were found effective with large effect size (Hedges' $g = 0.99$) and particularly conducive to younger and lower-proficiency students learning English in the foreign language context. In addition, the result indicated that the effects of the phonemic instruction were more clearly shown when learners are assessed to attend to a specific linguistic component (i.e., intensive listening) than to focus on general comprehension (i.e., selective listening). However, this general tendency found with the relatively small number of primary studies needs to be validated with more empirical studies in the future.

Conclusion

This article presents a meta-analysis of previous empirical studies to investigate the effectiveness of phonemic awareness instruction on L2 English listening skills. Several factors were found to moderate the effect, including setting, educational level, proficiency, treatment, and outcome measure. Despite the overall large effect of phonemic awareness instructions, the effectiveness differed by instructional settings, learners' age and L2 proficiency, types and duration of instruction, and measurement types. These findings indicate that phonemic awareness instructions could be particularly advantageous for young or beginning level learners who learn English in foreign language learning contexts. Besides, the instruction with a more specific focus on the sound itself would result in better listening outcomes than the instruction dealing with the phonics.

This study was not without limitations. One main limitation was that the number of primary studies identified for a meta-analysis was much smaller than what we originally intended. This difficulty is primarily related to the fact that the research interest in looking into the effects of phonemic awareness instruction on L2 listening ability is relatively recent. Therefore, not much research has been accumulated yet. Despite this limitation, the current meta-analysis study indicates that phonemic awareness instruction can contribute to developing listening skills across different age and proficiency groups of L2 English learners. Therefore, more empirical research needs to be conducted on this topic with learners of diverse characteristics and in different learning contexts. Future meta-analyses with a larger body of empirical studies are expected to provide us more definite answers to the effectiveness of phonemic awareness instruction on L2 listening ability development.

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