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Comparing the Effect of Face-to-face Education and E-learning on the Physical Activity of the Elderly

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ABSTRACT

Introduction: Regular physical activity is very effective in preventing or delaying chronic diseases and premature death in the elderly.

Objective: This study aimed to compare the effect of face-to-face education and e-learning methods on the physical activity of the elderly.

Materials and Methods: This is a quasi-experimental study conducted in Karaj, Iran in 2018. The participants were 88 elderly people referred to a senior rehab center and then were assigned into three groups of face-to-face education (n=30), e-learning (n=28), and control (n=30).The study data were collected by a demographic form and the 41-item Community Healthy Activities Program for Seniors questionnaire (CHAMPS) before the intervention, 1 month after the intervention, and 3-month follow-up. Face-to-face education and e-learning were presented to the two educational groups' during eight 20-minute sessions. The obtained data were analyzed using ANOVA, Bonferroni post hoc test, the Chi-square test, and repeated measures ANOVA. The significance level was set at 0.05.

Results: Between the two educational groups, a significant difference was observed in the mean score of physical activity at three measurement phases (P=0.001).The effect size was 0.61 for face-to-face education and 0.64 for e-learning. Based on the results of the Bonferroni post hoc test, there was no significant difference between e-learning and face-to-face education groups.

Conclusion: Both face-to-face and e-learning methods were effective in promoting the physical activity behavior of the elderly. E-learning method can be used as one of the complementary methods of traditional education for improving the physical activity of the elderly.

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Highlights

• Regular physical activity promotes physical and mental health, reduces the symptoms of depression and anxiety, increases life satisfaction, and improves the quality of life in the elderly.

• Regular physical activity, as an important health-promoting behavior, can prevent or delay a variety of chronic diseases and premature death.

• In the group that received e-learning, there was a significant difference in the mean score of physical activity at pre-test, post-test, and follow-up phases.

• The effect of e-learning on physical activity was higher compared to face-to-face education.

Plain Language Summary

As the world's population is aging and the prevalence of chronic diseases increases among older people, the importance and role of physical activity as a deterrent to health problems becomes more obvious. Regular physical activity as an important health-promoting behavior prevents or delays a variety of chronic diseases and premature deaths. There is ample evidence that regular physical activity promotes physical and mental health, reduces the symptoms of depression and anxiety, increases life satisfaction, and improves the quality of life of people. Since older people are the most growing age group and the highest costs of health care are related to them, the development of effective interventions to improve their health is necessary. The high prevalence of inactivity in the elderly requires appropriate action to increase their regular physical activity. Studies have shown that the amount of physical activity in the elderly can be effectively changed through the implementation of educational interventions focused on physical activity. This study aimed to compare the effect of face-to-face education and e-learning methods on the physical activity of the elderly. The results showed that both methods were effective in promoting physical activity in the elderly, where the effect of e-learning with the use of virtual social networks was higher. Therefore, e-learning can be used to promote physical activity in the elderly.

Introduction

The world's population is aging because of factors such as increasing life expectancy and decreasing fertility rates. In 2010, 8% of the world's population (about 524 million people) were 65 years old and older, and this figure is expected to be tripled and nearly 1.5 billion by 2050.In developing countries, people aged 60 years are considered old [1]. The increased number of older people is one of the effective factors in increasing the burden of non-communicable diseases [2], which are one of the leading causes of death in the modern era. It has been stated that inactivity is one of the main causes of these diseases [3]. Studies in Iran have shown that the likelihood of having low physical activity is 44% higher in the age group of 55-64 years compared to the age group of 15-24 years [4].

Physical activity in the elderly, compared to other age groups, has a more decisive role in maintaining health. In fact, as the world's population ages and the prevalence of chronic diseases in this age group increases, the importance and role of physical activity as a deterrent factor of health problems becomes clearer [5].

Regular physical activity as an important health-promoting behavior prevents or delays chronic diseases and premature death, reduces depressive and anxiety symptoms, increases life satisfaction, and improves the quality of life of people of all ages [6, 7]. The high prevalence of inactivity in the elderly requires appropriate action to increase regular physical activity in them [8]. Researches have shown that the amount of physical activity in the elderly can be effectively changed through the implementation of educational interventions focusing on physical activity [9, 10].

One of the most common methods of training in the health care system is face-to-face education. In this method, due to two-person discussions, behavior change is done better, but such training requires a lot of time and is not possible in crowded centers [11]. Therefore, effective educational methods must be found that can replace this method and meet the

health needs of the elderly in this area. In a review study, Müller et al. showed that non-face-to-face educational interventions can also effectively increase physical activity in older adults [12]. In this regard, one of the possible ways to increase knowledge and promote health-related behaviors in people is the use of new technological inventions such as mobile phones, the Internet, and so on [13]. They can be used to educate a large population of learners simultaneously [14]. Internet use among the elderly is expected to increase in the future [15].

On the other hand, some studies have shown that performing health-promoting behaviors such as physical activity and healthy diet in the elderly is not at a desirable level [16, 17] and the physical activity status of the Iranian elderly is not appropriate [9]. The use of social media and the Internet has increased in recent years, although it has not yet become popular among the Iranian elderly. Due to their capabilities in disseminating information, they can be used as desirable tools in various fields of education.

In a review study by Papi et al. [18] on different methods of education in the Iranian elderly, the e-learning method was reported to be used less. In this regard and considering that in Iran, there is not much information about the effectiveness of e-learning methods compared to more traditional methods, and on the other hand, promoting physical activity in the elderly can play a decisive role in maintaining and promoting their health. Meanwhile, this study aims to compare the effect of face-to-face education and e-learning methods on knowledge, attitude, and physical activity of the elderly in Iran.

Materials and Methods

This is a quasi-experimental study. The study population consists of all elderly people referred to a senior rehab center in Karaj City, Iran in 2018 (n=203). Of these people, 88 were selected as study samples using the block randomization technique. The sample size was calculated 30 people for every three groups of face-to-face education, e-learning, and control, according to the mean values of physical activity before and after the intervention in Karimi et al. 's study (Z1-α/2=2.5, Z1-B=1.92S1=153.36, S2=65.48, X^1=291.72, x^2=143.95, α=0.99, B=0.95) [19], and the probability of sample drop, divided into three groups using Random Allocation Software (RAS).

The inclusion criteria were aged60 years or older, willingness to participate in the study, ability to communicate, no specific physical and mental illnesses (based on self-report and medical records) that can prevent physical activity, reading and writing ability, having a cell phone, and the ability to work with a smart phone. The exclusion criteria were acute illness, death during the study, participation in fewer training classes (3/4 of the total number of sessions), and returning incomplete questionnaires.

The study data were collected using a two-part questionnaire and through self-report. The first part surveys demographic characteristics such as age, gender, weight, and marital status, level of education, employment status, income level, and living arrangements. The second part was the 41-item Community Healthy Activities Program for Seniors (CHAMPS) questionnaire developed by Stewart et al. It assesses physical activity at four levels of sedentary, low intensity (items 1, 2, 4, 5, 6, 8, 12, 17, 18), moderate (items 3, 10, 11, 13, 20, 22, 27, 28, 34, 35, 39), and severe (items 7, 9, 14, 15, 16, 19, 21, 23-26, 29, 30-33, 36,37,38, 40) [20]. This questionnaire measures activities that the elderly person performed during a week in the last month. To calculate activity levels, each activity is first weighed based on its relative intensity using the Metabolic Equivalent (MET). MET represents the amount of energy consumed per minute for each person at rest, and its one unit is equivalent to 3.5 mL of consumed oxygen per kilogram of body mass. In this study, we used the Persian version of CHAMPS [21].

After receiving a letter of introduction from the University of Social Welfare and Rehabilitation Sciences, the researchers visited the daycare center and performed sampling. At the beginning of the study, the objectives of the study were explained to the participants, and then a written consent was obtained from them. During the study, 2 out of 30 people in the e-learning group were excluded from the study due to unwillingness to continue the study and leaving the social network. How to allocate samples and the study methodology are shown in Figure 1.

After baseline assessment using the questionnaire, the training was presented to two experimental groups through face to face and e-learning methods (by social networks such as Telegram and Whats App), while in the control group no educational intervention was performed. One month after the intervention, the questionnaire was completed again by the participants. To stabilize the training effect, 3 months were

given to the two experimental groups. During this period, researchers evaluated training feedback and provided participants with guidance and counseling if they had difficulty with physical activity. At the end of the intervention, to observe ethical considerations, an educational booklet prepared by the researchers was given to the control group. It should be noted that no educational program had been given to the elderly by the senior rehab center.

In the face-to-face method, the instructor and the learner communicated face to face with each other and the learners could ask questions and provide opinions. This method was performed individually. In this way, the instructor discussed with each subject and encouraged them to change their behavior (physical activity) and ask any related questions and receive appropriate feedback. The education content in this method was prepared based on the standard guidelines of the World Health Organization for physical activity training and the CHAMPS [22, 23]. The training was held in the classrooms of the rehab centerduring8 sessions of 20 minutes each (1 session per week for 2 months) in the morning (odd days for men and even days for women).To increase the effectiveness of the educational sessions, an educational booklet with related content was also provided to the elderly in this group (Table 1).

In the e-learning method by using social networks, not only textual content was included, but also an e-learning package, including tables, pictures, animations, and videos related to physical activity was used. Similar to the face-to-face method, its content was prepared based on the standard guidelines of the (WHO) for physical activity training and the CHAMPS. It was presented in the form of educational messages through social media at 8 sessions of 20 minutes each (2 sessions per week for 1 month due to time and space constraints and that both educational groups must be in the same educational conditions). To facilitate the use of this method, mobile internet packages were purchased for all the elderly in this group. A telephone number was also given to them that answered their possible questions 24 hours a day. After posting the message in the social networks, it was ensured that the message was seen and read by the elderly according to the properties of the applications in viewing the message delivery report or asking them in private (Table 1).

Data analysis was performed in SPSS V. 24 using the Chi-square test (to examine the demographic factors in the three groups), ANOVA (to examine the effect of normal quantitative variables in the three groups), and repeated measures ANOVA (to evaluate the interaction effect of intervention type and time on physical activity).To calculate the effect size, each intervention group was compared with the control group separately using repeated measures ANOVA. The normality of data distribution was examined using the Shapiro-Wilk test. The significance level was set as $P<0.05$.

Results

The Mean±SD age of the participants was 70.26±6.43 years in the control group, 71.33±6.99 years in the face-to-face group, and 70.96±6.53) years in the e-learning group. The Mean±SD weight of the participants in the control, face-to-face education, and e-learning groups were 64.76±8.71, 64.70±7.43, and 67±7.74 kg, respectively. For more information, see

Table 1. The two educational protocols of face-to-face and e-learning

Variabels	Face-to-face education	E-learning
Target population	All elderly people referred to a senior rehab center in Karaj, Iran	
Duration/time	Eight sessions of 20 minutes each (One session per week for 2 months) in the morning (odd days for men and even days for women).	Eight sessions of 20 minutes each (Two sessions per week for 1 month)
Education team	Elderly health expert, occupational therapist, physiotherapist, and physical education expert	
Presentation method/resources	Paper, pen, marker, whiteboard, educational booklet via face to face	Internet package, mobile phone via social networks space such as Telegram and Whats App
Content	Introduction and acquaintance, the information needed to define the physical activity and its difference from exercise, benefits of regular physical activity in maintaining health and reducing the effects of the disease, types of physical activity suitable for promoting health and physical fitness, facilitators and barriers to participation in physical activity, goal setting and planning to improve physical activity, visiting a doctor in an emergency, strategies for success in the physical activity program, strategies to reduce the risks in the physical activity program, strategies for preventing injuries during physical activity, special weather conditions (air pollution, high altitudes), nutrition in sports, contraindications to physical activity, how to promote physical activity and exercise, summary	

Table 2. The Chi-square test results showed no significant difference between the three groups in terms of demographic factors, and the groups were homogeneous. Table 3 shows the results of repeated measures ANOVA. In the two training groups, a significant difference was observed in the mean score of physical activity between the three measurement phases (P=0.001). The effect size was 0.61 for the face-to-face education group and 0.64 for the e-learning group. Based on the results of the Bonferroni post hoc test (Table 4), there was a significant difference between the e-learning and control groups (P=0.002) and between the face-to-face education and control groups (P=0.02) in terms of physical activity.

Discussion

This study aimed to compare the effectiveness of face-to-face and e-learning methods on the physical activity behavior of the elderly. There was no statistically significant difference between the two intervention groups and the control group in terms of demographic variables such as age, level of education, employment status, etc. Therefore, the results of the comparison were probably due to the intervention factors (educational methods).The mean score of physical activity in the face-to-face group increased in the post-intervention and follow-up phases compared to the pre-intervention phase. The results of other studies also have shown that the implementation of face-to-face educational programs promotes physical activity [24, 25]. However, Sidman et al. [26] showed that face-to-face education had no considerable effect on improving physical activity. This discrepancy may be due to the difference in the study population. In their study, the study population was younger people with a higher level of education compared to our study.

The e-learning method using social networks also caused a significant increase in the physical activity of older people in our study. This result is consistent with some studies. For example, in the study by Alley et al. [27], older people in the web-based education group had more physical activity than the group that received educational booklets after the intervention. Golsteijn et al. [28] also indicated the impact and cost-effectiveness of the web-based method in promoting physical activity compared to traditional (printed) education. In another study, physical activity was significantly increased in the intervention group who performed 56 minutes of moderate-intensity physical activity and 119 minutes of low-intensity physical activity per week compared to the control group and the physical activity remained significantly higher during the 12-month follow-up [29].

The effect of the e-learning method using social networks on the physical activity behavior of the elderly was greater than that of the face-to-face education method. Hence, providing education in multimedia applications in the form of audio, video, text, animation, etc., makes the learning process better, faster, and more sustainable.

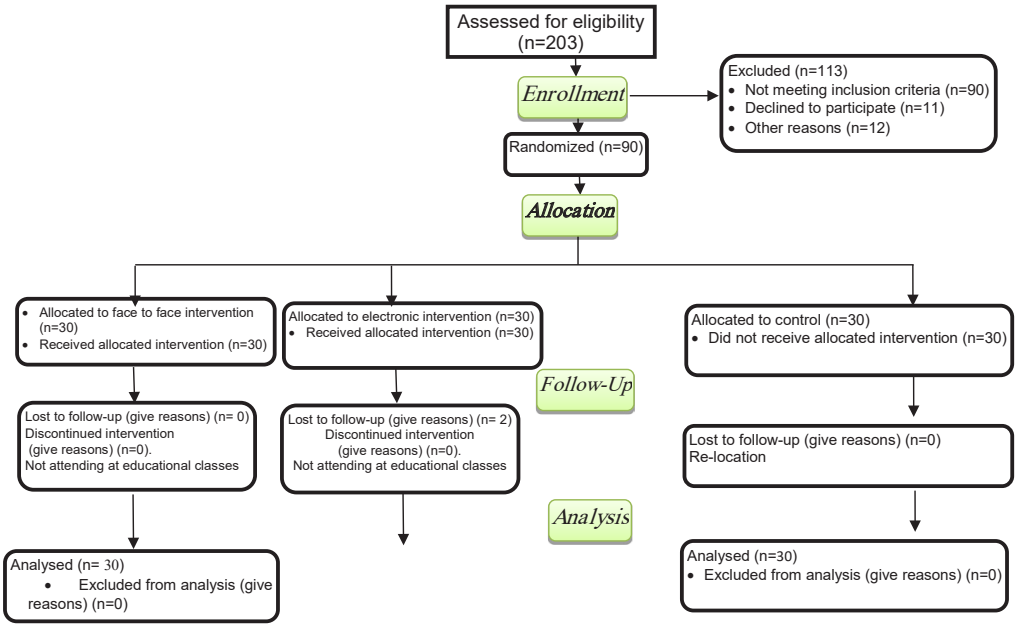

Figure 1. The flow diagram of the study

Table 2. Characteristics of study participants in three groups

Characteristics		No. (%)			
		Face-to-face Education (n=30)	E-Learning (n=28)	Control (n=30)	Sig.*
Gender	Male	9 (30)	9 (30)	8 (25)	0.88
	Female	21(70)	21 (70)	22 (75)	
Marital status	Married	17 (56.7)	20 (66.7)	16 (56.7)	0.67
	Single	13 (43.3)	10 (33.3)	12(42.9)	
Educational level	Primary school	18 (60)	18 (60)	15(53.5)	0.90
	Middle school	7 (23.3)	4 (13.3)	7 (25)	
	High school diploma	4 (13.3)	6 (20)	5 (17.9)	
	Associate degree and higher	1 (3.4)	2 (6.7)	1 (3.6)	
Occupation	Housekeeper	15 (50)	15 (49.7)	18(64.2)	0.38
	Retired	7 (23.3)	7 (23.3)	8 (23.6)	
	Worker	2 (6.7)	1 (3.3)	1 (3.6)	
	Unemployed	6 (20)	7 (23.3)	1 (3.6)	
Income level ($)	No income	14 (46.7)	12 (40)	6 (21.4)	0.48
	<200	1 (3.3)	2 (6.7)	4 (14.3)	
	200-350	12 (40)	14 (46.7)	13 (46.4)	
	351-500	1 (3.3)	1 (3.3)	1 (3.6)	
	>500	2 (6.7)	1 (3.3)	4 (14.3)	
Living arrangements	Living alone	6 (20)	9 (30)	6 (21.4)	0.89
	Living with spouse	19 (63.3)	16 (53.3)	16 (57.1)	
	Living with children	4 (13.3)	5 (16.7)	5 (17.9)	
	Living with others	1 (3.3)	0	1 (3.3)	

*The Chi-square test.

Table 3. The mean and standard deviation of the physical activity score of the elderly in three study groups at three measurement phases

Group	Mean±SD			F	Sig.*	Partial η^2
	Pre-test	Post-test	Follow-up			
Face-to-face education	112.73±60.63	363.39±348.15	246.89±198.78	44.51*	0.001	0.61
E-learning	137.73±73.65	397.59±332.43	329.13±257.55	50.09*	0.001	0.64
Control	111.25±75.62	122.10±72.85	124.44±72.76	-	-	-

* Repeated Measures ANOVA.

Table 4. Results of pairwise comparison of study groups in terms of physical activity

Groups		Mean±SD	Sig.*
Control	Face-To-Face education	-123.75±45.78	0.02
	E-learning	-164.38±46.61	0.002

*Bonferroni post hoc test.

Moreover, the possibility of accessing educational content at any time and place allows the elderly to receive an education without the need to travel and spend too much. The result is consistent with other similar studies [30, 31].

The e-package used in the present study allowed the elderly to become familiar with the e-learning method as part of their learning experience. Therefore, the potential of the e-learning method can be used to encourage people, especially the elderly, to have appropriate and adequate physical activity. The results of some studies, including Opdenacker and Boen's study [32], showed a significant effect of face-to-face education methods on improving physical activity behavior compared to telephone support. In a review study by Richards et al. [33], the difference between the effects of face-to-face, web-based, and remote interventions on the promotion of physical activity was not significant.

One of the strengths of the present study was the use of new presentation methods such as social media. Social media are widely used by elderly people as a group who spend more time acquiring health information. Among the limitations of this study was the time-consuming nature of the face-to-face education method, lack of patience in some elderly people, lack of continuous connection to the Internet, and the need to have a mobile phone with the ability to connect to the Internet at a suitable speed. Moreover, the participants were only from a senior rehab center; hence, caution is needed in generalizing the results to the community. Furthermore, a questionnaire was used to assess physical activity instead of observation.

Conclusion

The results showed the effectiveness of both face-to-face and e-learning methods in promoting the physical activity behavior of the elderly. E-learning method can be used as one of the complementary methods of traditional education for the education of the elderly. With the help of this method, active learning occurs in learners. We can also mention the cost- and time effectiveness of the e-learning method. Today, there is a need for the elderly living in Iran to have access to appropriate educational programs and also to encourage them to use new educational methods to improve their physical activity. It is recommended that a study with the same population but with a longer duration be conducted on comparing educational methods and the effect of social networks on the physical activity in people with chronic diseases. It is suggested that in future studies, both traditional and e-learning methods be used for elderly people as a complement to each other.

Ethical Considerations

Compliance with ethical guidelines

Written consent was obtained from the participants and their personal information was kept confidential. The study obtained its ethical approval from the Ethics Committee of the University of Social Welfare and Rehabilitation Sciences (Code: IR.USWR.REC.2017.129). It was also registered by the Iranian Registry of Clinical Trials (Code: IRCT20171031037124N1).

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Authors' contributions

Conceptualization and project administration: Shahab Papi, Yadollah Abolfathi Momtaz, Mahshid Foroughan, Farahnaz Mohammadi Shahboulaghi, Marzieh Araban; Methodology, writing, and Data collection: Shahab Papi, Tahereh Ramezani; Data analysis: Shahab Papi, Yadollah Abolfathi Momtaz; Editing and review: All authors.

Conflict of interest

The authors declared no conflict of interest.

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