



Tracing Changes in Foreign Language Anxiety and Speaking Skills of Iranian Epileptic EFL Learners: Does a Social, Metacognitive, and Problem-Solving Skills Training Package Make a Difference?

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Abstract

Background: The problems faced by English as a Foreign Language (EFL) learners with neurological disorders including epilepsy are often more serious, noticeable, and remarkable than those encountered by normal learners. Mostly, such patients, perform poorly in terms of productive and verbal skills and experience a high level of anxiety in language learning contexts. This study was conducted using a sequential design to investigate the effects of a social, metacognitive, and problem-solving skills training package on foreign language anxiety and speaking skills of epileptic EFL learners.

Methods: The study participants included a total of 60 epileptic EFL learners (35 males and 25 females), selected through purposive sampling. The participants were randomly divided into four groups of EFL learners (15 members each), with two groups engaged in an online format and two in a traditional classroom setting. Data were collected through the Foreign Language Classroom Anxiety Scale (FLCAS), IELTS Speaking Test, Quick Placement Test (QPT), and a Social, Metacognitive, and Problem-Solving Skills Training Package. Data were analyzed using descriptive statistics and the Shapiro-Wilk test.

Results: The findings of the current study showed the training package had a significant effect on foreign language anxiety and speaking skills of Iranian epileptic EFL learners, with notable impacts observed in the online learning environment.

Conclusion: The study highlighted the importance of integrating social, metacognitive, and problem-solving skills training into language programs for epileptic EFL learners to enhance their speaking skills and reduce foreign language anxiety. These findings have important implications for epileptic EFL learners, neurological centers, and language centers.

Keywords: Epileptic EFL Learners; Foreign Language Anxiety; Social, Metacognitive, and Problem-Solving Skills Training Package; Speaking Skills

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Introduction

Epileptic English as a Foreign Language (EFL) learners experience higher levels of anxiety during their language learning process compared to their non-epileptic counterparts. The challenges faced by these learners are exacerbated by the lack of social, problem-solving, and metacognitive skills (1). This partially accounts for the difficulties that epileptic EFL learners encounter in social interactions and communications with others in language classrooms (3). EFL learning is characterized by some inevitable complexities. Predictably, the complexities associated with EFL learning become more serious with various neurological disorders including epilepsy. Epilepsy is a disorder that impairs EFL learners' productive skills including speaking (2). Accordingly, the consensus among scholars (4-7) is that language trainers are required to utilize specific strategies to lessen the burden of the difficulties and complexities associated with acquiring productive skills in epileptic learners, thereby mitigating their foreign language anxiety. In reviewing the extant literature, some empirical studies (1,3,4,6) focused on neurologically impaired and epileptic learners. However, there remains a notable gap in research regarding potential changes in speaking skills and foreign language anxiety among epileptic EFL learners after exposure to empowerment programs that include a social, metacognitive, and problem-solving skills training package. Such empirical studies may contribute to higher learning success at least as far as foreign language anxiety and speaking skills are concerned (8).

This study is grounded in several theoretical frameworks: 1. Social Learning Theory, 2. Metacognition Theory, 3. Problem-Solving Cycle Framework, 4. Cognitive Load



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Theory, 5. Lazarus and Folkman's Transactional Model of Stress and Coping, 6, Piaget's Theory of Cognitive Development, and 7. Multimodal Learning Theory (9-15).

Marzban and Mahmoudvand and Yamini et al indicated the significant effect of training problem-solving skills on reducing foreign language anxiety in EFL learners (16, 17). Similarly, Mohamadpour et al reported the significant effect of metacognitive strategy instruction on reducing language anxiety in EFL learners (18). Bejarano Beltran and Guevara Perez (19) and Shir Mohammadi (20) explored the impact of training problem-solving skills on the vocabulary knowledge of EFL learners and revealed there were significant improvements in the learners' vocabulary knowledge after exposure to the problemsolving training. The study by Samadani and Shangarffam also proved the significant effect of cognitive training on EFL learners' vocabulary knowledge (21). In this regard, Lin et al developed a model of problem-solving skills to be employed in EFL classes, particularly when teaching speaking skills (22). Moreover, Karademir and Akgul explored the relationship between problem-solving skills and curiosity levels among pre-service teachers (23). The findings demonstrated that teachers with higher problem-solving skills were more curious (24). Another study analyzed the relationship between metacognitive skills, critical thinking, and teaching self-efficacy among EFL teachers. The results showed a significant correlation among all variables. In another study, Amini et al adopted a structural equation modeling (SEM) approach to examine the causal relationships among three types of metacognitive reading strategies and self-regulation in reading proficiency (25). The results indicated that higher scores in self-regulation strategies predicated higher scores on reading comprehension. Besides, Kian et al showed students' social skills could be predicted by their attitude towards school and its environment (26). Daguay-James and Bulusan's study revealed that Filipino participants used high levels of reading strategies, particularly problem-solving reading strategies, as their preferred choice, followed by support reading strategies and global reading strategies when reading academic texts in English (27). A meta-analysis conducted by Navarro addressed metacognitive strategies and reading comprehension, highlighting that reading comprehension is not only a problem for basic education students but also among foreign language learners, with only 25% of related studies conducted in Asia (28).

There remains a gap in the empirical literature regarding the effectiveness of a social, metacognitive, and problemsolving skills training package on foreign language anxiety and speaking skills of Iranian epileptic EFL learners. Accordingly, the present study sought to fill this gap. Considering the pivotal role of foreign language anxiety and speaking skills in EFL learning, addressing these issues may remarkably support epileptic EFL learners in confronting the challenges of EFL learning. Therefore, the present study aimed to explore the effects of a social, metacognitive, and problem-solving skills training package on foreign language anxiety and speaking skills of epileptic EFL learners. Furthermore, enhancing social, problemsolving, and metacognitive skills in epileptic learners may empower them to better cope with the challenges of foreign language anxiety and speaking skills in EFL learning (6). Accordingly, this study aimed to investigate the impacts of a training package on foreign language anxiety and speaking skills of Iranian epileptic EFL learners in both online and traditional classroom settings.

Methods

Design

This study was conducted using a quasi-experimental design. A quantitative analysis was conducted to assess the effect of the designed training package on foreign language anxiety and speaking skills of the participants. The training package was implemented as a treatment between the pretest and post-test phases, and its effectiveness on foreign language anxiety and speaking skills of the participants in both online and traditional classroom settings

Participants

The study participants included a total of 60 epileptic EFL learners (35 males and 25 females aged 22 to 45 years) in 2023, who were selected through purposive sampling (29). The participants were recruited from among those who visited the Long-Term Video EEG Monitoring (LTM) Center, with epilepsy diagnoses based on electroencephalography (EEG) and medical records. No specific type or severity of the disease was considered during sampling. Inclusion criteria were the lack of exposure to any training course on social, metacognitive, and problem-solving skills in the six months before the study, confirmed epilepsy by a psychoanalyst, and being classified as advanced EFL learners at the time of the study (30). Advanced-level learners were selected due to their perceived ability to cooperate more effectively compared to learners at other levels, based on the researcher's prior experience. The participants were in the 25-42 age range.

In the quantitative phase, the participants were randomly divided into four groups of EFL learners (15 members each), with two groups engaged in an online format and two in a traditional classroom setting.

Instruments

The required data were collected through the following instruments:

Quick Placement Test

To ensure homogeneity among participants in terms of their English language proficiency at the outset of the study, the standardized Quick Placement Test (QPT), developed and validated by Oxford University Press, was used. QPT is composed of 40 multiple-choice items covering grammar, vocabulary, and cloze test questions. The reliability of the test was calculated as 0.95 in this study using Cronbach's alpha. Moreover, the validity of the test was confirmed by a panel of four English language teaching experts with over 15 years of experience and also university degrees in language learning. The test took about 40 minutes to administer. The mean QPT score of the participants was 35.00, indicating that they were at the advanced level.

Foreign Language Classroom Anxiety Scale

The Foreign Language Classroom Anxiety Scale (FLCAS), developed by Shao et al (31), was used to assess participants' level of foreign language anxiety at the beginning and end of the study. The questionnaire consists of 33 items on a 5-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). The Cronbach's alpha reliability of the scale has been reported to be 0.92, and its validity has been established by factor analysis (31). In the present study, the Cronbach's Alpha reliability of the scale was 0.87, and a panel of four English language teaching experts confirmed its validity.

IELTS Speaking Test

An IELTS speaking test was used to assess participants'

Table 1. Specifications of the Social, Metacognitive, and Problem-Solving Skills Training Package

speaking skills. This test consists of three parts and lasts approximately 12 minutes. To enhance the inter-rater reliability of the test, two raters evaluated participants' performance according to IELTS Speaking Band Descriptors (public version), ranging from 0 to 9.

The Social, Metacognitive, and Problem-solving Skills Training Package

Two raters and a clinical psychologist conducted a qualitative analysis of the relevant literature to develop a social, metacognitive, and problem-solving skills training package. The relevant papers and theses were qualitatively and manually analyzed by the researcher to design a multi-session social, metacognitive, and problem-solving skills training package (32-38). The package was subsequently reviewed by three clinical psychologists, and two raters to ensure expert judgment. It was also validated using exploratory factor analysis (EFA).

The raters analyzed the literature meticulously to extract components for the training package. Then, the designed package was evaluated by three clinical psychologists to ensure its appropriateness and effectiveness. The training was structured into four sessions for each of the three social, metacognitive, and problem-solving skills. The specifications of the package are detailed in Table 1.

To statistically validate the training package, EFA was conducted. To do so, the link to the designed training

Social skills training				
Session 1	The importance of social skills and training on social skills were explained, and some general definitions of social skills were provided.			
Session 2	The training focused on life literacy, personal empowerment, self-expression, empathy and sympathy, asking for help, and persuasion. Some speaking learning strategies including 'group work vocabulary recognition' and 'group discussion' were also practiced.			
Session 3	The training emphasized peace, trust, accountability, fairness, and citizenship rights. Some speaking learning strategies including 'empathizing with others' and 'pair work activities' were also practiced.			
Session 4	The training covered sociocultural competence, decision-making, saying no, acknowledgment, and self-acceptance. Some speaking learning strategies including 'asking questions' and 'group sentence writing' were also practiced.			
Metacognitive skills training				
Session 1	The importance of metacognitive skills and training on metacognitive skills were explained, and some general definitions of metacognitive skills were provided.			
Session 2	The training focused on planning, monitoring, and evaluating strategies. Some speaking learning strategies including 'writing the words several times', 'grouping words with the same characteristics', and 'storytelling from pictures' were also practiced.			
Session 3	The training emphasized modifying strategies, time and place management, duty orientation, and goal-setting. Some speaking learning strategies including 'asking the teacher for clarification' and 'completing a partial oral story' were also practiced.			
Session 4	The training included organizing the study environment, correct breathing, exercise, self-evaluation, self-correction, and concentration. Some speaking learning strategies including 'using images to learn new words', 'using gestures or mimics to remember the words', and 'oral performance in imagined situations' were also practiced.			
Problem-solving skills training				
Session 1	The importance of problem-solving skills and training on problem-solving skills were explained, and some general definitions of problem-solving skills were provided.			
Session 2	The training focused on problem-solving confidence, avoidance styles, and creativity. Some speaking learning strategies including 'problem-solving puzzles', 'vocabulary notebooks', and 'information-gap tasks' were also practiced.			
Session 3	The training emphasized search skills, analysis skills, decision-making, and communicative skills. Some speaking learning strategies including 'identifying problematic vocabulary' and 'negotiating meaning' were also practiced.			
Session 4	The training addressed time awareness, concentrating on solutions instead of problems, answering important 'WHY' questions, simplification, and listing all possible solutions. Some speaking learning strategies including 'matching tasks', 'guessing tasks', and 'critical discussions' were also practiced.			

package was shared with the virtual group of the Iranian Psychological Association (IPA) for voluntary evaluation of the package components on a five-point scale (from 1 = strongly disagree to 5 = strongly agree). A total of 100 members (40 males and 60 females) provided complete responses.

Data collection and analysis procedures

To initiate the study, the social, metacognitive, and problem-solving skills training package was designed and validated (Table 1). Then, Adobe Connect was selected as the online platform for holding the training sessions for the online groups. In contrast, the traditional faceto-face training sessions were arranged for the groups in traditional classroom settings.

All four groups, which had been homogenized using the QPT, completed the FLCAS and IELTS speaking test before the treatment phase as pre-tests in both online and traditional settings. Then, the two experimental groups received training based on the designed package over twelve 90-minute sessions in online and traditional contexts. Each training session focused on specific skills, as shown in Table 1. The researcher received consultations from three clinical psychologists during the training sessions.

The two control groups did not participate in any training sessions of the package; instead, they experienced a traditional method of teaching speaking skills by participating in twelve 90-minute mainstream class sessions twice a week. In the first session, the issues were introduced, and the objectives of the study were explained to the participants. In the following eleven sessions, the participants learned English speaking through a traditional method called 'oral reproduction', in which they were provided with a short story and were asked to reproduce it orally in class. It is worth mentioning that one of the control groups attended face-to-face classes, while the other participated in classes via Adobe Connect. One week after the end of the treatment period, all four groups completed the FLCAS and IELTS speaking test as posttests in online and traditional settings.

Statistical analysis of the study was investigated using the paired t-test and independent t-test. Shapiro-Wilk test was used for testing normality of data. The significance level was 0.05 and data were analyzed using SPSS-19 statistical software.

Results

A total of 60 epileptic EFL learners participated in this study with 30 learners engaged in an online format (15 in the control group and 15 in the experimental group) and 30 in the traditional classroom setting (15 in the control group and 15 in the experimental group).

According to Table 2, gender and age were not significantly different in online and traditional groups,

indicating they were comparable.

The Shapiro-Wilk test for foreign language anxiety showed both groups followed a normal distribution (P=0.28 for the experimental group, P=0.52 for the control group). The intragroup comparison revealed the mean anxiety score as shown in Table 3 in the experimental group engaged in online learning was 100.4±17.38 before the treatment sessions and 87.08 ± 10.73 after the treatment, indicating significantly lower mean anxiety after the treatment (P < 0.001). However, in the control group, there was no significant difference in the mean anxiety score before and after the treatment. The intergroup comparison showed the mean anxiety scores of the experimental and control groups were not significantly different before the treatment. However, after the treatment, the mean anxiety score in the control group (101.85 ± 16.61) was significantly higher than in the experimental group (87.08 ± 10.73) (*P* < 0.001).

Concerning the traditional learning setting, the results of the Shapiro-Wilk test indicated that the anxiety variable in both groups followed a normal distribution (P = 0.58 for the experimental group, P = 0.38 for the control group). The intragroup comparison in the traditional method revealed the mean anxiety score in the experimental group was 140.5 ± 0.28 before the treatment which reduced to 49 ± 0.19 after the treatment, and the difference was statistically significant (P < 0.001). However, in the control group, there was no significant difference in the mean anxiety score before and after the treatment. The intergroup comparison demonstrated that the mean anxiety scores in the experimental and control groups were not significantly different before the treatment. Nevertheless, after the treatment, the mean anxiety score in the control group (139.33 ± 0.15) was significantly higher than in the experimental group (49 ± 0.19) (*P*<0.001).

The mean difference in anxiety in the experimental group engaged in the online training format (13.32) was higher than that of the traditional setting (91.5), suggesting that the treatment was more effective in the online than in the traditional context.

According to the Shapiro-Wilk test, regarding the

Table 2. Demographic characteristics of	of participants	in online	and traditi	onal
groups				

		Experimental group	Control group	P value
	Gender, No. (%)			0.69
Online	Male	5(33.3)	4(26.6)	
group	Female	10 (66.7)	11 (73.4)	
	Age (mean \pm SD)	22.12 ± 4.18	22.45 ± 3.06	0.93
	Gender, No. (%)			0.7
Traditional	Male	6(40)	5(33.3)	
group	Female	9(60)	10(66.7)	
	Age (mean \pm SD)	21.67 ± 1.26	22.96 ± 3.52	0.94

Table 3. Effect of training package on foreign language anxiety

		Experimental group	Control group	P value
	Pre-test	100.4 ± 17.38	102.07 ± 15.53	0.10
Online	Post-test	87.08 ± 10.73	101.85 ± 16.61	< 0.001
group	Mean difference	13.32	0.22	
	P value	< 0.001	0.95	
	Pre-test	140.5 ± 0.28	140.66 ± 0.3	0.95
Traditional	Post-test	49 ± 0.19	139.33 ± 0.15	< 0.001
group	Mean difference	91.5	1.33	
	P value	< 0.001	0.82	

speaking skills variable, both groups receiving online training followed a normal distribution (P=0.47 for the experimental group, p-value = 0.25 for the control group). The results of the intragroup comparison according to Table 4 showed the mean speaking skills score in the experimental group engaged in the online training format was 4.53 ± 0.64 before the treatment and 5.33 ± 0.49 after the treatment, indicating a statistically significant enhancement of the speaking skills (P < 0.001). However, in the control group, there was no significant difference in the mean speaking skills score before and after the treatment. The results of the intergroup comparison revealed the mean speaking skills scores in the experimental and control groups were not significantly different before the treatment. Nevertheless, after the treatment, the mean speaking skills score in the control group (4.75 ± 0.44) was significantly lower than in the experimental group (5.33 ± 0.49) (*P* < 0.001).

The results of the Shapiro-Wilk test showed that concerning the speaking skills variable in the traditional mode of learning, both groups followed a normal distribution (P = 0.62 for the experimental group, P = 0.41for the control group). The intragroup comparison indicated that in the traditional method, the mean speaking skills score of the experimental group was 4.29 ± 0.97 before the treatment which increased to 5 ± 0.75 after the treatment, and this difference was statistically significant (P < 0.001). However, in the control group, there was no significant difference in the mean speaking skills score before and after the treatment. The results of the intergroup comparison demonstrated that the mean speaking skills scores in the experimental and control groups were not significantly different before the treatment. Nonetheless, after the treatment, the mean speaking skills score in the experimental group (5±0.75) was significantly higher than in the control group (4.62 ± 0.6) (*P* < 0.001).

The mean difference in speaking skills in the experimental group engaged in the online training format (0.79) was significantly higher than that of the traditional setting (0.7), implying that the treatment was more effective in enhancing speaking skills in the online than in the traditional learning method.

Table 4. Effect of training package on speaking skills

		Experimental group	Control group	P value
	Pre-test	4.53 ± 0.64	4.73 ± 0.15	0.13
Online	Post-test	5.33 ± 0.49	4.75 ± 0.44	< 0.001
group	Mean difference	0.79	0.02	
	P value	< 0.001	0.73	
	Pre-test	4.29 ± 0.97	4.46 ± 0.91	0.45
Traditional	Post-test	5 ± 0.75	4.62 ± 0.6	0.02
group	Mean difference	0.7	0.15	
	P value	< 0.001	0.29	

Discussion

The present study examined the effect of a social, metacognitive, and problem-solving skills training package on foreign language anxiety and speaking skills of Iranian epileptic EFL learners in both online and traditional learning environments. The results of the study indicated a significant positive effect of the training package on reducing foreign language anxiety among Iranian epileptic EFL learners in both online and traditional contexts. Additionally, the findings demonstrated a significant improvement in the speaking skills of Iranian epileptic EFL learners following the implementation of the social, metacognitive, and problem-solving skills training package in both online and traditional settings.

The findings of the current study are in line with the existing literature on the positive impact of social, metacognitive, and problem-solving skills on language learning outcomes. Besides, the mediating role of various factors such as learning strategies, autonomy, cognitive strategies, motivation, goal orientation, social skills, selfefficacy, engagement, self-direction, creativity, higherorder thinking, and collaboration in enhancing language learning outcomes for epileptic EFL learners is supported by previous research (16-21,39-50). Overall, the findings of the study highlighted the importance of integrating social, metacognitive, and problem-solving skills training into language learning programs for epileptic EFL learners to enhance their speaking abilities in both online and traditional learning settings. The results underscored the significant role of these skills and factors in reducing foreign language anxiety and improving speaking skills among Iranian epileptic EFL learners.

Further research is warranted to explore the specific mechanisms through which these variables interact to influence language learning outcomes and to validate the effectiveness of social, metacognitive, and problemsolving skills training on speaking skills among this population. In addition, the impact of the relationship between social skills and self-efficacy (42) could be significant in understanding the results.

Furthermore, it is reasonable to attribute the results to the mediating role of motivation, which has been shown to

be significantly correlated with problem-solving strategies and metacognitive skills (43). Besides, the role of goal orientation as a mediator in the findings is noteworthy since it has been influenced by various skills including social, metacognitive, and problem-solving skills (44). Moreover, in explaining the results, it can be argued that those learners with higher social skills feel competent when they perform a task well compared to their peers (45). This feeling is strong enough to help epileptic EFL learners cope with their foreign language anxiety.

These findings are consistent with the results of the studies by Marzban and Mahmoudvand as well as Yamini et al which showed that problem-solving skills had a positive impact on reducing EFL learners' foreign language anxiety. Furthermore, the results support the findings of the study by Mohamadpour et al which reported instruction on metacognitive strategies had a significant effect on EFL learners' language anxiety (16-18).

The findings from this study also revealed the training package had a significant effect on the speaking skills of Iranian epileptic EFL learners in both online and traditional contexts. It can be stated that engagement, a core concept in problem-based learning, has led to significant improvements in the productive skills of epileptic EFL learners (22). In addition, the emphasis on self-direction promoted through social skills instruction may have mediated the effect of the social, metacognitive, and problem-solving skills training package on the speaking skills of Iranian epileptic EFL learners. The connection between problem-solving and social skills learning with the students' real life can contribute to deeper learning (46). This in turn may lead to remarkable improvements in the speaking skills of epileptic EFL learners (47). Furthermore, creativity and higher-order thinking, as the outcomes of enhanced problem-solving skills and metacognition have the potential to empower EFL learners to evaluate their performance, thereby improving their English speaking skills (48). Last but not least, collaboration as a fundamental component of social skills learning, enables EFL learners to effectively convey meaning and experiences, hence enhancing their speaking abilities (49).

The researchers could not find any study in the literature investigating the effectiveness of social, metacognitive, and problem-solving skills on the speaking skills of Iranian epileptic EFL learners to compare the results. However, the studies by Bejarano Beltran and Guevara Perez (19), Kadhim and Al-Nasrawi (50), Shir Mohammadi (20), as well as Samadani and Shangarffam (21) approved the significant effect of metacognitive and problem-solving skills on various language skills among EFL learners.

The present study had some limitations. First, finding a reasonably representative sample of epileptic learners presented certain challenges. Second, the long-term effects of the designed package on the foreign language anxiety and speaking skills of epileptic learners could not be investigated. Finally, the potential effects of age, gender, and socioeconomic characteristics of the learners on the findings were not examined.

The study findings align with the existing literature on the positive impact of social, metacognitive, and problem-solving skills on language learning outcomes, particularly speaking skills, among EFL learners. Previous research supports the mediating role of various factors such as learning strategies, autonomy, motivation, and collaboration in enhancing language learning outcomes for epileptic EFL learners.

Conclusion

This study emphasized the significance of incorporating social, metacognitive, and problem-solving skills training into language learning programs for epileptic EFL learners to improve their speaking skills in both online and traditional settings. The results underscored the crucial role of these skills and factors in reducing foreign language anxiety and enhancing speaking skills among Iranian epileptic EFL learners. Further research is required to explore how these variables interact to influence language learning outcomes and to validate the effectiveness of such training on speaking skills in this population. The findings have some implications for different groups. Epileptic EFL learners can gain insights from the results to deal with their foreign language anxiety and speaking problems. Neurological centers can utilize the findings to inform strategies for treating anxiety in patients with epilepsy. Furthermore, language centers can implement the training package developed in the current study to provide instructions to epileptic EFL learners.

Author's Contribution

Conceptualization: Mina Rohanizadeh, Valeh Jalali, Neda Fatehi Rad. Data curation: Mina Rohanizadeh, Valeh Jalali. Formal analysis: Mina Rohanizadeh, Valeh Jalali. Investigation: Mina Rohanizadeh, Valeh Jalali. Methodology: Mina Rohanizadeh, Valeh Jalali, Neda Fatehi Rad. Project administration: Valeh Jalali, Neda Fatehi Rad. Supervision: Valeh Jalali. Validation: Mina Rohanizadeh, Valeh Jalali, Neda Fatehi Rad. Writing-original draft : Mina Rohanizadeh.

Writing-review & editing: Valeh Jalali, Neda Fatehi Rad.

Competing Interests

The authors declare no conflict of interest.

Ethical Approval

Ethical considerations were taken into account in sample selection, and informed consent was obtained from all participants. This study was approved by the Research Ethics Committee of the Kerman Branch, Islamic Azad University, Kerman, Iran with the code: IR.IAU. Kerman.REC.1402.027.

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