



Effects of Songs on Implicit Vocabulary Learning: Spoken-Form Recognition, Form-Meaning Connection, and Collocation Recognition of Iranian English as a Foreign Language Learners

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This study explores the immediate and delayed impacts of songs on implicit vocabulary learning in terms of spoken-form recognition (SFR), form-meaning connection (FMC), and collocation recognition (CR) of Iranian intermediate female English as a foreign language (EFL) learners. For this purpose, a total of 150 female EFL learners, aged from 11 to 15, were selected from Iran Language Institute in Shahrekord City. The participants were randomly assigned into four experimental groups and two control groups. Two experimental groups and one control group took the pre-test, while for the other groups there was not any pre-test. Two experimental groups and one control group received immediate post-test whereas for the other groups there was not any immediate post-test. Nevertheless, all the groups took a delayed post-test. The data were obtained over five 90-min sessions. The control groups did not listen to any songs. Two experimental groups and one control group completed the immediate post-test. After 3 weeks, all the groups took the delayed post-test. The outcomes of a two-way ANOVA revealed that there was a statistically significant difference between the experimental group which received both pre-test and the treatment and the experimental group which received treatment but no pre-test. Additionally, the outcomes of a three-way ANOVA indicated that the experimental groups outperformed the control groups, giving rise to the conclusion that the treatment had been positively influential in improving the learners' vocabulary learning. Finally, the outcomes of a one-way MANOVA showed that experimental groups and control groups performed differently with respect to SFR, FMC, and CR. Based on the findings, some implications are presented for different stakeholders.

Keywords: collocation recognition, form-meaning connection, implicit learning of vocabulary, song, spoken-form recognition, test effect, vocabulary learning

INTRODUCTION

One of the simple principles of second language (L2) learning is that there is a close correlation between vocabulary size and the ability to use L2 in communicative contexts efficiently (e.g., Alipour et al., 2012; Abdolmanafi-Rokni and Jannati Ataee, 2014; Albaladejo et al., 2018). Sometimes, it is argued that L2 learning is equal to vocabulary learning (Gass, 1999; Gunasinghe et al., 2020). Nancy and Stephanie (2018) note that, our ability in accessing prior knowledge, expressing our ideas, communicating, and learning new concepts is highly linked to vocabulary knowledge. In fact, communication collapses when L2 learners do not use words appropriately (Allen, 1983; Köprü and Ayas, 2020; Ramezani et al., 2021). In addition, lack of inadequate vocabulary knowledge means that there are a large number of unknown words that L2 learners do not know their meanings and that result in problems in using L2 (Hao et al., 2021; Deogratias, 2022). Powell et al. (2020) point out that vocabulary development is essential for L2 learners to be able to use language skills successfully. Thus, vocabulary learning is important because it is a core element in L2 development.

Listening is considered as an integral part of successful communication. It is clear that L2 learners who develop listening comprehension skills substantially are able to run and handle conversations effectively (Ghanbari and Hashemian, 2014; Butt et al., 2021; Liu et al., 2021). According to Anderson and Lynch (2003), L2 learners only feel the importance of listening skills when they do not a good command of them to start and handle conversations. In close, listening is a necessary skill in L2 learning and over half of the time that L2 learners invest working on an L2 is allocated to developing listening comprehension (Nunan, 1998; Ardiç and Çiftçi, 2019; Hamid et al., 2020; Goh and Vandergrift, 2021).

One of the commons ways to receive input in L2 is listening to songs. Songs play a key role in stimulating L2 learners to learn English. They can support L2 learners' development in reading, writing, listening, and speaking (Pavia et al., 2019). In addition, songs are very useful to improve pronunciation, rhythm, grammar, and vocabulary (Bokiev et al., 2018; Seneviratne et al., 2019; Namaziandost et al., 2021). Songs not only can make L2 learners involved in learning processes efficiently but they can make L2 learning fun (Mousavi Davoudi and Ebrahimian, 2019; Murphy Odo, 2021; Yang, 2021). Zogota (2011) states that songs and speech are vocally produced and linguistically meaningful and they have melody. Rhythms, melodies, and tempos are all parts of music and characteristics also found in oral language (Abbott, 2002; Bahmani Choubbasti et al., 2019). Lyrics in songs are repeated regularly and this repetition may assist L2 learners by betraying them to forms, syntax, lexical items, segmentals, and suprasegmentals that appear in English (Abbott, 2002; Bian, 2021; Karabulatova et al., 2021). In other words, songs can provoke and strengthen L2 learners' enthusiasm and stimulation to learn, enjoy, and be involved in learning processes (Setia et al., 2012; Baills et al., 2021). Furthermore, teaching English through songs creates a calm atmosphere in the classroom, which can lead to lowering the affective filter and, accordingly, fostering L2 learning (Alosaimi, 2021). Villalobos (2007) found that songs could be

a source of input for presenting and practicing grammar and syntax, vocabulary, pronunciation, listening, reading, speaking, writing, and translation.

Given the central role of listening to songs in improving L2 learning, it is interesting to note that to date, the effects of listening to songs on improving English as a foreign language (EFL) learners' incidental vocabulary has remained largely unexplored in the Iranian context. In response to this long-lasting lacuna in the literature, the present study aimed at exploring the effects of songs on improving Iranian EFL learners' incidental vocabulary learning in terms of spoken form recognition, form-meaning connection, and collocation recognition. Additionally, it aimed at investigating the effects of test effect on improving the EFL learners' incidental vocabulary learning. The results of this study may further our understanding of the possible effects of songs on cultivating Iranian EFL learners' implicit vocabulary learning. As such, it can be considered as an influential way to cultivate their vocabulary learning substantially. Moreover, materials developers may consider English songs as a useful source and include them in instructional materials.

LITERATURE REVIEW

Songs and Second Language Learning

A song is considered as a short musical composition featuring lyrics and words (Richard, 2002). A song features rhymes and uses a language style differing from the language used in formal and scientific situations. In a song, as Kerekes (2015) notes, words are set and presented in a particular rhythms, tone, and tones.

Using songs in second language (L2) education is not something new. As Dolean (2016) notes, as L2 learners are involved in doing assignments, songs are used to stimulate brain work. In L2 education, songs can be used to teach language aspects and language skills (Abbott, 2002). Learning L2 through songs can be fun for L2 learners because it can make students feel relaxed and free them from the affective pressures (Adnyani and Dewi, 2020). According to the Multiple Intelligences theory (Gardner, 1985), the musical intelligence is one of the intelligences that emerge early in young children. From the perspective of this theory, using songs to teach L2 aspects and skills can be useful because it can open up valued opportunities to use the right hemisphere to control the learning tasks. As Larsen-Freeman and Long (2000) point out, songs have the capabilities of activating L2 learning in both hemispheres. In other words, songs are able to "bridge the (brain's) hemispheres strengthening, retention through a complementary function as the right hemisphere learns the melody, the left the words" (Guglielmino, 1986; p. 20). It is reasonable to argue that when both right and left hemispheres are engaged simultaneously, the outcomes of the learning processes are more promising (Anton, 1990). Concerning vocabulary learning, listening to songs leads to improving L2 learners because they can establish a meaningful context (Maneshi, 2017). Additionally, listening to songs can expose L2 learners to sufficient input where incidental learning can make the ways for to learn and consolidate vocabulary.

To explain the facilitative role of listening to songs in improving vocabulary learning, the affective, cognitive, and linguistic perspectives can be taken into account. As emphasized by the affective filter hypothesis (Krashen, 1982), in order to make the way for optimal vocabulary learning, the level of affective filter should be reduced. Listening to songs can lower the level of affective filter, and consequently, promotes vocabulary learning. From the cognitive perspective, listening to songs can develop automaticity in the processes of language development. Additionally, as L2 learners listen to words and chunks repeated over and over, it can be of high value for them to benefit from the repetitive nature of songs. From the linguistic perspective, songs are easily followed by L2 learners, since they enjoy discourse features such as tones and rhymes (Saricoban and Metin, 2000). Moreover, due to the fact that L2 learners use informal styles of L2 in daily-life situations, listening to the song can be of great value to improve their knowledge of informal forms of vocabulary. This, in turn, can help them to handle conversions (Peregoy and Boyle, 2008; Khan et al., 2011).

Incidental Vocabulary Learning

It is deemed that an integral part of learning a second language (L2) includes acquiring a large vocabulary size. As Schmitt (2008) notes, L2 learners cannot use the target language efficiently unless they have a good command of vocabulary. The empirical evidence has demonstrated that vocabulary learning can occur in two forms, including incidental vocabulary learning and intentional vocabulary learning (Loewen, 2015). As its name may suggest, in incidental vocabulary learning, L2 learners learn new vocabulary incidentally when they are involved in other learning activities, such as listening to songs, reading a text, watching television, or writing a letter. In contrast, in intentional vocabulary learning, L2 learners give explicit attention to the intended vocabulary learning (Loewen, 2015). According to Nation (2011), due to the fact that L2 learners need a large vocabulary size, intentional vocabulary learning cannot meet this need. Thus, incidental vocabulary learning should be accompanied by intentional vocabulary learning.

Owing to the facilitative role of incidental vocabulary learning to improve the vocabulary size of L2 learners, it has received huge attention over the last decades. A mass of studies has investigated the role of reading, listening, and watching television and movies in improving L2 vocabulary learning (e.g., Horst, 2005; Webb, 2007; Rogers, 2013; Van Zeeland and Schmitt, 2013). In general, they have disclosed that incidental vocabulary learning could take place if their participants were provided with enough source of input.

The vocabulary knowledge framework, presented by Nation (2011), was used to measure learners' vocabulary knowledge in this study. Based on this framework, vocabulary knowledge includes three dimensions: form, meaning, and use. Then, each dimension is broken down into smaller components, including spoken form, form and meaning connection, written form, associations with the word, collocations, grammatical function, different parts of the word that have meaning, and concept and referents of each word. As stressed by Nation (2011), the all components of vocabulary knowledge should be learned and

consolidated such that L2 learners can use a word accurately. Of particular note is that previous studies have disclosed that the learning of some aspects of vocabulary knowledge takes place before others (Van Zeeland and Schmitt, 2013). Therefore, it is essential to consider each aspect of vocabulary knowledge to achieve an accurate evaluation of it (Webb, 2007). To measure gains of vocabulary learning, three aspects, namely form-meaning connection, spoken form recognition, and collocation recognition were considered. Form-meaning connection means L2 learners' knowledge to make connection between the spoken form of the words and its meaning. Form meaning recognition refers to L2 learners' ability to recognize the spoken forms of the target words. And, collocation recognition treats with L2 learners' knowledge to recognize the words that come together with each other (Nation, 2011).

Related Studies in the Literature

To lay the groundwork for the present study, we critically a few of the studies have explored the effects of using songs to improve L2 development. For example, Rafiee et al. (2010) explored the effects of humorous songs on Iranian EFL learners' listening comprehension and their immediate and delayed recall. Moreover, Rezaei and Ahour (2015) inspected the effects of listening to English songs on pre-intermediate EFL learners' listening comprehension improvement. Further, Ghanbari and Hashemian (2014) investigated the effects of using songs compared to the traditional method on young learners' listening comprehension and pronunciation. Besides, Moradi and Shahrokhi (2014) studied whether children learning English by music can improve their ability in segmental and suprasegmental pronunciation or not. Likewise, Rashidi and Faham (2011) surveyed the effects of classical music on Iranian students' reading comprehension. Besides, Haghverdi and Abdpur (2013) assessed the impact of songs and movies on male and female high school students. Furthermore, Maneshi (2017) explored the effects of listening to songs on improving L2 learners' incidental vocabulary learning in the context of the United States of America. The findings evidenced that listening to songs significantly improved the participants' incidental vocabulary learning.

As may be implied from the above-reviewed studies, the effects of listening to songs on improving L2 vocabulary learning has remained largely unexplored in the Iranian EFL learners. Thus, the present study aimed to disclose the effects of listening to songs on improving Iranian EFL learners' incidental vocabulary learning in terms of spoken form recognition, form-meaning connection, and collocation recognition. To meet these objectives, the following research questions were put forward:

RQ1. Do listening to songs and test effect lead to improving Iranian intermediate EFL learners' vocabulary learning?

RQ2. Do listening to songs and test effect lead to improving Iranian intermediate EFL learners' vocabulary learning retention?

RQ3. Does listening to songs improve Iranian intermediate EFL learners' vocabulary learning in terms of spoken form recognition, form-meaning connection, and collocation recognition?

METHODOLOGY

Research Design

Solomon's design was employed in the study that was suggested to suppress the problem of the pre-test sensitization. Pre-test sensitization arises when the participants' scores on a post-test are affected because of a pre-test being administered. The main feature of this design is that participants are randomly assigned either to receive or not to receive a pre-test and then randomly assigned to either a treatment or a comparison group. This method gives the researchers a chance to get the benefits of using a pre-test, while controlling the pre-test sensitization (Navarro and Siegel, 2018). Combinations of tested and untested groups with treatment and control groups made the researchers confident that confounding variables and extraneous factors did not affect the results. The design comprised of an experimental group (EG), a control group (CG), a Pre-test (T1), an Immediate Post-test (T2), a Delayed Post-test (T3), and the Treatment (X). **Table 1** displays the design of the study.

For the two experimental groups and one control group no pre-test was administered. In addition, for the two experimental groups and one control group there was no immediate post-test, because if the result of the delayed post-test were higher than that of the immediate post-test, the results of the delayed post-test could not entirely be attributed to the intervention program. All of the participants were later measured on the delayed post-test. Thus, the possibility of a learning effect from the pre-test or the immediate post-test could be eliminated.

Participants

The participants of the study were a sample of 150 female EFL learners whose ages ranged from 11 to 15 years old. They were all native speakers of Persian and based on the results of the Oxford quick placement test (OQPT), their level of proficiency was intermediate. The reason for selecting the participants was their easy availability to the researchers. All the participants had been studying English for 3 years at Iran Language Institute in Shahrekord City. The participants were assigned into four experimental groups ($n = 25$) and two control groups ($n = 25$). Each group in the experimental and the control conditions had 25 members. Of particular note is that prior to running the main study, the researchers earned written consent from the participants' parents. Those who were willing to let their children participate in the study signed the written consent. The researchers ensured that the participants' performance during the study would remain confidential and they would be kept informed about the final findings.

Data Collection Instruments

Materials and instruments such as songs, target words, pre-test, immediate post-test, and delayed post-test are explained in the following.

Songs

The songs that were appropriate to the participants' level of foreign language proficiency were chosen from the internet.

TABLE 1 | Schematic representation of the design of the study.

	Groups	Pre-test	Treatment	Immediate post-test	Delayed post-test
Experimental groups	EG1	T1	X	T2	T3
	EG2	T1	X	–	T3
	EG3	–	X	T2	T3
	EG4	–	X	–	T3
Control groups	CG1	T1	–	T2	T3
	CG2	–	–	–	T3

Besides, cultural and religious aspects were also considered when choosing the songs in order not to have offensive words. The songs were not too long, not too fast, and easy to sing along, in everyday English. The vocabulary items also were not too complex or new. The songs were clear so that the students were able to hear all the words effortlessly. The researcher chose the songs with lots of rhyming words and rhythms so that it would be easy for the students to learn new words and start singing along.

Five teachers who had more than 10 years of teaching experience in language institutes were asked to examine the content validity of the songs with respect to their difficulty level. Based on the teachers' suggestions, the songs, which had high tempo or heavy beats were not selected and thus simply two songs were established to be suitable for using in the present study. Two English songs that were finally selected for the study were the song "Let It Go" by Menzel (2013) and "How Far I'll Go" by Cravalho (2016). Ten single-word items and ten collocations were selected as the target items for Song A. The target items in Song B were also ten single-word items and ten collocations. The target items for the two songs are presented in **Table 2**.

Vocabulary Tests

Based on the guidelines suggested by Nation and Webb (2011), the researcher developed a multiple-choice vocabulary test for the pre-test, the immediate post-test, and the delayed post-test. The test comprised of three parts and each part assessed a different dimension of learners' vocabulary knowledge: spoken-form recognition, form-meaning connection, and collocation recognition, each comprising of 10 items. Rearrangements of the items were made for the immediate post-test and the delayed post-test.

Spoken-form recognition of the single word items was tested in Part A. Three nonsense words made up the distractors for the multiple-choice test options. Using nonsense words ensured that the participants did not recognize the distractors. For writing the distractors, the researcher made some changes in the first letter of the answer so that they would look and sound like real words in English. The number of syllables matched the target words so that the participants would not reject the distractors based on the word length. After making the distractors, a Persian/English speaker checked them in terms of matching with any L1 words. For this part of the test, all the participants listened to the similar recording of the test in which there was a two-second

TABLE 2 | The target items for the two songs.

Song	Single word items	Frequency of exposure	Collocation	Frequency of exposure
Let It Go	Mountain	2	Glow white	1
	Funny	1	Icy blast	1
	Cry	2	Looks like	3
	Fear	1	Keep in	1
	Ground	2	Break through	2
	Conceal	1	Going back	2
	Slam	3	Hold back	3
	Control	2	Turn away	1
	Distance	2	Rage on	1
	Flurry	2	Make small	2
How Far I'll Go	Remember	1	Staring at	1
	Perfect	2	Edge of water	2
	Satisfied	2	Turn (I) take	1
	Shine	1	Come back	3
	Pride	1	Role on	1
	Trail	1	Play along	2
	Track	1	Leads back	1
	Path	1	Stay behind	1
	Sail	1	Trail (I) track	2
	Island	1	Calling out	1

TABLE 3 | Reliability of the vocabulary tests.

	SFR	FMC	CR
Pre-test	0.78	0.86	0.78
Post-test	0.89	0.72	0.84
Delayed post-test	0.73	0.86	0.82

gap between options and a four-second gap between questions (Maneshi, 2017).

Part B of the test measured the association between form and meaning of the single word items. This part required the participants to read the questions and circle the correct answers in relation to the meaning of the sentences. Part C of the test evaluated the participants' ability to discern collocations. In each question, the participants were required to complete the target collocation in the sentences.

The reliability of the vocabulary tests was estimated through a pilot study. For this purpose, the researchers gave the test to 25 female learners whose language proficiency was intermediate level. The Cronbach's alpha was used to calculate the internal consistency within the items of the tests. The results for the pre-test, the immediate post-test, and the delayed post-test for spoken-form recognition, form-meaning connection, and collocation recognition are reported in **Table 3**. As the reliability coefficients were all higher than the minimum value required (i.e., 0.70), it was concluded that the tests enjoyed the required reliability. The validity of these tests was confirmed by seeking experts' opinions through asking three experts in TEFL to assess the content of the tests and suggest any possible changes. Based on their views, several questions and items were modified and rewritten and some of them were replaced.

Oxford Quick Placement Test

The participants took OQPT to assess their overall foreign language proficiency level. The test comprised of 60 multiple-choice items that tested structure, vocabulary, and reading. The maximum possible score was 60. The participants' scores ranged from 30 to 49. According to OQPT direction, they were all at the intermediate level of foreign language proficiency.

Data Collection Procedures

In the first week of the study, all the participants were randomly assigned to either the experimental or the control groups. There were 25 learners in each group. Three sessions were held every week. The students worked on songs just one session of a week and the data were gathered over five 90-min sessions. All the participants took the OQPT. The pre-test was administered to the two experimental groups and one control group. For the other two experimental groups and one control group there was no pre-test. The purpose was to eliminate any possible test effect on the participants' immediate post-test results. In addition, for two experimental groups and one control group no immediate post-test was given. Therefore, there was no test effect of immediate post-test and if the results of the delayed post-test were higher than the pre-test, they could be attributed to the learning conditions.

In the second week, the participants were encouraged to just listen. In the beginning, they were asked to listen to the music and enjoy it. Questions were used for starting conversations, so three or four learners were grouped together and then received feedback from each group on their thoughts. The teacher taught a small number of words before students listened to the song. Then, she gave an easy assignment for the first listening. The participants were given three or four words that were selected from the song and they were asked to listen out for the words that rhyme with them. In addition, they were asked to conceive the possible rhymes before listening to the song.

In the third week, the participants were given a chance to read the lyrics to the song. At this stage, one or combinations of the following activities were practiced: Learners could just read the lyrics while they were listening to them. They could likely mark unfamiliar words for the succeeding discussion. The participants filled in the gaps in a lyric worksheet that was prepared by the teacher as they listened. The next lyric worksheet was organized as a gap fill by cutting out the strips which were chosen from the missing words. This time, learners corresponded the word strips with the gaps while listening to the songs.

The creative and artistic application of the vocabulary in lyrics was of great importance. Therefore, in the fourth week, attention was paid to the meanings. In so doing, the meaning of vocabulary idioms, and expressions were presented by giving students some examples.

To keep students motivated, creativity was also taken into consideration during the teaching process. In the fifth week, the teaching was accompanied by an activity that was implemented to stimulate students' creative thinking. Another form of lyrics was written, that kept the same mood and style similar to the first one. The students did the activity independently or in-groups. Then, these new lyrics were given to other students in the class. Several

groups worked on this activity and an entirely new set of lyrics were developed for the whole song.

The learners designed a music video for the song. They cooperatively made decisions about the location, the characters, and what happened. Afterward, each group clarified their views to the rest of the class and their classmates selected the best one. The findings were amazing, as they repeatedly made different interpretations. The students wrote a diary entry for a character in the song. They were asked to evaluate the ideas and feelings that inspired the story being played out in the lyrics.

Two experimental groups and one control group completed the immediate post-test 1 h after the accomplishment of the intervention. Two weeks after the immediate post-test, the participants in all six experimental and control groups took the delayed post-test.

For the control groups, there was no song. At the beginning of the class, some difficult vocabulary items were written down on the board. Next, the appropriate pronunciation of the vocabularies was given several times and then the students pronounced them after practicing the right pronunciation many times. The teacher explained the structure of the words such as adjective, noun, etc., and the students made new sentences with the new vocabulary items. The students were asked to underline these new vocabularies in the context.

Data Analysis Procedures

To analyze the collected data, the researchers used SPSS, version 23. In addition to calculating the basic descriptive statistics, including mean and standard deviation, they run inferential statistics to answer the research questions. To answer the first research question to see whether listening to song and test effect affect intermediate EFL learners' vocabulary learning, a two-way ANOVA was run. For the second research question, a three-way ANOVA was run to reveal the effects of listening to songs and test effect on intermediate EFL learners' L2 vocabulary retention. Finally, a one-way MANOVA was run to answer the third research question to disclose the effects of listening to songs on intermediate EFL learners' vocabulary learning in terms of spoken-form recognition, form-meaning connection, and collocation recognition.

RESULTS

As mentioned above, the first research investigated if listening to songs and test effect led to improving Iranian intermediate EFL learners' vocabulary learning EG1 and CG1 took a pre-test, but EG3 did not take the pre-test and just took the post-test. As such, the researchers investigated whether the pre-test had any effect on the learners' vocabulary. Accordingly, the two conditions of \pm treatment and \pm pre-test were considered as the two independent variables and their possible effects on the post-test were scrutinized through a two-way ANOVA. The results are presented in **Table 4** and **Figure 1** below.

The mean of the post-test scores for the EG1 (+pre-test, +treatment) yielded 25.04, while the mean of the post-test score

TABLE 4 | Descriptive statistics for comparing the effects of \pm treatment and \pm pre-test.

Pre-test	Treatment	Mean	Std. deviation	N
+Pre-test	+Treatment	25.04	1.17	25
	-Treatment	18.28	1.54	25
	Total	21.66	3.67	50
-Pre-test	+Treatment	23.00	1.32	25
	Total	23.00	1.32	25
Total	+Treatment	24.02	1.60	50
	-Treatment	18.28	1.54	25
	Total	22.10	3.14	75

for the CG1 (+pre-test, -treatment) yielded 18.28 and the post-test mean scores for the EG2 (-pre-test, +treatment) yielded 23.00. To examine whether these differences among the groups in both \pm treatment and \pm pre-test conditions were statistically significant, the p -values were considered. The results are reported in **Table 5**.

As seen in **Table 5**, a statistically significant difference was reported for the \pm pre-test conditions because the p -value for the pre-test was lower than the significance level ($p < 0.05$). Likewise, the treatment had exerted statistically significant effects on the post-test scores of the learners because the p -value corresponding to this analysis was also 0.00, which was lower than the significance level of 0.05. **Figure 1** displays the mean scores for the groups.

As displayed in **Figure 1**, there was a significant difference between the EG1 (which received both pre-test and the treatment) and the EG3 (which was exposed to the intervention program but had no pre-test), hence, the large effect of pre-test on the learners' performance on the post-test. Moreover, there was a significant difference between the experimental groups on the one hand and the CG1 group on the other, suggesting that the intervention exerted statistically significant effects on the learners' vocabulary learning on the post-test.

The second research question examined if listening to songs and test effect led to improving Iranian intermediate EFL learners' vocabulary learning retention. In other words, the primary purpose was to investigate if \pm post-test conditions (in combination with \pm pre-test and \pm treatment conditions) had effects on the learners' vocabulary learning on the delayed post-test. In this respect, the three intervention conditions as described above were considered the independent variables and the learners' delayed post-test scores were treated as the dependent variable. Thus, a three-way ANOVA was run to disclose the effects of the pre-test, the treatment, and the post-test, on the learners' delayed post-test scores. The results obtained through the three-way ANOVA are presented in **Table 6**.

The mean scores of delayed post-test for the EG1 (+pre-test, +treatment, +post-test) came to 23.96, while the mean score of the delayed post-test for the EG2 (+pre-test, +treatment, -post-test) was 21.00, the one for the EG3 (-pre-test, +treatment, +post-test) amounted to 21.96, and that for the EG4 (-pre-test, +treatment, -post-test) yielded 20.08. Concerning the control groups, the mean score of the delayed post-test for the CG1

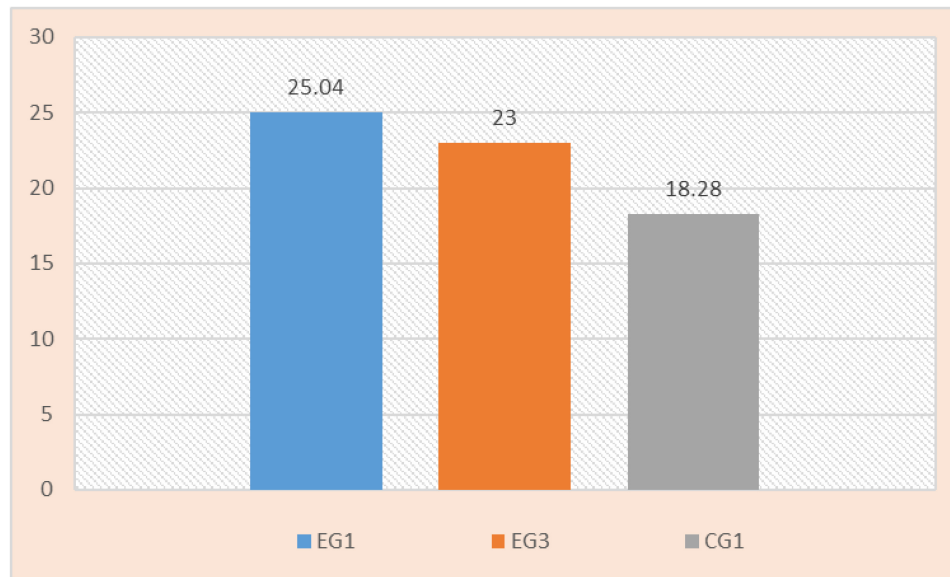


FIGURE 1 | Post-test mean scores of the groups with different \pm pre-test and \pm treatment conditions.

TABLE 5 | Results of two-way ANOVA for comparing the effects of \pm treatment and \pm pre-test conditions.

Source	Type III sum of squares	df	Mean square	F	Sig.	Partial Eta squared
Corrected model	601.14	2	300.57	163.94	0.00	0.82
Intercept	32160.44	1	32160.44	17542.06	0.00	0.99
Pre-test	52.02	1	52.02	28.37	0.00	0.28
Treatment	571.22	1	571.22	311.57	0.00	0.81
Pre-test * treatment	0.00	0	.	.	.	0.00
Error	132.00	72	1.83			
Total	37386.00	75				
Corrected total	733.14	74				

(+pre-test, -treatment, +post-test) yielded 17.12, while the mean score of the delayed post-test for the CG2 (-pre-test, -treatment, -post-test) yielded 16.08. To find out whether these differences among the different groups in the different combinations of \pm pre-test, \pm treatment, and \pm post-test conditions were statistically significant, the *p*-values were checked. The results of the three-way ANOVA are presented in **Table 7**.

The results indicated that there was a statistically significant difference in the learners' delayed post-test scores in the \pm pre-test conditions as the *p*-value across from the pre-test and under the *Sig.* column equaled 0.00 ($p < 0.05$). This suggested that the inclusion of the pre-test produced a statistically significant test effect on the learners' delayed post-test scores. The results for the \pm treatment and \pm post-test conditions were also the same. That is, exposure to the intervention program assisted the EG group to outperform the CG on the delayed post-test. In the same way, the

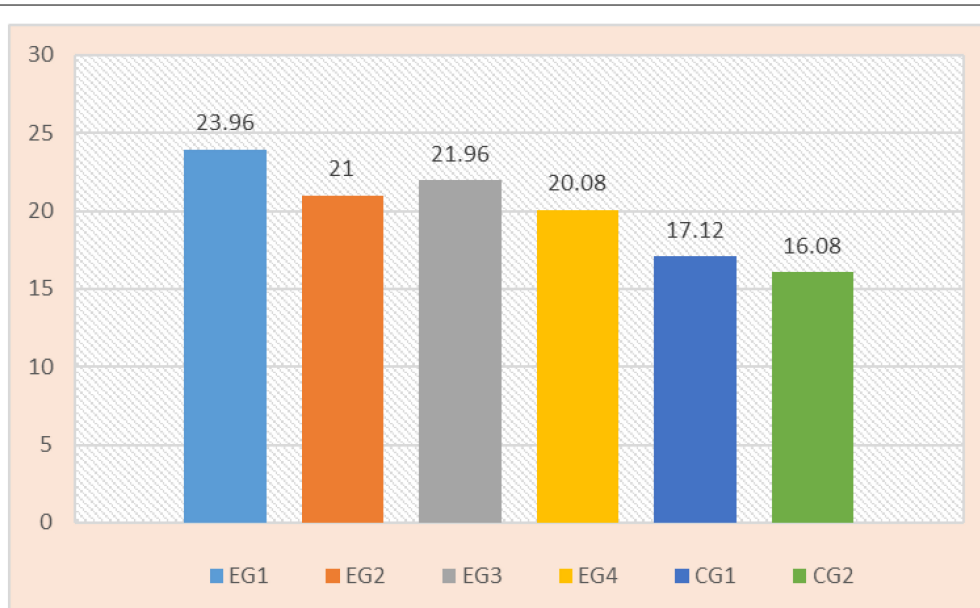
administration of the post-test had statistically significant effects on of the learners' performance on the delayed post-test. These findings are displayed in **Figure 2**.

TABLE 6 | Descriptive statistics for comparing the effects of \pm treatment, \pm pre-test, and \pm post-test.

Pre-test	Treatment	Post-test	Mean	Std. deviation	N
+Pre-test	+Treatment	+Post-test	23.96	1.45	25
		-Post-test	21.00	1.58	25
	Total	22.48	2.12	50	
	-Treatment	+Post-test	17.12	1.20	25
		Total	17.12	1.20	25
	Total	+Post-test	20.54	3.69	50
		-Post-test	21.00	1.58	25
		Total	20.69	3.14	75
-Pre-test	+Treatment	+Post-test	21.96	1.20	25
		-Post-test	20.08	1.57	25
	Total	21.02	1.68	50	
	-Treatment	-Post-test	16.08	0.95	25
		Total	16.08	0.95	25
	Total	+Post-test	21.96	1.20	25
		-Post-test	18.08	2.39	50
		Total	19.37	2.76	75
Total	+Treatment	+Post-test	22.96	1.66	50
		-Post-test	20.54	1.63	50
	Total	21.75	2.04	100	
	-Treatment	+Post-test	17.12	1.20	25
		-Post-test	16.08	0.95	25
		Total	16.60	1.19	50
	Total	+Post-test	21.01	3.16	75
		-Post-test	19.05	2.55	75
		Total	20.03	3.02	150

TABLE 7 | Results of three-way ANOVA for comparing the effects of \pm treatment, \pm pre-test and \pm post-test.

Source	Type III sum of squares	df	Mean square	F	Sig.	Partial Eta squared
Corrected model	1104.59	5	220.91	121.31	0.00	0.80
Intercept	48477.75	1	48477.75	26619.87	0.00	0.99
Pre-test	53.29	1	53.29	29.26	0.00	0.16
Treatment	734.41	1	734.41	403.27	0.00	0.73
Post-test	146.41	1	146.41	80.39	0.00	0.35
Pre-test * Treatment	0.00	0	.	.	.	0.00
Pre-test * post-test	7.29	1	7.29	4.00	0.04	0.02
Treatment * post-test	0.00	0	.	.	.	0.00
Pre-test * treatment * post-test	0.00	0	.	.	.	0.00
Error	262.24	144	1.82			
Total	61567.00	150				
Corrected total	1366.83	149				

**FIGURE 2** | Delayed post-test mean scores of the groups with different \pm pre-test, \pm treatment, and \pm post-test conditions.

As displayed in **Figure 2**, the four EG groups outweighed the two CG groups significantly, implying that the intervention (i.e., teaching L2 vocabulary through songs) had statistically significant effects on the learners' L2 vocabulary learning. The highest mean score was related to the participants in the EG1 who underwent pre-test, treatment, and post-test conditions. The participants in the EG3 group who had benefited from the treatment and had taken the post-test reported the second highest mean score. The EG2 group who took the pre-test and were exposed to the treatment, but had no post-test were in the next rank. In addition, among the four experimental groups, the EG4 group who took neither pre-test nor post-test (but just received the treatment) reported the lowest mean score. The results of the statistical analyses revealed that test effects for both the pre-test and the post-test were significant. In addition, the treatment had significant effect on EFL learners' performance on the delayed post-test.

The third research question examined if listening to songs improved Iranian intermediate EFL learners' vocabulary learning in terms of spoken-form recognition, form-meaning connection, and collocation recognition. To answer this research question, a one-way MANOVA was run. Prior to running this statistical test, the main assumptions, including normality, sample size, outliers, linearity, and homogeneity of regression were examined and met. The results are reported in **Tables 6, 8**.

Table 6 presents the mean scores of the EG and the CG groups for the vocabulary SFR, FMC, and CR on the delayed post-test. There were differences between the mean scores of the two groups as for SFR, FMC, and CR, the mean scores of EG were larger than the mean scores of CG. To find out whether these differences were statistically significant, the results of the one-way MANOVA are presented in **Table 9**.

Since the most commonly reported statistical procedure is Wilk's Lambda, here the value for these statistics was reported

TABLE 8 | Descriptive statistics results comparing experimental group (EG) and control group (CG) on spoken-form recognition (SFR), form-meaning connection (FMC), and collocation recognition (CR) scores on the delayed post-test.

Vocabulary learning		Mean	Std. deviation	N
SFR	EG	7.54	0.73	100
	CG	5.90	0.50	50
	Total	6.99	1.01	150
FMC	EG	7.29	0.75	100
	CG	5.48	0.54	50
	Total	6.68	1.09	150
CR	EG	6.93	0.74	100
	CG	5.22	0.46	50
	Total	6.36	1.04	150

as well (0.35). The Wilk's Lambda's associated Sig. value was found to be 0.00, which was lower than the significance level (i.e., $0.00 < 0.05$). This implied that EG and CG groups were significantly different on their delayed post-test scores. To see if this significant difference could be attributed to their differences in SFR, FMC, or CR (or probably two of them or possibly the three factors), a Test of Between-Subjects Effects was used. The results are presented in **Table 10**.

Bonferroni adjustment, which entails dividing the significance level (i.e., 0.05) by the number of analyses, was applied to avoid Type I error. Since there were three dependent variables, the significance level was divided into three and the new significance level of 0.017 was obtained. In **Table 8**, under the Sig. column, the *p*-values for all the dependent variables of SFR, FMC, and CR were found to be less than 0.017 suggesting that the two groups of EG and CG were significantly different with respect to SFR, FMC, and CR, in favor of the incidental vocabulary learning condition.

DISCUSSION

The first research question if listening to songs and test effect led to improving Iranian intermediate EFL learners' vocabulary learning. The results evidenced that the experimental groups outperformed the control groups on the post-test. The findings

indicated that the experimental groups listening to the songs and had experience of the test-effect their vocabulary improved significantly. The findings of the study are in congruent with those of the previous studies (Li and Brand, 2009; Alipour et al., 2012; Coyle and Gómez Gracia, 2014; Rezaei and Ahour, 2015; Javadi-Safa, 2018), reporting that song-based tasks had positive on improving EFL learners' vocabulary learning.

The second research question investigated if listening to songs and test effect led to improving Iranian intermediate EFL learners' vocabulary retention. The results documented that the experimental groups outweighed the control groups in terms of vocabulary retention at the end of the treatments. The findings indicated that the participants were at a better position at recalling the vocabulary after listening to the songs and experiencing the test effect. The results are in line with those of the previous studies (Abdolmanafi-Rokni and Jannati Ataee, 2014; Madani and Mahmoodi Nasrabadi, 2016; Shakerian et al., 2016), reporting that listening to songs led to substantial improvement in L2 learners' vocabulary retention.

The third research question examined if listening to songs improve Iranian intermediate EFL learners' vocabulary learning in terms of spoken-form recognition, form-meaning connection, and collocation recognition. The findings revealed that there were statistically significant difference among the experimental groups and control groups concerning gains of spoken-form recognition, form-meaning connection, and collocation recognition. That is, the results disclosed due to the positive effects of the treatments, the participants in the experimental groups could recognize the spoken-form, making connection between form and meaning, and recognize the collocations embedded within the songs. The results of the study lend support to the previous studies (Deconinck et al., 2014; Kusnierek, 2016; Scharenborg and Larson, 2018), indicating that when their participants listened to songs multiple times, they constructed a good command of knowledge concerning spoken-form recognition, form-meaning connection, and collocation recognition.

The findings of the study may be discussed from this view that since listening to the songs were found interesting and fun by the participants, they might have inspired to listening to them multiple times. This repeated listening to songs might have

TABLE 9 | MANOVA results comparing experimental group (EG) and control group (CG) on spoken-form recognition (SFR), form-meaning connection (FMC), and collocation recognition (CR) scores on the delayed post-test.

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta squared
Pillai's trace	0.64	88.88	3.00	146.00	0.00	0.64
Wilk's Lambda	0.35	88.88	3.00	146.00	0.00	0.64
Hotelling's trace	1.82	88.88	3.00	146.00	0.00	0.64
Roy's largest root	1.82	88.88	3.00	146.00	0.00	0.64

TABLE 10 | Results of test of between-subjects effects.

Dependent variables	Type III sum of squares	df	Mean square	F	Sig.	Partial Eta squared
SFR	89.65	1	89.65	203.07	0.00	0.57
FMC	109.20	1	109.20	227.41	0.00	0.60
CR	97.47	1	97.47	221.62	0.00	0.60

had positive effects on the learning of different aspects of the target vocabulary. These findings are in line with those of the previous studies (Penno et al., 2002; Webb and Chang, 2012a), reporting that repeated listening and repeated reading improved vocabulary learning. Additionally, the results of the study may be attributed to the view that songs can provide large quantities of input for L2 learners. As argued by Kuppens (2010), since the participants had tendency in listening to the songs multiple times, they were exposed to the English language sufficiently. This, accordingly, might have improved the incidental learning of the target vocabulary. Moreover, to explain the findings of this study, it may be argued that the experimental group tended to listen to the song multiple times. Along with Kerekes (2015), it may be argued that the participants' tendency in listening to the same song multiple times, the number of exposure to the target vocabulary might have increased incidentally. This, in turn, may have increased the opportunity for the target vocabulary to be captured by the participants' attention. As such, they might have developed their depth of knowledge of the different dimensions of the target vocabulary (Penno et al., 2002).

Furthermore, the superiority of the experimental group over the control group may have been due to the repeated encounters of the words in the different songs. In a sense, it may be argued that as the participants encountered the target vocabulary many times, it might have fostered incidental vocabulary learning (Webb and Chang, 2015b). Moreover, it is reasonable to argue that as the participants encountered the target words several times, they might have developed deeper knowledge of different aspects of the target words, including form, meaning, and use (Peters et al., 2016). The findings of the study are in line with those of Van Zeeland and Schmitt (2013), revealing that the knowledge of spoken form recognition and form-meaning connection increased with the increase times of encounters. To justify the findings of this study, we can also refer to the noticeable advantage of songs in aiding memory in L2 learning. Based on the empirical findings of imaging research, the same area of the brain is involved in processing melodic patterns and language structures (Maess et al., 2001; Kerekes, 2015). Therefore, aligned with Abbott (2002), it can be argued that since the songs included the rhythmical arrangement of L2, they might have resulted in deeper processing and efficient incidental learning of the intended vocabulary. The other line of discussion for the findings may be ascribed to this view that listening to songs can decrease anxiety levels of L2 learners. Along with Dolean (2016), it may be argued that since anxiety levels of the participants decreased, they might have suffered less from skipping, frustration, and acting out, and accordingly, the L2 learning processes might not have been hindered. In other words, according to the findings, it may be argued that as the songs provided a precious source of language for the participants, they might have acted as an effective teaching tool establishing a tranquil learning environment leading to boosting the participants' incidental vocabulary learning.

Finally, a part of the findings evidenced positive gains related to the collocation recognition. In other words, the findings documented that listening to the song was so useful to gain knowledge of collocations than single words. Aligned with Lin (2012), it may be argued that because of the prosodic forms of

collocations, songs might have made them more salient during the listening. In a sense, it may be argued that the songs might have made the collocations more salient due to the fact that they put emphasis on stresses and rhythms. The results are in consistent with those of Webb and Chang (2015b), revealing that repeated listening to the songs significantly improved gains of collocation learning among EFL learners.

CONCLUSION AND IMPLICATIONS

This study purported to explore the effects of songs on improving Iranian intermediate EFL learners' implicit vocabulary learning in terms of SFR, FMC, and CR. The results evidenced that listening to songs and test effect were effective to cultivate the participants' implicit vocabulary learning in terms of SFR, FMC, and CR. Thus, the findings documented that learning vocabulary through songs is an effective way to help EFL learners to boost their implicit vocabulary learning. It should be noted that using English music and songs cannot replace other instructional materials; however, they can be regarded as suitable supplementary materials (Salcedo, 2002). Overall, songs play a significant role in stimulating students to learn English. They can sustain the improvement of learners' ability in reading, writing, listening, and speaking, and generate appropriate chances for learning pronunciation, rhythm, grammar, and vocabulary (Lo and Fai Li, 1998; Saad et al., 2014).

The results of the study may bring about some implications for different stakeholders. The findings of the present study can be beneficial for materials developers. Although English textbooks integrate somehow music, it is essential to include more English songs and music so that EFL learners can use them to foster their vocabulary learning, recall, and retention. Furthermore, for the classroom practice, it is recommended that EFL teachers should have wider choices of techniques and tools for implementing in their teaching, and the traditional ways for teaching vocabularies should be avoided. They can make use of different songs according to students' language proficiency levels. In this way, EFL learners' language competence develops. Moreover, EFL learners may benefit from the results of the present study and expose themselves to more English songs and music. Besides, language institute owners and school principals can take advantage of the present study and equip their educational centers with modern technologies. In this way, EFL teachers and learners can use more English songs and music in classes and, accordingly, get more input.

Considering the limitations imposed on the present study a range of implications is suggested. First, as the current study was conducted in one language institute in Sharekurd City, future studies can be carried out in other parts of the country to increase the generalizability of the findings. Second, since this study included just female EFL learners, more studies are needed to incorporate male genders to see if the results of the present study can be validated and supported. Third, because the current study was confined to EFL intermediate learners, interested researchers can explore the effects of songs on improving EFL learners' implicit vocabulary learning of different

language proficiency levels in other educational settings (e.g., public school and university). Four, since this study aimed to disclose the effects of songs on improving implicit vocabulary learning, further research can investigate the impacts of songs on fostering grammar learning. Last but not least, as this study used a quantitative design, future studies can employ qualitative designs to uncover the howness aspect of the issue.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

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ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Iranian Educational English Language Institutions. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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