Health Tech Asmnt Act. 6(3). doi: 10.18502/htaa.v6i3.12432

Research Article

The Effect of Educational Intervention Based on the Theory of Planned Behavior on the Physical Activity of Office Employees

Mohamad Ali Moazen[1], Hamid Salehiniya[1], Abbas Javadi[1,*]

[1]Social Determinants of Health Research Center, Birjand University of Medical Sciences, Birjand, Iran

[*] *Corresponding Author:* Abbas Javadi, Social Determinants of Health Research Center, Birjand University of Medical Sciences, Birjand, Iran. Email: javadi56@yahoo.com

Received 2022 May 01; Accepted 2022 May 20.

Abstract

Background: Inactivity has a high contribution to premature deaths and non-communicable diseases.

Objectives: The study aimed to determine the effect of the educational intervention based on the theory of planned behavior on physical activity among administrative staff in Birjand.

Methods: In this field trial, 69 employees of 4 offices in Birjand who were qualified to participate in the study were randomly divided into intervention (2 offices) and control (2 offices) groups. The intervention group participated in eight training sessions based on the theory of planned behavior. The required data were collected through a researcher-made questionnaire at three different times (before the intervention, immediately after the intervention, and three months after the intervention). Then the data was analyzed using SPSS 19, independent t-tests, repeated analysis of variance, and chi-square. A significance level of 0.05 was considered.

Results: According to the results of the study, implementing the training program based on the theory of planned behavior three months after the study significantly increased the performance of a desirable physical activity in the employees of the intervention group (P = 0.005), 38.9 percent VS 9.1. This change was accompanied by a significant increase in the constructs of the theory of planned behavior (awareness, attitude, subjective norm, perceived behavioral control, and behavioral intention) in physical activity immediately or three months after the intervention. There was a significant increase in the intervention group compared to the control group.

Conclusions: The implementation of an educational program based on the theory of planned behavior by increasing awareness, attitude, mental norm, perceived behavioral control, and behavioral intention can have a positive effect on increasing the amount of physical activity among employees, which can be used in training other health behaviors.

Keywords: Physical Activity; Office Employees; Theory of Planned Behavior

1. Background

Regular physical activity is one of the most important factors in developing and maintaining health. It is one of the 15 priorities for changing behavior to improve health (1). Physical activity is one of the important components of a healthy lifestyle, and it indirectly improves public health by reducing the societal burden of disease and medical costs (2). The recommended physical activity for adults is 30 minutes of moderate intensity per week, or at least five days per week, which can minimize the risk of chronic diseases (3). The preliminary findings of the World Health Organization (WHO)'s research indicate that a sedentary lifestyle is one of the world's ten leading causes of death.

According to WHO studies, 60 to 85 percent of adults in different countries do not exercise enough to improve their health. A sedentary life increases all the main causes of death and doubles the risk of cardiovascular disease, diabetes, and obesity (4). According to Mohebi et al., insufficient mobility is highly prevalent in Iran, with a prevalence of 54.7% in the entire community. Also, a significant difference was observed between men and women (45.3% for men and 61.9% for women). Another study finding was that 33.6% of participants had a habit of sitting for at least 4 hours daily (5). In another study that was conducted on office employees in Hamadan, the prevalence of inactivity among office employees in this city was reported as 49.2% (6).

Teaching health behaviors can lead to behavior change, which means that as a result of such training, correct behaviors replace incorrect ones (7). The review of the previous studies in Iran and the world demonstrates a need for planned and systematic education to culture, create

a supportive environment, and modify the way of life in the field of healthy and hygienic behaviors (8, 9).

One of the educational theories based on behavioral intention is the theory of planned behavior (TPB) (10). This theory states that the major cause of a behavior is the desire to conduct it, which is impacted by three factors: Attitude, subjective standards, and an individual's feeling of control over the activity in terms of ease and difficulty. Also, people positively evaluate behavior and intend to do it when they believe that influential and important people do this behavior and that the behavior is under their control (11).

It is claimed that this educational model has the potential capacity to develop behavior change interventions, especially for behaviors that have become habitual (12). According to the studies, since office employees are exposed to the risks of insufficient mobility due to long periods of sitting, increasing their awareness will be useful in preventing the complications of inactivity.

2. Objectives

The present study was conducted to determine the effect of educational intervention based on the theory of planned behavior on physical activity among the employees of Birjand offices.

3. Methods

3.1. Type of Study, Statistical Population, and Sample Size

The present field trial was conducted on office employees in Birjand in 2021. The sample size is based on an extensive literature review and Parrott MW et al. (13) study, considering the averages of 8.09 and 7.54, respectively. With 35 persons in each group with a 95% confidence interval and power of 90%, the two groups' standard deviations were 0.78 and 0.59. With possible dropout, the sample size in each group was considered to be 37 individuals.

Inclusion criteria: Working in selected offices, having at least a diploma, ability to participate in training sessions, no report of disease (cardiovascular, blood pressure, diabetes, cancer, and chronic respiratory diseases) during the study, age between 20 and 55 years, service history of fewer than 27 years, official contract employment, permanent contract until the end of the study, not having professional sports activities

Exclusion criteria: Reluctance to attend the training sessions, missing more than one session, illness of the person preventing attending the sessions.

3.2. Data Collection Tools

A researcher-made questionnaire was used to collect data. This questionnaire included demographic information (8 questions) and physical activity questionnaire based on the planned behavior model (39 questions). Demographic information included gender, age, education, work experience, spouse's education and occupation, household size, and income. The physical activity behavior questionnaire measures awareness with eight three-choice questions (yes, no, and don't know), attitude, norm-mindedness, and perceived behavioral control with eight 5-choice questions each (completely agree, agree, no opinion, disagree, completely disagree), the behavioral intention with seven questions and five options (completely agree, agree, have no opinion, disagree, completely disagree) and physical activity behavior was measured with five questions (doing or not doing light or heavy physical activity and the number of active days, as well as the number of minutes of activity and hours of sitting).

The content validity of the questionnaire was approved by 11 professors from the Health Education and Promotion Department and the Physical Education Department. Cronbach's alpha was applied to examine the reliability of the questionnaire, the final questionnaire was distributed to 25 employees who met the inclusion requirements, and all questions with an alpha better than 0.7 were deemed acceptable and included (alpha was greater than 0.7 for all questions).

3.3. Study Execution Process

To generate the required sample, four offices were picked at random from a list of city offices. Then, two institutions were randomly assigned to the intervention group and two to the control group. Thereafter, each office retrieved a list of eligible persons based on the study entry and exit criteria, and the study subjects were randomly picked from the list (intervention group of 37 people and control group of 37 people). Afterward, both groups completed the questionnaires in three phases (before the start of the study, immediately after the study, and three months after the study). No training was scheduled for the control group.

3.3.1. Intervention

After obtaining informed and written consent, the intervention group received the necessary training in 8 sessions with the cooperation of a doctor, a physical education expert, and a nutrition expert (Appendix 1).

3.4. Data Analysis

Data were analyzed using SPSS version 19. Initially, the normality of the data distribution was checked by the Kolmogorov-Smirnov test. Consequently, according to the normality of the data, the analysis was performed using an independent t-test, repeated analysis of variance, and chi-square. A P-value less than 0.05 was considered a significant level.

4. Results

From a total of 74 participants, 69 completed the ques-

tionnaire after completing the training. There was no significant difference between the groups regarding demographic variables (Table 1).

Table 1. Demographic Information of Participants by Group a

	Intervention Group	Control Group	P-Value
Gender			0.45 [b]
Male	8 (22.2)	10 (30.3)	
Female	28 (77.8)	23 (69.7)	
Economic status			0.22 [b]
Week	4 (11.1)	9 (27.3)	
Moderate	30 (83.3)	22 (66.7)	
Good	2 (5.6)	2 (1.6)	
Education			0.60 [b]
Middle and high school	1 (2.8)	2 (6.1)	
University	35 (91.7)	29 (87.95)	
Age	39.72 ± 5.16	39.48 ± 8.43	0.88 [c]
Work experience	15.25 ± 6.07	14.55 ± 6.31	0.64 [c]
Family members	3.81 ± 1.06	3.85 ± 1.09	0.87 [c]

[a] Values are expressed as No. (%) or mean ± SD.
[b] Chi-square test.
[c] t-test.

The study results revealed that the average knowledge score in the intervention group immediately after the training was significantly higher than the control group (P = 0.01). However, three months after the intervention, this difference was not significant (Table 2). The analysis of variance (ANOVA) with repeated measurements (Table 3) showed that the group effect, the time effect, and their interaction did not increase the awareness score (P = 0.418, P = 0.238, and P = 0.302 respectively), indicating that physical activity training courses and the time interval between training and measuring awareness did not increase awareness of physical activity.

Table 2. Comparison of the Mean and Standard Deviation of the Score of Awareness, Attitude, Mental Norm, Perceived Behavior Control, Behavioral Intention, and Physical Activity in Two Intervention and Control Groups Before, Immediately, and Three Months After the Intervention a

Variables	Control Group	Intervention Group	The Result of the Independent t-Test	
			Test Statistics	P-Value
Awareness				
Before intervention (1)	6.18 ± 1.13	6.00 ± 1.12	-0.670	0.50
Immediately after the intervention (2)	5.85 ± 1.06	6.78 ±1 .77	2.61	0.01
Three months after the intervention (3)	6.21 ± 1.05	6.25 ± 1.10	0.14	0.88
P-value	0.882	0.173		
Attitude				
Before the intervention (1)	34.52 ±4.26	33.97 ± 3.91	-0.55	0.58
Immediately after the intervention (2)	33.27 ± 4.83	35.50 ± 6.07	1.68	0.10
Three months after the intervention (3)	33.70 ± 3.95	35.47 ± 3.65	1.94	0.06
P-value	0.247	0.022		
Mental norm				
Before intervention (1)	30.58 ± 5.28	30.25 ± 4.85	-0.27	0.79
Immediately after the intervention (2)	30.70 ± 5.11	34.25 ± 4.78	2.98	0.004
Three months after the intervention (3)	30.91 ± 4.83	31.53 ± 4.19	0.57	0.57
P-value [c]	0.668	0.178		

Perceived behavioral control				
Before intervention (1)	27.06 ± 3.98	26.33 ± 3.72	-0.78	0.43
Immediately after the intervention (2)	26.76 ± 3.97	29.14 ± 4.66	2.27	0.03
Three months after the intervention (3)	26.36 ± 4.48	28.36 ± 4.89	1.76	0.08
P-value [c]	0.354	0.048		
Behavioral intention				
Before intervention (1)	26.88 ± 5.58	24.03 ± 498	-2.24	0.03
2 months after intervention (2)	25.55 ± 6.19	28.92 ± 4.00	2.71	0.009
3 months after intervention (3)	25.82 ± 6.59	27.39 ± 4.28	1.18	0.24
P-value [c]	0.098	0.001		

[a] Values are expressed as mean ± SD.

Table 3. Results of One-Way Repeated Measures Analysis of Variance for the Score of Awareness, Attitude, Mental Norm, Perceived Behavior Control, and Behavioral Intention to Perform Physical Activity in Two Intervention and Control Groups Before, Immediately, and Three Months After the Intervention

Variables and Type of Effect	P-Value			
	Control Group	Intervention Group	Score Difference in Intervention Times	
			First and Second Time	First and Third Time
Awareness			0.01	0.42
Group and time interaction	0.665	0.418		
Group's effect	1.42	0.238		
Time effect	1.083	0.302		
Attitude			0.04	0.02
Group and time interaction	6.163	0.016		
Group's effect	1.821	1.82		
Time effect	0.533	0.468		
Mental norm			< 0.001	0.44
Group and time interaction	0.598	0.442		
Group's effect	1.744	0.191		
Time effect	1.442	0.191		
Perceived behavioral control			0.002	0.03
Group and time interaction	4.727	0.033		
Group's effect	2.261	0.137		
Time effect	1.128	0.292		
Behavioral intention			< 0.001	0.01
Group and time interaction	15.617	< 0.001		
Group's effect	0.397	0.535		
Time effect	4.227	0.044		

Three months after the training, the mean attitude score in the intervention group was significantly higher than the control group (P = 0.06). However, immediately after the intervention, this difference is not significant (Table 2). The ANOVA with repeated measurements (Table 3) showed that the group and time interaction was signif-

icant in the intervention group, indicating that physical activity training courses and the time interval between education and attitude measurement increased the physical activity attitude score (P = 0.016).

The score of the mental norm of physical activity increased significantly in the intervention group compared to the control group immediately after the intervention (P = 0.004) (Table 2). Also, the ANOVA with repeated measurements showed that the group effect, the time effect, and their interaction had become no significant in increasing the mental norm score (P = 0.442, P = 0.191, and P = 0.191 respectively), which means that physical activity training courses and the time interval between training and measuring mental norm do not increase the score of the mental norm of physical activity (Table 3).

The perceived behavior control score immediately after the intervention in the case group increased significantly compared to the control group (P = 0.03) (Table 2). Also, the ANOVA with repeated measurements showed that the effect of time and group interaction significantly increased the perceived behavioral control score (P = 0.033), indicating that physical activity training courses and the time interval between training and measuring perceived behavioral control increased the score of perceived behavioral control of physical activity (Table 3).

The behavioral intention score of physical activity immediately after the intervention in the intervention group has increased significantly compared to the control group (P = 0.01) (Table 2). Also, the ANOVA with repeated measurements showed that the time effect and the interaction effect were significant (P = 0.044 and P < 0.001, respectively), indicating that participation in training courses and the time interval between training and measuring of behavioral intention increase the score of physical activity behavioral intention (P < 0.001) (Table 3).

In general, the results of the study (chi-square test) showed that desirable physical activity increased significantly in the intervention group three months after the start of the study (P = 0.005) (Table 4).

Table 4. Comparison of Optimal Physical Activity in the Studied Groups Before, Immediately and Three Months After the Intervention [a]

Time and Group	Undesirable	Desirable	P-Value [b]
Before intervention			1.00
Intervention	33 (91.7)	3 (8.3)	
Control	30 (90.9)	3 (9.1)	
Immediately after the intervention			0.19
Intervention	23 (63.9)	13 (36.1)	
Control	26 (78.8)	7 (21.2)	
Three months after the intervention			0.005
Intervention	22 (61.1)	14 (38.9)	
Control	30 (90.9)	3 (9.1)	

[a] Values are expressed as No. (%).

[b] Test result chi-square.

5. Discussion

The current study aimed to investigate the implementation of physical activity training programs among office employees based on the theory of planned behavior and found that participating in physical activity training programs after three months increased physical activity among employees in the intervention group. Also, the results of the study indicated that the physical activity awareness score increased significantly in the intervention group immediately after the intervention.

Similarly, Nohtani et al. reported the effect of educational intervention using the theory of planned behavior on changing the awareness of the research subjects, in line with the present study (14). In addition, in the study of Izadirad et al., the awareness of the people in the intervention group increased after the training; they found that the type of educational method used was similar to the educational method of the present study (15). In contrast, Abu-Moghli et al.'s study, "the influence of a health education program on lifestyle and health behaviors among 130 Jordanian students," found that while awareness and attitude improved, health performance did not (16).

The present study's findings in the field of attitude score indicated a significant increase in the mean attitude score to physical activity immediately after the intervention and three months after the intervention in the intervention group compared to the control group. These findings are in line with the results of the studies by Hazavehei et al. (17), Shafieinia et al. (18), Solhi et al. (19), Sharifirad et al. (4), Parrott et al. (13), and is inconsistent with Ahmadi Tabatabaei et al.'s study (20). This inconsistency can be caused by the type, content, and method of the intended intervention, mainly through health slogans written on fabric text messages through mobile phones, educational messages through administrative automation, and sending printed articles on physical activity.

In terms of the mental norm, the results of the study indicated that the score of the mental norm of physical activity increased significantly after the intervention and three months after the intervention in the intervention group compared to the control group. This result is consistent with the findings of the study by Solhi et al. (19), Sharifirad et al. (4), and Gholamnia Shirvani et al. (21).

Teaching and obtaining information about physical activity to people who are important to a person increases the probability of their approval of the desired behavior. So, early talks with managers of important departments and receiving their intellectual and practical support from conducting training sessions and active involvement of workers in training and practical courses may promote subjective norms connected to physical exercise.

In addition, the results of Mehrabia et al.'s study showed that the mean score of the subjective norm structure increased significantly in the intervention group, which was in line with the current findings (22). However, in Sharifirad et al.'s study, the subjective norms in the intervention group after training did not differ significantly from the control group (4), which does not agree with the present study. According to the group of housewife participants, to increase the score of the subjective norm, other groups besides colleagues and the head of the department should also be involved in the intervention. Besides, it may be necessary to spend more time justifying and educating important people for participants, including spouses, children, and friends, about physical activity.

Regarding perceived behavioral control, our findings indicated that the score of perceived behavioral control of physical activity increased significantly in the intervention group compared to the control group immediately after the intervention. In the study of Nohtani et al., the intervention group's perceived behavioral control of self-care behavior increased significantly after training (14). Sharifirad et al., reported that the perceived behavioral control score of the physical activity of housewives after training in the intervention group was statistically significant (4).

Furthermore Armitage and Martin et al. showed the positive role of perceived behavioral control in engaging in physical activity (23, 24). In previous studies found that training was also effective on the perceived behavioral control structure. Parrott et al. did not expect educational text messages to be able to influence the perceived behavioral control structure. However, after the training, the students felt fewer obstacles, and their perceived behavioral control score increased because the motivational text messages probably gave the participants a new idea about participating in physical activities such as mountain hiking, cycling, walking in the open space, and enjoying physical activity (13). In the study of Tsorbatzoudis, education has been effective on the perceived behavioral control structure. In this study, the researchers informed teenagers about various sports activities (volleyball, basketball) and noted that physical activity does not require strenuous training. As a result, it increased the students' barriers and perceived behavioral control (25). Perceived behavioral control is the degree of a person's understanding of the ease or difficulty of adopting a behavior (26).

In order to impact this structure, appropriate educational interventions should be designed so that the audience feels that they have sufficient control over performing the behavior and that they can perform the behavior in any situation and do not need special resources or skills. In contrast to these studies, Chatzisarantis and Hagger found that perceived behavioral control was not a predictor of physical activity. In this study, education was more effective on attitude and behavioral intention than perceived behavioral control. Therefore this result is not far from expected (27). Ahmadi Tabatabaei et al. reported that the educational intervention decreased the perceived behavioral control score, which was due to unfavorable weather conditions or the cancellation of the policy of early physical activity in the workplace (20). If people do not expect to be able to perform a behavior, they will probably not be motivated to perform that behavior (26), and perceived behavioral control is the strongest predictor of behavior (28). Providing educational programs based on the theory of planned behavior to strengthen the perceived behavioral control can be useful in increasing physical activity.

In terms of behavioral intention, the results of the study indicated that the physical activity behavioral intention score increased significantly immediately after the intervention in the intervention group compared to the control group. This result is consistent with the findings of the study by Ahmadi Tabatabaei et al. (20), Sharifirad et al. (4), and Solhi et al. (19). In these studies, the score of behavioral intention increased after training.

In the research by Mehrabia et al., the average behavioral intention construct was improved significantly (22). In Rezaei Pandari's study, the structure of intention in the theory of planned behavior has good predictive power in relation to behavior and has significantly increased after training (29). Intention is introduced as a necessary and immediate introduction to behavior, but there is no strong complete (100%) relationship between intention and behavior, so the intention is necessary but not sufficient for behavior (30, 31).

In the present study, the physical activity performance of the study subjects improved significantly after the intervention. In a similar study by Sharifirad et al., physical activity after training in the intervention group was statistically significant (4).

In addition, White and Wellington in Australia demonstrated that the behavior intention structure was increased following the educational intervention. The

perceived behavioral control after the educational intervention showed a significant difference (32). In addition, similar results were observed by Babaei-Sis et al. that training intervention improved self-regulation and physical activity and decreased the blood pressure of patients suffering from high blood pressure (33).

However, in contrast to the findings of the current study, Ahmadi Tabatabaei et al. reported that the educational intervention was conducted based on the theory of programmed behavior to improve physical activity in the subject group, a significant difference in physical activity was observed after the intervention compared to before the intervention (20). Because the target group in this study was the employees of health centers, it seems that they had a positive attitude and behavior toward physical activity from the beginning, which remained at the same level after the intervention (34).

Also, it may be due to the difference in the studied sample, busy work, and many obstacles to performing the activity. In such studies, there may be changes in structures and behavior during the intervention, but over time, the effect of the educational intervention will decrease. In theoretical studies, to correctly measure the educational intervention, it is necessary to measure the structures immediately and a few weeks after the intervention, and the duration of the intervention and the follow-up period should be longer (34).

5.1. Conclusions

The findings of the present study showed that the implementation of an educational program based on the theory of planned behavior by increasing awareness, attitude, mental norms, perceived behavioral control, and behavioral intention could have a positive effect on increasing employees' tendency to physical activity. Therefore, the theory of planned behavior can also be proposed and used in various health issues. The health of the population would benefit greatly from more research in this area and public education campaigns aimed at reducing sedentary behavior.

Acknowledgments

We acknowledge financial support from Birjand University of Medical Sciences.

Conflict of Interests:

There is not any conflict of interest.

Ethical approval:

The study was approved by the ethics committee of the Birjand University of Medical Sciences (ethics committee approval code IR.BUMS.REC.1400.039).

References

1. Saber F, Shanazi H, Sharifrad G. [The survey of Theory of planned behavior constructs regarding girl student's physical activity in Naein payame Noor University in 2012]. *J Health Syst Res.* 2013;**9**(9):1014-21. Persian.
2. Mok WK, Lee AYK. A Case Study on Application of the Theory of Planned Behaviour:Predicting Physical Activity of Adolescents in Hong Kong. *J Community Med Health Educ.* 2013;**3**(5):231. https://doi.org/10.4172/2161-0711.1000231.
3. Dareh F, Kelishadi R, Kahbazi M, Rabii C, Heidari S, Baghaei A. [Determining the Pattern of Physical Activity of Children in Markazi and Isfahan Provinces in 2002]. *J Arak Univ Med Sci.* 2004;**7**(1):26-33. Persian.
4. Sharifirad G, Saber F, Hasanzadeh A, Mozaffarianpour E. The Impact of Educational Intervention Based on Theory of Planned Behaviour on Housewives Aged 20-45 Years Old Physical Activity in Naein. *J Hum Health.* 2015;**1**(2):35-41.
5. Mohebi F, Mohajer B, Yoosefi M, Sheidaei A, Zokaei H, Damerchilu B, et al. Physical activity profile of the Iranian population: STEPS survey, 2016. *BMC Public Health.* 2019;**19**(1):1266. [PubMed ID:31519165]. [PubMed Central ID:PMC6743153]. https://doi.org/10.1186/s12889-019-7592-5.
6. Abdi J, Efthekhar H, Mahmodi M, Shojayzadeh D, Sadeghi R. [Physical Activity Status of Employees of Governmental Departments in Hamadan, Iran: An Application of the Transtheoretical Model]. *Health System Research.* 2016;**12**(1):50-7. Persian.
7. Besharati F, Hazavehei SMM, Moeini B, Moghimbeigi A. [Effect of Educational Interventions Based on Theory of Planned Behavior (TPB) in Selecting Delivery Mode among Pregnant Women Referred to Rasht Health Centers]. *J Adv Med Biomed Res.* 2011;**19**(77):94-106. Persian.
8. Abedini Z, Ahmari Tehran H, Gaini M, Khorami Rad A. [Dietary Food Intake of Pregnant Women Based on Food Guide Pyramid and Its Related Factors]. *Iran J Nurs.* 2011;**24**(73):36-46. Persian.
9. Fallah F, Pourabbas A, Delpisheh A, Veisani Y, Shadnoush M. Effects of nutrition education on levels of nutritional awareness of pregnant women in Western Iran. *Int J Endocrinol Metab.* 2013;**11**(3):175-8. [PubMed ID:24348589]. [PubMed Central ID:PMC3860105]. https://doi.org/10.5812/ijem.9122.
10. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process.* 1991;**50**(2):179-211. https://doi.org/10.1016/0749-5978(91)90020-t.
11. Vafaeenajar A, Masihabadi M, Moshki M, Ebrahimipour H, Tehrani H, Esmaily H, et al. [Determining the Theory of Planned Behavior's Predictive Power on Adolescents' Dependence on Computer Games]. *Iran J Health Educ Health Promot.* 2015;**2**(4):303-11. Persian.
12. Su D, Huang X. Research on Online Shopping Intention of Undergraduate Consumer in China--Based on the Theory of Planned Behavior. *Int Bus Res.* 2011;**4**(1):86-92. https://doi.org/10.5539/ibr.v4n1p86.
13. 13.Parrott MW, Tennant LK, Olejnik S, Poudevigne MS. Theory of Planned Behavior: Implications for an email-based physical activity intervention. *Psychol Sport Exerc.* 2008;**9**(4):511-26. https://doi.org/10.1016/j.psychsport.2007.07.002.
14. Nohtani V, Zareban I, Ansari H. [Educational Program Based on The Theory of Planned Behavior and Its Effect on Self-Care Behaviors in Patients with Pre-Hypertension]. *Iran J Health Educ Health Promot.* 2021;**9**(1):5-19. Persian. https://doi.org/10.52547/ijhehp.9.1.5.
15. Izadirad H, Niknami S, Zareban I, Hidarnia A, Ansari Moghadam A. Designing and Developing the Prenatal Care Scale based on Health Belief Model. *Health Educ Health Promot.* 2015;**3**(3):29-42.
16. Abu-Moghli FA, Khalaf IA, Barghoti FF. The influence of a health education programme on healthy lifestyles and practices among university students. *Int J Nurs Pract.* 2010;**16**(1):35-42. [PubMed ID:20158546]. https://doi.org/10.1111/j.1440-172X.2009.01801.x.
17. Hazavehei SMM, Asadi Z, Hassanzadeh A, Shekarchizadeh P. [Comparing the Effect of Two Methods of Presenting Physical Education 2 Course on the Attitudes and Practices of Female Students towards Regular Physical Activity in Isfahan University of Medical Sciences]. *Iran J Med Educa.* 2008;**8**(1):121-31. Persian.
18. Shafieinia M, Hidarnia A, Kazemnejad A, Rajabi R. Effects of a Theory Based Intervention on Physical Activity Among Female Employees: A Quasi-Experimental Study. *Asian J Sports Med.* 2016;**7**(2):e31534. [PubMed ID:27625759]. [PubMed Central ID:PMC5003306]. https://doi.org/10.5812/asjsm.31534.
19. Solhi M, Zinat Motlagh F, Karimzade Shirazi K, Taghdisi MH, Jalilian F. [Designing and Implementing Educational Programs to Promote Physical Activity Among Students: An Application of

the Theory of Planned Behavior]. *Intern Med Today.* 2012;**18**(1):45-52. Persian.
20. Ahmadi Tabatabaei, S V, Taghdisi MH, Nakheei N, Balali F. [Effect of Educational Intervention Based on the Theory of Planned Behaviour on the Physical Activities of Kerman Health Center's Staff (2008)]. *J Babol Univ Med Sci.* 2010;**12**(2):62-9. Persian.
21. Gholamnia Shirvani Z, Ghofranipour F, Gharakhanlou R, Kazemnejad A. [Path analysis of physical activity based on the Theory of Planned Behavior in women residing in Tehran's organizational townships]. *Int J Behav Sci.* 2015;**9**(2):159-67. Persian.
22. Mehrabia F, Farmanbar R, Mahdavi Roshan M, Farzan R, Omidi S, Aghebati R. [Effect of an Intervention Based on the Theory of Planned Behavior on Self-Care Behavior of Patients With Hypertension: A Clinical Trial]. *J Guilan Univ Med Sci.* 2021;**30**(1):64-75. Persian. https://doi.org/10.32598/jgums.30.1.1160.5.
23. Armitage CJ. Can the theory of planned behavior predict the maintenance of physical activity? *Health Psychol.* 2005;**24**(3):235-45. [PubMed ID:15898858]. https://doi.org/10.1037/0278-6133.24.3.235.
24. Martin JJ, Kulinna PH, McCaughtry N, Cothran D, Dake J, Fahoome G. The Theory of Planned Behavior: Predicting Physical Activity and Cardiorespiratory Fitness in African American Children. *J Sport Exerc Psychol.* 2005;**27**(4):456-69. https://doi.org/10.1123/jsep.27.4.456.
25. Tsorbatzoudis H. Evaluation of a school-based intervention programme to promote physical activity: an application of the theory of planned behavior. *Percept Mot Skills.* 2005;**101**(3):787-802. [PubMed ID:16491680]. https://doi.org/10.2466/pms.101.3.787-802.
26. Asa-Kohnefroody Z, Peyman N, Ghodsikhah F, Shakeri-Nejad G. [The Effect of Education Based on Planned Behavior Theory on Physical Activity of High School Girls]. *Iran J Health Educ Health Promot.* 2020;**8**(3):210-23. Persian. https://doi.org/10.29252/ijhehp.8.3.210.
27. Chatzisarantis NLD, Hagger MS. Effects of a Brief Intervention Based on the Theory of Planned Behavior on Leisure-Time Physical Activity Participation. *J Sport Exerc Psychol.* 2005;**27**(4):470-87. https://doi.org/10.1123/jsep.27.4.470.
28. Tavousi M, Heidarnia AR, Montazeri A, Taremian F, Akbari H, Haeri AA. [Distinction Between Two Control Constructs: An Application of the Theory of Planned Behavior for Substance Abuse Avoidance in Adolescents]. *Intern Med Today.* 2009;**15**(3):36-44. Persian.
29. Rezaei Pandari H, Keshavarz Mohammadi N, Ramezankhani A, Morowati Sharifabad MA, Rahaei Z. [Consumers Analysis Towards Fish Consumption, and its Related Factors, Barriers of Consumption and Promotion Strategies using Social Marketing frame work among women in Yazd city in 2013]. *Tolooebehdasht.* 2014;**13**(3):98-115. Persian.
30. Saif AA. *[Measurement, assessment and evaluation of training].* Tehran: Doran; 2005.
31. Saffari M, Shojaizadeh D, Ghofranipour F, Heydarnia A, Pakpour Haji Agha A. *[Theories, models and methods of health education and health promotion].* Tehran: Asar Sobhan; 2009.
32. White KM, Wellington L. Predicting participation in group parenting education in an Australian sample: the role of attitudes, norms, and control factors. *J Prim Prev.* 2009;**30**(2):173-89. [PubMed ID:19283485]. https://doi.org/10.1007/s10935-009-0167-y.
33. Babaei-Sis M, Ranjbaran S, Mahmoodi H, Babazadeh T, Moradi F, Mirzaeian K. [The Effect of Educational Intervention of Life Style Modification on Blood Pressure Control in Patients with Hypertension]. *J Educ Community Health.* 2016;**3**(1):12-9. Persian. https://doi.org/10.21859/jech-03012.
34. Aghamolaei T, Farshidi H, Safari-Moradabadi A, Dadipoor S. [Ef-