



## The Effect of an Educational Intervention Based on the Health Action Process Approach on Physical Activity among Retired Female Employees



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### ABSTRACT

**Background:** Physical activity during retirement is one of the health promotion determinants in this group. This study was conducted to determine the effect of an educational intervention based on the health action process approach (HAPA) on the levels of physical activity among retired female employees.

**Methods:** This quasi-experimental study was conducted among 97 retired women, selected through a simple random sampling technique, and divided into two groups. The primary instruments employed for data collection included the International Standard Physical Activity Behavior Questionnaire (IPAQ) and a researcher-made questionnaire based on the HAPA. Data analysis was performed using SPSS version 20, incorporating a range of statistical tests, namely Spearman's correlation, independent and paired t-tests, the Willcoxon signed-rank test, and the Mann-Whitney U test.

**Results:** After the educational intervention, the average score of different levels of physical activity has increased significantly ( $p < 0.05$ ). In addition, three months after the intervention, the score of all the constructs of the HAPA model except for the structure of action planning and coping planning, was significantly increased ( $p < 0.05$ ).

**Conclusion:** The implementation of an intervention based on the HAPA can improve the level of physical activity in middle-aged women. Therefore, it is suggested that future studies based on this approach be conducted in other target groups to promote physical activity.

## 1. Introduction

Retirement is defined as the stage of ending employment and activity, separation from occupational responsibilities, time constraints, and other limitations imposed by work [1]. Official statistics indicate an increase in the retiree

population, with projections suggesting that retirees will constitute a significant proportion, approximately one-fourth, of Iran's total population within the next three decades [2]. An important issue with this increasing population of older people is their potential increase in healthcare needs due to age-related chronic diseases and



disabilities [3]. As a result, considerable attention has been directed towards strategies aimed at maintaining the independence, as well as the mental and physical well-being, of this part of society [4]. Retirement represents a significant milestone in an individual's life, which is accompanied by changes in lifestyle and social roles [5]. Consequently, the impact of retirement on health status has been considered one of the significant research topics over the past decade [6]. Shai's study (2018) shows that retirement can have a negative effect on certain health indicators among retired employees. Specifically, this transitional phase is associated with an upsurge in disability rates and a decline in overall health indicators [7]. Also, Kämpfen and Maurer (2016) found that the retirement period is associated with a decrease in physical activity levels [8]. The World Health Organization (WHO) defines physical activity as any body movement that is produced by skeletal muscles that necessitates energy consumption [9]. Extensive evidence has demonstrated that physical activity can effectively reduce the burden of chronic diseases [10]. Additionally, it has been shown to improve mental health and cognitive function, promote better sleep quality, reinforce bones and muscle strength, as well as enhance immune system function [11]. Therefore, physical activity as a non-pharmacological and cheap treatment protocol can solve mental and physical problems caused by old age and help to maintain these two aspects of health [12]. Despite the many benefits of physical activity, in countries around the world, between 60-80 % of adults do not have enough physical activity [13]. In Iran, only 18.2 % of women do physical activity for at least 10 min a day [14]. Also, in a similar study, Tabatabaei *et al.* (2017) showed that 61.3 % of women in Kerman City do not have physical activity or have low-intensity physical activity [15]. Lack of physical activity causes 2 million deaths in the world every year and plays a major role in physical and mental diseases and mortality [16]. One of the contributing factors to insufficient physical activity is the presence of various barriers that individuals encounter when attempting to engage in physical exercise. These barriers include financial situation, lack of social support, lack of sports facilities specifically designed for women, and concerns regarding neighborhood safety [17]. In addition, Mohammadi Zeidi *et al.* (2020) concluded in their study that psychological variables such as action self-efficacy, coping self-efficacy, outcome expectation, and risk perception play a role in performing regular physical activity, so their absence is also considered as an obstacle to physical activity [18]. However, education emerges as a potential solution to mitigate and overcome these obstacles. Araban *et al.* (2021) showed the effectiveness of educational interventions in reducing perceived barriers to physical activity [14]. In this context, evaluating the efficacy of new theories of behavior change, according to the nature of the desired behavior, can prove beneficial. One such model applicable to physical activity behavior is the health action process approach (HAPA) introduced by Schwarzer in 2008 [19]. According to HAPA, the process of engaging in health-related actions involves two distinct stages: the motivational stage and the voluntary

stage. In the motivational phase, three key factors, namely risk perception, outcome expectation, and action self-efficacy, affect an individual's behavioral intention. Once the behavioral intention is formed, the individual enters the voluntary stage, which consists of action planning (referring to the time, place, and manner of acting), coping planning (predicting obstacles and creating alternative behaviors to overcome them), recovery self-efficacy (the experience of failure and recovery from obstacles), and maintenance self-efficacy (representing optimistic beliefs about the person's ability to deal with obstacles during the maintenance period). These factors collectively influence the adoption of the desired behavior by an individual [20]. Furthermore, social support is an intermediary construct within the HAPA and constitutes an essential emotional and informational tool that reflects obstacles and resources that can enable a person to adopt behavior and continue behavior [21]. A study conducted by Pomery *et al.* (2012) aimed at determining predictors of physical activity based on the health action process approach among inactive middle-aged women showed that the use of this model is effective in improving the level of physical activity in these groups [22]. Limited research has been conducted in the retired community based on the mentioned approach to promoting physical activity. Notably, no studies were found in Iran that investigated the effect of using the HAPA to improve the physical activity behavior of this group. As a result, this study was conducted to determine the effect of an educational intervention based on HAPA on the physical activity levels of retired female employees at Rafsanjan University of Medical Sciences.

## 2. Materials and Methods

The current quasi-experimental study was conducted among 97 retired women of Rafsanjan University of Medical Sciences, with 49 participants in the intervention group and 48 participants in the control group using a simple random sampling method. The required sample size was estimated based on the statistical formula  $n = 2(z_{1-\alpha/2} + z_{1-\beta})^2 \sigma^2/d^2$ , considering  $\alpha = 0.05$ ,  $\beta = 10\%$ , a significant difference between the means of the two groups ( $d = 2$ ), and a standard deviation of  $\sigma = 2.93$ . Consequently, a minimum of 45 participants per group was considered necessary. For more certainty, a total of 50 individuals were selected for each group [18]. After receiving the code of ethics from Rafsanjan University of Medical Sciences and coordinating with the retired affairs officer, a list of the characteristics of all retired women of the university was prepared. Then, 100 eligible retired women who satisfied the predetermined inclusion criteria were selected by simple random sampling. To allocate participants into either the control or intervention group, a lottery method was employed, ensuring random assignment. (Figure 1) Following these initial steps, a phone call was made with the selected individuals. During these calls, the objectives were elucidated, and informed consent was obtained from each participant before participating in the research. The inclusion criteria for participation in the study were female

retirees aged 45-70 years of Rafsanjan University of Medical Sciences. Additionally, they were required to possess at least a middle school degree. Voluntary and informed consent to participate in the study was also imperative. Exclusion criteria consisted of individuals with specific diseases or disabilities that were incompatible with physical activity. Moreover, individuals who failed to attend any of the training courses, or did not complete the questionnaire were excluded from the study (Figure 1).

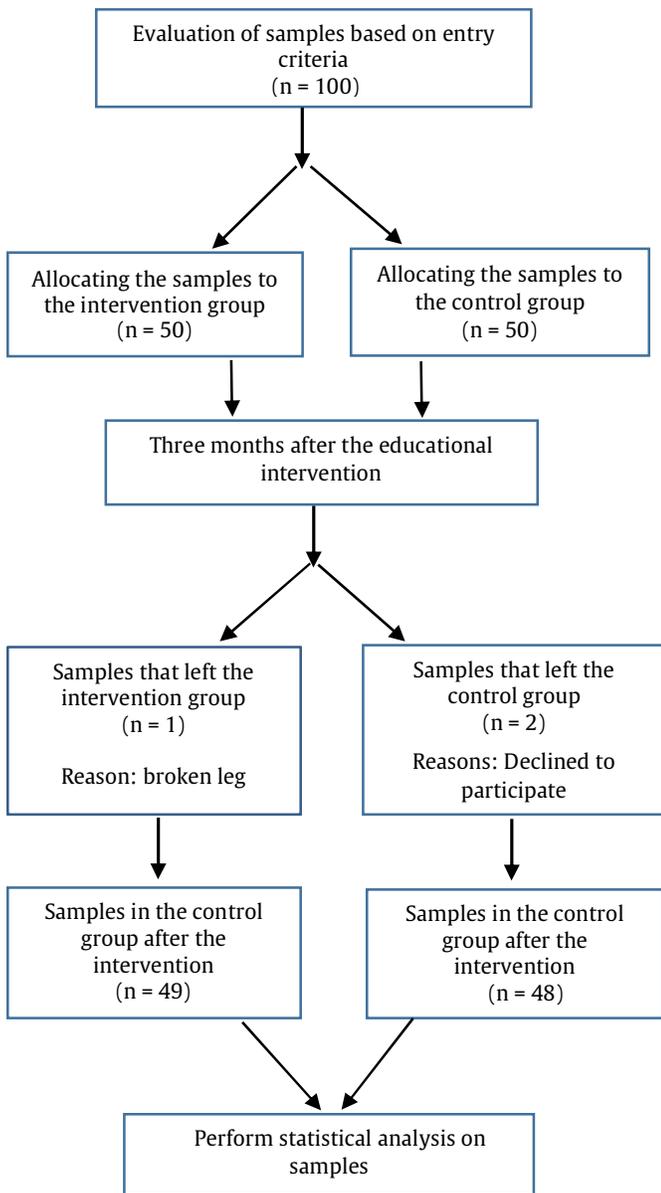


Figure 1. Consort diagram

The data collection tool in this study included a questionnaire consisting of three sections: demographic information (including 7 questions on age, marital status, education level, economic status, history of illness, number of children, and body mass index), the international standard

questionnaire of physical activity behavior status (IPAQ) [23], and a researcher-made questionnaire based on the constructs of the HAPA. Physical activity behavior was measured using the IPAQ questionnaire. This questionnaire consists of 7 questions that evaluate the level of physical activity of an individual in the last week. To calculate the total amount of physical activity for the week, the amount of walking (days × minutes × METs), the amount of moderate physical activity (days × minutes × METs), and the amount of vigorous physical activity (days × minutes × METs) in the previous week are added together. This questionnaire is standard and its validity and reliability have been confirmed by Farahani *et al.* (2011) [24]. The researcher-made questionnaire based on the HAPA includes several constructs, including risk perception (6 items), outcome expectations (8 items), action self-efficacy (6 items), maintenance self-efficacy (6 items), recovery self-efficacy (3 items), social support (4 items), behavioral intention (4 items), action planning (4 items), and coping planning (5 items). Responses were measured through a 5-point Likert scale ranging from “I completely agree” to “I completely disagree”, with scores ranging from 4 to 0 respectively. For the validity of the mentioned questionnaire, the method of content validity and the panel of experts in the field of health education and health promotion were used. For this purpose, the questionnaire was sent to 10 experts in the mentioned field. At first, the content validity ratio (CVR) was calculated using 3 scales (item is not necessary, item is useful but not necessary, and item is necessary). By referring to the Lavshé table, the questions whose CVR was smaller than 0.62 were removed. (The CVR score was within the range of 0.77 to 1). In order to calculate the content validity index (CVI), 3 criteria (simplicity and fluency, relevance and clarity) were used using a 4-point Likert scale for each item. (The CVR score was within the range of 0.79 to 1). Finally, out of 54 initial questions, 46 questions were confirmed. Also, for the reliability of this questionnaire, Cronbach's alpha coefficient was calculated on 30 retirees for data reliability, and this coefficient was obtained for the structure of risk perception 0.94, outcome expectations 0.95, action self-efficacy 0.96, social support 0.94, maintenance self-efficacy 0.97, recovery self-efficacy 0.96, action planning 0.96, and coping planning 0.96. The training program was implemented in a combined (virtual and face-to-face) format in 2022. The training course was held in the form of 5 sessions and 45 days. Due to the high-risk situation of corona disease in this period and to maintain the health of this group, the sessions were initiated with virtual training. Virtual interventions were held in group format and through social network (WhatsApp) in 4 sessions. The duration of each educational file was 15 to 20 minutes, and the method of presenting the content was through lectures, questions, and answers, describing experiences, and providing effective solutions to overcome the obstacles of doing physical activity and teaching planning to do physical activity. The first session was held to create of risk perception in the intervention group, about the consequences of not doing physical activity (osteoporosis, diabetes, blood pressure, cardiovascular diseases,

depression, etc.). The second session was held to review the previous session and create positive outcome expectations regarding the importance and benefits of physical activity (improving the functioning of the cardiovascular and pulmonary system, preventing diabetes and its control, preventing depression, and creating vitality in people, etc.). In the third session, to create and improve action self-efficacy, maintenance self-efficacy, and recovery self-efficacy in the intervention group, successful elderly people in the field of regular physical activity were interviewed and they related to the role that physical activity had in their lives and also The existence of limitations that they had in this way and how to deal with them, as well as the role of their family members in doing physical activity, provided explanations. In addition, by using verbal persuasion and crushing the desired behavior in order to perform that behavior more simply and easily, an attempt was made to encourage people and increase their self-efficacy. The fourth session was conducted to familiarize the intervention group with the way of action planning and coping planning. In this way, explanations were first given about planning, its importance and benefits, and then a planning sample was sent to them to start physical activity as well as to deal with possible obstacles and problems explained about it. However, due to the decrease in the spread of the

Coronavirus and the favorable risk status observed in Rafsanjan city, a 90-minute meeting was held with the presence of retirees, their families, and a physical education instructor. Thus, the fifth training session was held face-to-face to review the previous sessions as well as promote social support and behavior. In this meeting, to increase the awareness of the families of retirees to support them, explanations were given about the importance of physical activity for the elderly, and an Exercise instructor was also invited to teach the correct principles of exercise and walking in this group (Table 1). One month after the completion of the training sessions, two text messages containing motivational messages were sent every week to the intervention group to continue doing physical activity. Three months after the completion of the educational intervention, the post-test was conducted for both groups, and all the training of the intervention group was also sent to the control group. The data obtained from the pre-test and post-test assessments were subjected to statistical analysis using various tests, including the paired test, Mann-Whitney and Wilcoxon tests. These analyses were performed utilizing the Statistical Package for the Social Sciences (SPSS) software (version 20) at a significance level of less than 0.05. The normal distribution of the data was checked by the Kolmogorov-Smirnov test.

Table 1. Educational objectives of the intervention program based on the health action process approach

Session	Educational objectives	Construct	Teaching method	Educational materials
First	Familiarizing the target group with the concept of physical activity and its types. Familiarity with the consequences of inactivity	Risk perception	Lecture-question and answer	Educational videos - electronic educational pamphlets
Second	Explaining the importance and physical and mental benefits of physical activity.	Outcome expectations	Lecture-Question and answer	Educational videos
Third	Explaining experiences and using successful models as well as crushing behavior in order to empower people to perform behavior and deal with obstacles	Action self-efficacy, coping self efficacy and maintenance self-efficacy	Explaining experiences crushing behavior	Videos made by successful people in this field
Forth	Explaining the objectives of the session and familiarizing the intervention group with the concept of planning	Action planning-coping planning	Lecture-Explanation of experiences-question and answer	Educational videos and doing sample format
Fifth	Acquainting the families of the intervention group with the concept of physical activity the benefits of doing physical activity and the consequences of physical inactivity promoting social support in this group. Teaching skills to people and presenting the principles of walking and stretching movements.	Social support-behavior	Lecture-explaining experiences-crushing behavior-question and answer	Educational Pamphlet-Using a physical training instructor

### 3. Results and Discussion

This study included 97 retired women with an average age of 59.37 ± 4.7 years. Among them, 79 individuals (81.4 %) were married, 50 (51.1 %) had a diploma, and 57 (58.8 %) had an income level of 5-10 million tomans. Further, 44 participants (45.4 %) had two children. The research participants were in the average range of overweight in

terms of body mass index. The results of the Chi-square test showed that there was no statistically significant difference between the control and intervention groups in terms of demographic variables, indicating that both groups were similar in this respect (Table 2). In order to examine the correlation between the constructs of the HAPA model and physical activity behavior, Spearman's correlation coefficient was used due to the non-normal distribution of the data. The

results of this analysis showed that there is a positive and significant correlation between all the constructs of the health action process approach model as well as the construct of social support with physical activity behavior ( $p < 0.01$ ) (Table 3). The paired t-test showed a statistically

significant difference between the mean score and the standard deviation of all the constructs of the mentioned model, except for the construct of outcome expectations, after training in the intervention group compared to before ( $p < 0.001$ ) (Table 4).

Table 2. Comparison of demographic characteristics of retired women in the study in both intervention and control groups

Variable	Intervention group (n = 49)	Control group (n = 48)	P-value
Age (Mean ± SD)	58.94 ± 4.57	59.81 ± 4.83	0.363 <sup>†</sup>
BMI (Mean ± SD)	29.49 ± 6.8	27.85 ± 1.61	0.108 <sup>†</sup>
Level of education N (%)			
intermediate education	10 (20.4)	13 (27/1)	0.3 <sup>††</sup>
Diploma	49 (24)	26 (54.2)	
Bachelor's degree	15 (30.6)	8 (16.7)	
masters	0 (0)	1 (2.1)	
Family income N (%)			
< 5million tomans	16 (32.7)	16 (33.3)	0.723 <sup>††</sup>
5 - 10million tomans	30 (61.2)	27 (56.3)	
> 10million tomans	3 (6.1)	5 (10.4)	
Marital status N (%)			
Widow	2 (4.1)	0 (0)	0.324 <sup>††</sup>
Married	40 (81.6)	39 (81.3)	
Divorced	7 (14.3)	9 (18.8)	
Disease Background N (%)			
Diabetes	16 (7.32)	16 (33.3)	0.989 <sup>††</sup>
Hypertension	11 (22.4)	12 (25)	
Hyperlipidemia	2 (4.1)	2 (4.2)	
Osteoporosis	2 (4.1)	3 (6.3)	
No record	3 (6.1)	3 (6.3)	
Having several diseases	15 (30.6)	12 (25)	

† Derived from Independent t-test, †† Derived from Chi-square test,  $P < 0.05$ , the significant difference

Table 3. Spearman's correlation coefficients between the constructs of the health action process approach model and total physical activity in retired women

variables	1	2	3	4	5	6	7	8	9	10
1. Physical activity	1									
2. Coping planning	0.264 <sup>**</sup>	1								
3. Action planning	0.264 <sup>**</sup>	0.93	1							
4. Social support	0.31 <sup>**</sup>	0.556 <sup>**</sup>	0.521 <sup>**</sup>	1						
5. Recovery self-efficacy	0.34 <sup>**</sup>	0.448 <sup>**</sup>	0.418 <sup>**</sup>	0.826 <sup>**</sup>	1					
6. Maintenance self-efficacy	0.32 <sup>**</sup>	0.464 <sup>**</sup>	0.447 <sup>**</sup>	0.795 <sup>**</sup>	0.865 <sup>**</sup>	1				
7. Action self-efficacy	0.423 <sup>**</sup>	0.404 <sup>**</sup>	0.377 <sup>**</sup>	0.622 <sup>**</sup>	0.721 <sup>**</sup>	0.812 <sup>**</sup>	1			
8. Outcome expectations	0.48 <sup>**</sup>	0.217 <sup>*</sup>	0.286 <sup>**</sup>	0.181	0.233 <sup>*</sup>	0.287 <sup>**</sup>	0.409 <sup>**</sup>	1		
9. Risk perception	0.395 <sup>**</sup>	0.134	0.187	0.16	0.233 <sup>*</sup>	0.247 <sup>*</sup>	0.362 <sup>**</sup>	0.895 <sup>**</sup>	1	
10. Intentional behavior	0.276 <sup>**</sup>	0.772 <sup>**</sup>	0.817 <sup>**</sup>	0.745 <sup>**</sup>	0.633 <sup>**</sup>	0.638 <sup>**</sup>	0.592 <sup>**</sup>	0.308 <sup>**</sup>	0.253 <sup>*</sup>	1

\*\* Correlation at a significance level of 0.01, \*Correlation at a significant level of 0.05

The average score and standard deviation of different levels of physical activity (intense physical activity, moderate physical activity, walking) and total physical activity in two groups before and after the intervention are presented. According to the results of the Will-Coxon test, the average score of all levels of physical activity, except intense physical activity, increased after training in the intervention group

compared to before, and this increase was statistically significant ( $p < 0.001$ ) (Table 5). The present study was conducted to determine the effectiveness of the educational intervention based on the health action process approach model on the physical activity of female retirees of Rafsanjan University of Medical Sciences. The results of the present study showed that the average walking score in the

intervention group after the training had increased significantly. This result is consistent with the result of the study of Malaijerdi *et al.* (2019), which showed that the empowerment program based on this approach improves physical activity behavior in middle-aged people [25]. In the present study, the average score of moderate physical activity after the educational intervention was significantly higher than before the intervention, which was consistent with the results obtained from the study by Zanjanchi *et al.* (2023) [26]. However, this result contradicts the findings of a study by Shafieinia *et al.* (2016) [27]. It is important to note that in the current study, the interventions were carried out until the intention formation stage, while in the HAPA, strategies such as planning and dealing with obstacles to behavior change are provided after forming the intention. Regarding intense physical activity, the study found that the average score did not significantly increase three months after the training. In justifying this finding, we can mention the limitations that people of this age have to perform intense physical activity. Also, some studies show that doing

intense physical activity may cause complications in this group [28]. On this basis, there is not much emphasis on performing this type of physical activity for the samples of this research. In contrast to the findings of this study, a study conducted by Mahdizadeh *et al.* (2013) [29] to promote physical activity in women with type 2 diabetes, showed that intense physical activity has increased significantly in the intervention group, which could be due to the younger age of the research samples compared to the present study. In this study, the average total physical activity score was improved after the intervention, which can indicate the positive effect of training programs based on the health action process approach model. However, the physical activity behavior in the samples of this research is still lower than the recommended standard level for the elderly and middle-aged. The findings of this study were consistent with the results of the studies of Zanjanchi *et al.* (2023) [26] and Malaijerdi *et al.* (2019) [25]. Therefore, the intervention based on the health action process approach can improve the level of physical activity in middle-aged women.

Table 4. Comparison of the mean score and standard deviation of the constructs of HAPA before and three months after the intervention

Variables	group (number)	Mean ± standard deviation		Paired t-test
		Before intervention	Three months after the intervention	
Risk perception	Control (48)	21.39 ± 3.65	21.5 ± 3.64	<b>0.133</b> 0.004
	Intervention (49)	22.57 ± 2.86	23.87 ± 0.85	
	Independent T-test	0.082	< 0.001	
Outcome expectation	Control (48)	29.16 ± 4.41	29.52 ± 3.57	0.29 0.11
	Intervention (49)	30.85 ± 4	31.83 ± 1.14	
	Independent T-test	0.051	< 0.001	
Action planning	Control (48)	16.25 ± 5.35	16.31 ± 5.3	0.444 < 0.001
	Intervention (49)	17.63 ± 6.54	20.53 ± 3.42	
	Independent T-test	0.257	< 0.001	
Intentional behavior	Control (48)	11.37 ± 2.97	11.45 ± 2.9	0.29 0.001
	Intervention (49)	11.55 ± 3.76	12.75 ± 2.61	
	Independent T-test	0.799	0.023	
Social support	Control (48)	11.75 ± 2.62	12.16 ± 2.72	0.182 < 0.001
	Intervention (49)	12.44 ± 3.54	14.04 ± 2.46	
	Independent T-test	0.272	0.001	
Maintenance self-efficacy	Control (48)	14.85 ± 5.84	15.02 ± 5.85	0.018 < 0.001
	Intervention (49)	16.04 ± 6.38	19.95 ± 4.47	
	Independent T-test	0.35	< 0.001	
Recovery self-efficacy	Control (48)	8.2 ± 2.7	8.29 ± 2.65	0.42 < 0.001
	Intervention (49)	9.4 ± 2.7	10.51 ± 2.15	
	Independent T-test	0.036	< 0.001	
Action planning	Control (48)	11.25 ± 3.41	11.25 ± 3.4	1 < 0.001
	Intervention (49)	9.95 ± 4.62	12.2 ± 2.89	
	Independent T-test	0.121	0.141	
Copping planning	Control (48)	13.37 ± 4.2	13.64 ± 4.25	0.36 < 0.001
	Intervention (49)	12.53 ± 5.84	15.18 ± 3.92	
	Independent T-test	0.416	0.067	

The results of the analysis of Spearman's correlation coefficient showed that there is a positive and significant

correlation between all the constructs of the HAPA. The results of Mohammadi Zaidi *et al.*'s study (2020) [18], which

aimed to determine the factors affecting physical activity based on the model of the health process approach on patients with high blood pressure; were consistent with the present study. In addition, the findings of the study by Parschau *et al.* (2014) [30] are also consistent with the findings of the present study. The findings of our study indicate that there was a relationship between all three types of self-efficacy (action self-efficacy, recovery self-efficacy, and maintenance self-efficacy) with physical activity behavior. Juwita and Damayanti's study (2022) also confirmed the role of self-efficacy as an effective variable in promoting physical activity in the elderly [31]. Therefore, health experts and professionals should consider the identification of obstacles, facilitators, and factors affecting self-efficacy as an important step in increasing the probability of success in changing behavior. In this study, two strategies of verbal persuasion and explanation of experiences were used to improve the mentioned structures in the intervention group. The results of the present study are consistent, with the study of Zanjanchi *et al.* (2023) [26] and Karthijekan *et al.* (2022) [32], which showed the effect of interventions on improving self-efficacy and increasing the level of physical activity. In this study, the average score of the risk perception structure in the intervention group increased significantly. Consistent with this study, Daryabeygi *et al.* (2021) [33]. Were also able to significantly increase risk perception in their intervention group. Based on a general rule, people react appropriately to health messages and behavior change when they feel that they are in danger due to not performing the behavior [34]. Therefore, it is suggested that the promotion of middle-aged and elderly women's understanding of the risk of the consequences of not performing physical activity should be taken into consideration by relevant authorities and healthcare providers. Based on the results of this study, the score of outcome expectations construct improved after the intervention. Outcome expectations are the beliefs based on which the target behavior leads to outcomes that are beneficial to the individual [35]. In line with this study, Malaijerdi *et al.* (2019) [25] and Zanjanchi *et al.* (2023) [26] were able to improve the average score of this construct

regarding physical activity in middle-aged and elderly women. Several studies show that outcome expectancy structure can predict physical activity behavior [36]. The average score of the behavioral intention structure had increased significantly. As stated; the three constructs of risk perception, outcome expectations, and action self-efficacy in the motivational phase of this approach influence the intention to perform the behavior. In line with this study, Bagherniya *et al.* (2018) [37] were also able to create the intention to perform the behavior in people after training. Also, the average score of action planning and coping planning structure was improved, which can be caused by effective training, doing both types of planning, and adhering to it. Planning is a type of self-regulation strategy that facilitates the realization of behavioral goals by filling the gap between intention and behavior and forming healthy behavioral habits [38]. The findings of this study were consistent with the results of the study by Zanjanchi *et al.* (2023) [26]. The average score of the social support construct improved three months after the intervention. Schwarzer states that if there is social support; it is a source of support for the implementation of the desired behavior as well as its continuation, and if it does not exist; It can be considered as an obstacle to conduct behavior in people [21]. This result was consistent with the findings of Skvortsova *et al.*'s study (2022) [39]. Also, similar studies showed that social support for exercise is related to increased physical activity in women [40]. Therefore, it seems that effective steps can be taken by using and improving the structures of the health action process approach to increase the level of physical activity of people in retirement and old age. The present study is one of the few studies that, by using the comprehensive approach of the HAPA, in addition to creating motivation, put strategies for converting intention into behavior through social support in its intervention program, however, the present study had some limitations; Among these limitations, we can mention the relatively limited sample size. Also, due to the conditions of the spread of the COVID-19 virus, some interventions were implemented on the virtual platform, which can have an impact on the effectiveness of the interventions.

Table 5. Comparison of the average score and standard deviation of physical activity levels in two groups before and three months after the educational intervention

Variables group (number)		Mean ± standard deviation	Mean ± standard deviation	Will Coxon test
		Before intervention	Three months after the intervention	
IntensePhysical activity	Control (48)	25.83 ± 64.17	15 ± 58.7	0.204
	Intervention (49)	39.18 ± 125.56	48.97 ± 97.83	
	Mann-Whitney test	0.488	0.027	0.361
Moderate physical activity	Control (48)	112.08 ± 164.23	97.66 ± 221.4	0.274
	Intervention (49)	86.12 ± 145.72	352.57 ± 149.76	
	Mann-Whitney test	0.261	< 0.001	< 0.001
Walking	Control (48)	274.93 ± 223.36	316.25 ± 267.88	0.139
	Intervention (49)	348.85 ± 370.79	447.18 ± 323.03	
	Mann-Whitney test	0.808	0.03	<0.001
Total physical activity	Control (48)	412.87 ± 298.4	428.916 ± 381.83	0.808
	Intervention (49)	474.16 ± 443	848.73 ± 337.78	<0.001
	Mann-Whitney test	0.891	<0.001	

## 4. Conclusion

In this study, it was found that the constructs of the HAPA have a positive and significant effect on the physical activity levels of the participants. As a result, the intervention based on the mentioned model along with the mediating construct of social support, can increase the level of physical activity. However, considering that the level of physical activity behavior in the sample was still low, it is recommended that future studies expand their interventions to larger populations and address the limitations of the current study. By doing so, it would be possible to further enhance the level of effective and recommended physical activity among retirees and older adults.

## Authors' Contributions

Hooriyeh Mirzaei Moghadam: Writing original draft; Data collection. Mostafa Nasirzadeh: Editing. Ahmadrza Sayadi: Data analysis. Mahdi Abdolkarimi: Final approved; Supervision.

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## Conflicts of Interest

There is no conflict of interest in this study.

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## Ethical considerations

In this study, ethical principles and considerations, including obtaining informed consent to participate in the research by presenting the research objectives, preserving the anonymity and secrets of the participants, and observing the preservation of their health, were considered, and this research was approved by the Ethics Committee of Rafsanjan University of Medical Sciences (IR.RUMS.REC.1400.167).

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