Health Education & Health Promotion (HEHP) (2013) Vol. 1 (1): (51- 66)

A Survey on the Effects of the Pender's Health Promotion Model on Prediction of the Employees' Physical Activity

Mohammad Vahedian Shahroodi[1], Farkhondeh Amin-Shokravi[2*], Alireza Haidarnia[3], Hadi Jabbari Nooghabi[4]

Received: 21/04/2013 Accepted: 19/05/2013

Abstract

Aims: Most of the world population who is at work and production age does not have appropriate and regular physical activity for various reasons. Accordingly, the researchers tried to evaluate the effect of physical activity predictors of employees through the path analysis based on the Pender's Health Promotion Model (HPM).

Methods and Materials: We conducted this study on 359 employees of the milk and milk powder production factories in Mashhad. A questionnaire consisted of items related to the structure of the Pender's Health Promotion Model (Perceived Benefits, Perceived Barriers, Prior Related Behavior, Perceived Self-Efficacy, Activity Related Affect, Personal Factors, Interpersonal Influences and Situational Influences) and the IPAQ standard questionnaire related to the physical activity were designed and applied in interviews as data collection instruments.

Findings: One fourth of the employees had proper physical activity. Generally, structures of the Pender's Health Promotion Model predicted 34.8 % of the physical activity behavior variance. Regression analysis has shown that the predictability of Prior Related Behavior, Perceived Self-Efficacy, Personal Factors, Activity Related Affect and Interpersonal Influences are significant and Situational Influences are nearly significant. Prior Related Behavior ($\beta = 0.45$, $P < 0.000$) and Self-Efficacy ($\beta = 0.17$, $P<0.001$) had the highest positive predictability in physical activity.

Conclusions: The findings of the study revealed that HPM is efficient in identifying and predicting the physical activity behavior. This pattern can be used as a framework for planning and implementing educational interventions in order to improve the physical activity of the adult employees.

Key words: Prediction; Physical activity; Pender's Health Promotion Model; Adult; Employee

1. PhD Candidate, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Email: VahedianM@mums.ac.ir

2. Assistant Professor, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Email: aminsh_f@modares.ac.ir

3. Associate Professor, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Email: hidarnia@modares.ac.ir

4. Assistant Professor, Faculty of Mathematics, Ferdowsi University of Mashhad, Mashhad Iran

Email: jabbari@yahoo.com

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

Introduction

The physical activity refers to "various kinds of defined movement in daily life including work, entertainment, sport and other practical activities"; and the regular physical activity includes the widespread and regular vigorous activities such as walking, running, jumping, and exercise which is an accessible change for non-active adults' life style [1].

The proper and regular physical activity improves the Glucose metabolism; decreases fatness, stress, depression and intestinal transference time; increases antioxidants level, mental health, muscles and bones strengthens; controls height, helps prevent or control the behavioral challenges.

According to WHO, the physical activity plans in the U.S workplaces result in reduction of absenteeism 6-32 % and medical care expenses 20-55%; it also increases the production 2-52%. The companies with physical activity plan for their employees can achieve 513 dollars annual benefit per employee through changes in production, the workers' absenteeism, capital benefit return and physical injuries [2].

In factories and administrations, the monotonous work affects negatively the employees' health and the rate of productivity. Promotion of physical activity in workplaces and improving the physical activities among the personnel and their families through the employers' support improves their health level and productivity [3].

When an individual repeats a similar activity in long term, his or her body members will wear out and the skeletal-muscular symptoms including pain, creeping and prickling senses, touching sensitivity, inflammation, movement scope restriction, losing the capabilities and sensational disorders appear. The works like montaging, data entering by keyboard, packing and carpet-weaving are repetitive and cause the above mentioned disorder [4]. Nicola and his colleagues studied jobs and physical activities in leisure times among the colored-skin workers and showed that more than 50 % of the workers didn't have proper physical activity [5]. In addition, they suggested the inverse relationship between the workload and physical activity in leisure times [6].

According to the global estimation, 58 percent of the adults have no or very little physical activity (not enough, less than 2.5 hours in a week) [7]. Analysis of the Healthy Heart Project (2002) suggested that about 34 percent of deaths in Iran resulted from the Coronary Artery Disease, the frequency of high Cholesterol was 17 percent among the 40-69 population and the lack of physical activity were reported 88 percent [8]. The major questions are as follows: how can we keep the people active? Why do some people have regular physical activity and some others do not under the same conditions? [9]

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

In order that the health experts achieve the goal of improving the physical activity, it is of great importance to identify the relevant and effective individual and environmental factors on physical activity of different groups for determining the effective and applicable strategies [10].

Pender's Health Promotion Model (HPM) is one of the applicable theories for health-related behaviors where the threat is not the main source of motivation. The model can be used to promote the physical activity among the working and healthy adults. The theoretical principles of the model have suggested that the individuals are committed to do activities, which can be promoted by the Perceived Benefits. The Perceived Barriers can hinder the commitment to do a special behavior and the Perceived Self-Efficacy increases it. Family, officials and health services providers are among the important and effective interpersonal sources who increase or decrease the of the activity commitment [11]. The structures of Pender's Health Promotion Model have been examined and identified as the crucial determiners of the physical activity by experts [12]. The effective factors on the physical activity among the Iranian working adults have not been identified completely, with regard to its complicated characteristics; and there is not any exclusive and widespread research to identify these factors.

Materials and Methods

The present research is part of a two-year intervening study started in 2012. The samples were workers and employees of the factories and administrative units. With regard to the results of the five studies conducted on the university students and staffs in Iran (2009), the non- activity rate was reported to be 65-80 percent [13-17].

Considering 5% diminished samples, 359 workers and employees of the milk and milk powder factories in Mashhad answered the physical activity-related questionnaire. The criteria of participating in the research were: having at least one year work experience in the factory, being healthy enough to do physical activities, not being paralyzed and taking the consent form to participate in the research.

Instruments

Three kinds of questionnaires were designed and distributed for data collection as follows:

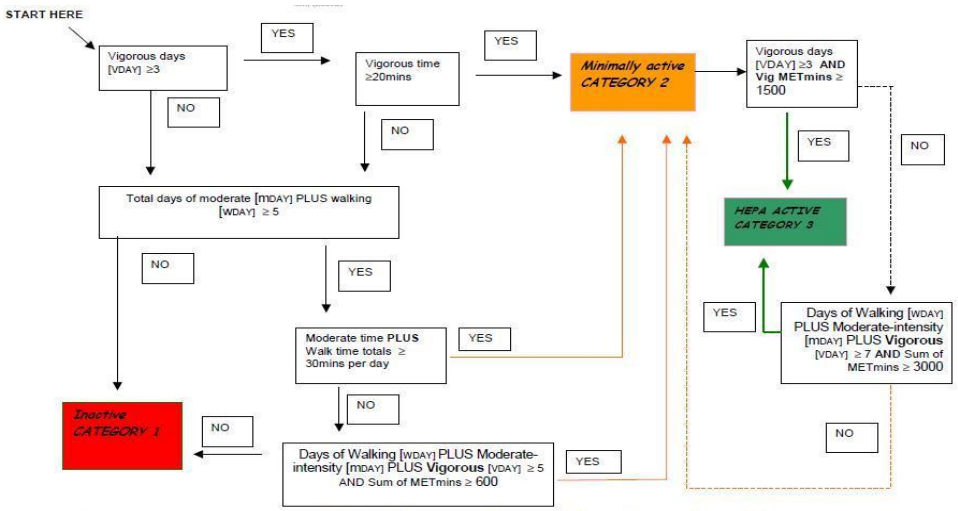
1- The International Physical Activity Questionnaire (IPAQ) - its Persian version approved in previous researches was used to evaluate the physical activity. It is a reporting questionnaire, which has been tested on adults of the 18-65 in 20 countries and approved [18-21]. This questionnaire asks about the vigorous and moderate physical activities and walking practice during the last three weeks. We can extract and report the rate of physical activity

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

based on the scoring protocol. In this questionnaire, physical activity over 10 minutes was recorded. The rate of physical activity in a week is estimated based on MET-minutes/week (MET is a scale that is used to estimate the consumed energy during any physical activity. One MET equals the amount of the energy consumption of a relaxing person). In addition, all physical activities were classified as the multiple of energy consumption rate in the relaxing status. In this standard questionnaire, walking equals 3.3 METs, the moderate physical activity equals 4 METs and the vigorous physical activity equals 8 METs. To calculate the total physical activity in a week, the amount of walking (MET 3. 3 × min × day) should be summed up with the amount of moderate physical activity (4 MET × min × day) and vigorous physical activity (8 MET × min × day). The classification categorized the samples in three groups of inactive, minimally active and active based on the following definition:

The active person is one who has vigorous physical activity three days a week and at least 1500 MET/min or goes walking at vigorous and moderate levels, or one who has 3000 Met-minutes/week in five days a week or more.

The minimally active person is one who has vigorous physical activity, three days a week for at least 20 minutes each session; or goes vigorous and moderate walking five days a week or more, at least 30 minutes each session. The inactive person does not have any physical activity or the related physical activity report does not have the criteria of vigorous or moderate physical activity [22]. (Figure)



http://www.ipaq.ki.se/scoring.htm

Flow chart algorithm for the analysis of IPAQ short form

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

2. Designed Questionnaire- its questions measure the structures of the Pender's Health Promotion Model, and consists of:

2.1. The Perceived Benefits of the physical activity, which means perceiving the benefits of the physical activity in three physical, mental and social dimensions. In this research, the Perceived Benefits of the physical activity were investigated using a questionnaire consisted of 27 questions with the Likret's four scales scoring system. The least Cronbach alpha was 0.93 [16, 21].

2.2. The Perceived Barriers of the physical activity means perceiving what hinders the physical activity e.g. unavailability of sports facilities, lack of time, expenses, responsibility toward family and taking care of others. In this study, the Perceived Barriers of the physical activities were investigated through a 14- item questionnaire with the Likret's four scales scoring system. The least Cronbach alpha was 0.81 [16, 21].

2.3. The Prior Related Behavior means the evaluation of qualitative and quantitative scales of the physical activity in the past. The experimental studies determined that the best predictor of the behavior is the frequency of the same behavior or the similar ones. It was also determined that the Prior Behavior Affects the probability of adopting the health promoter behaviors, which likely result from the habit, inclined the individual to perform an activity and its details. The power of habit increases in case of doing the activity. According to Pender, this structure supports the following behavior by 75% [11]. In this study, the person reports his or her physical activities in the last years with regard to time, place and the kind of activity by answering six questions.

2.4. The Perceived Self-Efficacy means the perceived ability to do physical activities. In the present study, the Perceived Self-Efficacy is investigated in order to evaluate the ability of physical activity, using an 18-item questionnaire with the scale of 0 to 100 percent. The highest score determines that the respondent has efficiency in physical activities. Cronbach alpha was 0.94 [23].

2.5. The Interpersonal Influences means the individual's comment about the emotional and practical support from family members and intimate friends. In this study, the Interpersonal Influences in physical activity is a 20-item scale consisted of two subscales. Five items of the questionnaire related to friends' support and 15 to emotional and practical support from family. The answers were scored based on the Likret's 5-scale scoring system. The least Cronbach alpha for the subscale of family support was 0.92 and for the subscale of friend's support was 0.90 [16].

2.6. The Situational Structure influencing on the health promotion behaviors includes perceiving the current options, characteristics of request

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

and environmental beauty suggests a special behavior. In Kaplan's studies on the energetic environments, being aware of the environment effects or situational aspects increases the health or the relevant behaviors on health. Certainly, the individuals tend to work in a more compatible environment. They show their ability in the familiar (compared to the strange environments) and safe (compared to the threatening) environments. Among the reported studies by Pender, 56% of them have suggested the Situational Influences as significant predictor of health promoter behavior. For instance, one physical activity stimulator in environment causes more requests for physical activities. The company regulations concerning the sports equipment cause more requests for physical activities, which in turn promotes the commitment for healthy behaviours [11]. In this research, the variables of Situational Influences were evaluated using fifteen questions (yes/no).

2.7. The Activity Related Affect means the subjects' feelings before, during and after the action, based on the stimulating proportions related to the behavioral event. Activity Related Affect has been investigated as the determiners of the health behavior in the recent studies. There is probability of positive feeling-related behaviors repetition, while the negative feeling-related behaviors will be avoided. The Activity Related Affect is a significant predictor of the health promotion behavior in 56% of Pender' studies [11]. In this paper, the variables of Activity Related Affect were evaluated using six questions.

2.8. The behavior related personal factors structure is another item of Health Promotion Model, which is a predictor of Personal Factors' effects on special behaviors formed by the nature of the target behavior, according to the Pender. The Personal Factors have three aspects: biological, psychological and socio-cultural ones. Biological factors consist of age, body mass index, power, agility or balance; psychological factors consist of self-confidence, self-motivation and perceived health; and socio-cultural factors consist of races, ethnicity, acculturation, education and the socio-economic status. Of course, Personal Factors are not restricted to just these factors. Given the large numbers of Personal Factors, this item should be limited to the variables, which are theoretically proper for description and prediction of the behavior. Although, Personal Factors may be effective on cognition, feeling and the healthy behavior, some Personal Factors are not changeable. Pender stated that Personal Factors supports 59% of the determination of the next behaviour [11]. The Personal Factors variables were combined with the demographic items of the questionnaire.

3-The Demographic Questionnaire- includes the personal information, demography, medical history, result of body check and

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

height, weight, health status evaluation and rate of physical activity. Also, each person filled out a form to record the type of physical activity performed all days a week and its duration in order to estimate the time spent for each physical activity (Sallie's Questionnaire). The questionnaire reliability was evaluated and confirmed; the Intra-class correlation coefficient and its range was 0.34 - 0.99. It is useful to investigate the frequency of the physical activity [24]. The questionnaire validity was measured and approved by experts' panel and 13 professors. With regard to the necessity of using the interview technique, the authenticity was assessed through two interviewers and the results suggest that the authenticity was acceptable and approved.

Its reliability was estimated using test-retest; at first, a 30-person group of workers from the same factory was selected for assessing the questions comprehensiveness and congruency; then they were modified based on the received suggestions. To determine the internal stability, 35 individuals were participated and alpha limitation was achieved between 0.75-0.93. The alpha limitation was also estimated between 0.70-0.96 based on the total sample evaluation. The correlation coefficient for IPAQ was 0.772.

Data were analyzed using SPSS and the Pearson correlation coefficient and regression. Descriptive Statistics was used to calculate the distribution index. Participants were informed about the process and privacy codes; and their consents taken.

One of the limitations of this research was the diversity of the previous experiences of individuals, which affects the learning rate, and the way of responding; thus it was emphasized that each individual should fill out the questionnaire separately. During the time of filling out the questionnaire, the researcher and his assistants were present.

Findings

Three hundred and fifty-nine subjects participated in the process as samples and filled out the questionnaire. The age of the samples was between 22-60 and the Mean and Standard deviation was 34.5±7.1. 85.2% of samples were married. They worked 50 hours in a week (± 12.7). 38.7% of them were university students. The body mass of half of subjects (51.7%) was 25 or more. Based on the findings of this study, one fourth of the working adults were classified as the active persons (Table 1).

Table 1: Frequency distribution of the physical activity among the research population

Classification of Physical Activity	n	%
inactive	266	74.3
minimally active	61	17
active	31	8.7
total	358	100

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

The status of ranges, mean and standard deviation of the structures of HPM including Prior Related Behavior, Personal Factors, Perceived Benefits, Perceived Barriers, Perceived Self-Efficacy, the Activity Related Affect, Interpersonal Influences and Situational Influences of the physical behaviors are shown in (Table2). In the present study, the mean scores of the Prior Related Behavior, Interpersonal Influences, the Situational Influences and Physical Activity were less than half of the accessible range. Also the mean scores of the Personal Factors, Perceived Benefits, Perceived Barriers, Perceived Self-Efficacy, and the Activity Related Affect were higher than half of the accessible range which suggests the desirable status of these structures among the samples compared to those of Morowati's study [25] and similar to the findings of Stuifbergen [26].

Table 2: Descriptive statistics (Mean ± Standard deviation and Range) for the HPM and physical activity

Description Scale	Mean	Standard deviation	Range Observed
Prior Related Behavior	9.86	5.39	2-31
Personal Factors	31.11	4.81	14-43
Perceived Benefits	117.72	12.04	59-183
Perceived Barriers	44.99	7.67	24-70
Perceived Self-Efficacy	857.99	340.05	80-1750
Activity Related Affect	9.23	1.89	1-12
Interpersonal Influences	32.08	12.74	7-70
Situational Influences	7.73	3.91	0-16
Physical Activity (MET-minutes/week)	687.18	457.39	232-3250

To study the correlation coefficient between the structures of HPM and physical behavior, Pearson correlation test was used (Table 3). As shown in the table, the Prior Related Behavior and Perceived Self-Efficacy were the only structures, which suggest a significant correlation between the other structures of HPM and physical activity.

Prior Related Behavior, Perceived Benefits, Perceived Barriers, Perceived Self-Efficacy, and Interpersonal Influences show a significant correlation with physical activity behavior.

To investigate the prediction rate of the physical activity behaviors by the HPM structures, the linear-regression analysis was used. Generally, the structures predicted 34.8% of physical activity variance in which the regression analysis suggested significant correlation of the prediction ability of the Prior Related Behavior, Perceived Self-Efficacy, Personal Factors, the Activity Related Affect and the Interpersonal Influences, which suggested the nearly significant correlation between the conditional effectors (Table4).

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

The results of the table suggest that the Prior Related Behavior, Perceived Self-Efficacy, and Interpersonal Influences have the highest positive effect and the personal activity had the highest negative effect. For instance, 0.171 unit change occurs at the level of physical activity per unit change in the Self-Efficacy score. In other words, the structures have this kind of physical activity prediction ability.

Table 3: correlation coefficients Matrix for structures of the HPM and physical activity behaviour

	I	II	III	IV	V	VI	VII	VIII	IX
I-MET-minutes/week	1								
II-Prior Related Behavior	.527**	1							
III-Personal Factors	-.024	.105*	1						
IV-Perceived Benefits	.120*	.186**	.032	1					
V-Perceived Barriers	.143**	.139**	.335**	.244**	1				
VI-Perceived Self-Efficacy	.314**	.310**	.280**	.204**	.257**	1			
VII-Activity Related Affect	.161**	.123*	.148**	.292**	.186**	.208**	1		
VIII-Interpersonal Influences	.272**	.277**	.156**	.090*	.180**	.289**	.056	1	
IX-situational influences	.035	.103*	.029	.062	.060	.182**	.091*	.253**	1

*At meaningful level of 0.05, ** At meaningful level of 0.001

Table 4: Regression analysis of the physical activity behavior's factors based on the HPM

Independent Variables	standardized Coefficients Beta	Sig	R Square	Dependent Variable
Prior Related Behavior	.451	.000	.348	physical activity Behavior
Personal Factors	-.173	.001		
perceived benefits	-.045	.352		
Perceived Barriers	-.069	.163		
Perceived Self-Efficacy	.171	.001		
Activity Related Affect	.096	.043		
Interpersonal Influences	.132	.007		
situational influences	-.081	.082		

Discussion

The participants of the study work 50 hours a week and were in good status concerning physical activity-related health. However, 74.3% of them stated that they did not have proper physical activity. Unfortunately, this rate is compatible with the published researches. In a literature review, it was suggested that more than 70% of Iranians do not have physical activity and the findings of a National Review among the Iranian adults suggested that more than 80% of them are not active physically [27]. The physical activity of non-working young people is not good. Mohammadi et al. reported that the number of non-active students was 64% [16], Aghamolaei

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

reported that the lack of physical activity among the students was 37.5% [13], Moeini 67.8% [15] and Farmanbar 81.8% [28].

While in the studies of most countries as America, and Lebanon, the numbers of physically active persons are high, the National Centre for Chronic Diseases Prevention in America reported that more than half of adults in that country do not have physical activity [29].

AL-Tanir reported that the rate of physical activity of adults was 55.5% in Lebanon [30] which is compatible with the results of Patterson [31] in Ireland; Medant in Jordon; and other similar studies [32]. This study showed that the rate of physical activity is not proper in Iran. The effects of physical activity includes coping with stress and reducing the mental stress and job worn-out which in turn results in increase of output in the workplace and the work quality [33]. Yang (2010) stated that the company might enhance the physical capability and fitness among the employees through promotion of physical activity and help them get along with the workplace requirements [6]. Physical activities are complicated, their changes are unlikely, and even if one can change them, maintaining the new behavior is hard. That is why, it is essential to use the behavior change theory [34] to identify the facilitator and inhibitor factors well and to be applied in consultations and intervening programs [35]. The theories identify the main factors, which influence on the behaviors; determine the relationships among the factors; and represents conditions, manner and time of occurrence. The theories and patterns are useful in identification of the components which should be considered as the main focus of interventions [36]. One of the most comprehensive predictor patterns which is used in health promotion behaviors and propose the theoretical framework for discovering the effective factors in health promotion behavior is the Pender's Health Promoter Model (HPM) [11].

The Perceived Self-Efficacy structure is the only factor that shows significant correlation with the physical activity behavior and other HPM structures (Table 3). The Prior Related Behavior, Perceived Benefits, Perceived Barriers, Perceived Self-Efficacy, Prior Related behavior, Interpersonal Influences, and Commitment show significant correlation with the physical activity behavior. One of goals of this study is to determine the factors, which has direct effect on physical activity. Therefore, all structures were analyzed using logistic regression. In the present study, structures of the patterns predict 34.6% of the physical activity behavior variance (Table 4). Therefore, one may claim that the pattern has proper congruence with this research's finding and it is applicable as a reference framework

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

for designing educational intervention of physical activity. Mohammadi Zeidi et al. announced the rate as 34 % for students [16]. Also, Norouzi et al. concluded that the rate represents 33 % change in physical activity behavior among the diabetic patients [37]. As shown in Table 4, the structure of the Prior Relevant Behavior is the top structure, concerning prediction of the physical activity behavior (ß = 0.45, P = 0.000).

On the other hand, this structure is the first predictor of the factor applied in intervening to increase and retain the physical activity behavior. So, the emphasis on the positive function of individuals related to the physical activity in the past and the previous success in changing the behavior effect the non-active behaviours [37]. The Prior Relative Behavior forms cognition and the special feelings for the future behaviors. The trainer may help the person form a positive behavior history for future; this may happen through "concentration on the behavior"; i.e. train the person to overcome the obstacles of a behavior and to achieve the favorable efficiency and positive feeling through experiencing the feeling of successful behavior and the positive feedback. The Perceived Self-Efficacy (self confident to do physical activity and persist on doing it) is the second top structure having the highest relationship with the physical activity behavior (ß = 0.17, P=0.001). In other words, the Perceived Self-Efficacy is the second predictor factor with direct effect and applicable in intervening to increase and retain the physical activity behavior. This finding is confirmed by Cardinal and Levy [38]. In a research on the students, the results of multivariable regression analysis suggested that the Perceived Self-Efficacy is the most effective structure on physical activity [39].

Of course, the results of other studies showed that the Perceived Self-Efficacy is one of the most powerful predictors of physical activity behaviors. Admitting the effect of Perceived Self-Efficacy [40, 41]. Pender stated that Self-Efficacy motivates the health promotion behavior directly based on the expectations. Also, it influences the motivation indirectly through the Perceived obstacles and determining the rate of commitment and follow up [11]. The Interpersonal Influences factor (ß = 0.13, P=0.008) is the third top structure and the most powerful in prediction of the physical activity behavior. On the other hand, the family and friend support are the direct and positive predictors for physical activity behavior. While Norouzi et al. have shown that the family and friend support had the minor effect on prediction of physical activity behavior on teenagers [37], Thrasher et al. (2004) suggested that the emotional support is an important factor in promotion of physical activity among women [42]. In another study,

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

it was suggested that the women and girls receive most supports from their family concerning the physical activity [43]. The Personal Factor has the negative effect and is the fourth top structure in prediction of physical activity behavior (ß = -0.17, $p<0.001$). Although, the Personal Factors may affect cognition, feeling and the health behavior; most of them are not changeable. reviewing the previous studies, Pender stated that the structure supports determination of following behavior as 59% [11].

Conclusions

Based on the findings of this research, about one fourth of the employees have proper physical activity. This may be due to accepting the modern life style, which cause the people be inactive and endangers their health status. People have to sit before computers for a long time, use their cars instead of walking and lifts instead of stairs. Moreover, technology decreases of works needed physical activity [14]. The important point is that people have difficulty with recognizing problems concerning their active life style and attempting to start and retain the physical activity [44]. Health experts must recognize the explanatory factors of people participation in physical activity programs, because knowing these factors help them know the people at risk and proper techniques for providing educational programs, in order to influence the intervening programs.

Behavior changing pattern has not been considered seriously in planning educational programs for physical activity. Without recognizing the effective factors in behavior change, the programs would be just cliché training and lack desirable effects.

In this study, we have recognized the factors with direct and indirect effects on physical activity using the health promoter model as the most comprehensive pattern of behavior change. Based on the pattern, the concepts of cognition and specific behavior emotions possess the main motivation connotation, thus they form the main key of interventions; because they are modified and changed through interventions. With regard to the similar studies, the efficiency of the model in description of variance related to the physical activity is acceptable. Providing adults with facilities and education may be helpful in prevention and controlling the side effects of physical activity, reduction of the related expenses and promotion of their life quality and health.

Acknowledgments

Thanks to all participants, particularly Pegah Khorasan and Milk Powder industries. This article is derived from the PhD thesis, on health education and promotion, Approved by

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

Tarbiat Modares University's Research Council (2009/09/02) and Ethics Committee (2009/09/08). The authors would like to thank for Dr. Hashem Koozechian, Dr. Shamsaddin Niknami, Dr. Fazlollah Ghofranipour, Dr. Sedigheh Sadat Tavafian, Dr. Fazlollah Ahmadi, and Dr. Fatemeh Rakhshani. Without their sincere cooperation, the project would not end successfully. We also appreciate the Mashhad University of Medical Sciences for her support

References

[1] Gal D, Santos AC, Barros H. Leisure-time versus full-day energy expenditure: a cross-sectional study of sedentarism in a Portuguese urban population. BMC Public Health 2005; 5(1): 16.

[2] WHO. Health and development through physical activity and sport. Geneva, Switzerland: World Health Organization. http://apps.who.int/iris/handle/10665/67796; 2003.

[3] Pronk NP, Kottke TE. Physical activity promotion as a strategic corporate priority to improve worker health and business performance. Prev Med 2009; 49(4): 316-21.

[4] Choobine A. [Methods of posture assessment in occupational ergonomics]. 1st, editor. Hamadan: Fanavaran; 2003 (Persian).

[5] Burton NW, Turrell G. Occupation, Hours Worked, and Leisure-Time Physical Activity. Prev Med 2000; 31(6): 673-81.

[6] Yang X, Telama R, Hirvensalo M, Hintsanen M, Hintsa T, Pulkki-Raback L, et al. The benefits of sustained leisure-time physical activity on job strain. Occupational medicine (Oxford, England). 2010; 60(5): 369-75.

[7] WHO. Reducing risks to health, promoting healthy life. JAMA 2002; 288(16): 1974. http://jama.jamanetwork.com/article.aspx?articleid=195444.

[8] Farmanbar R, Niknami S, Hidarnia A, Hajizadeh E. [Prediction of Exercise Behavior among College Students Based on Transtheoretical Model and Self-determination Theory Using Path Analysis]. payesh 2010; 10: 27-39. (Persian).

[9] Daley AJ, Duda JL. Self-determination, stage of readiness to change for exercise, and frequency of physical activity in young people. EJSS 2006; 6(4): 231-43.

[10] Robbins LB, Gretebeck KA, Kazanis AS, Pender NJ. Girls on the move program to increase physical activity participation. Nurs Res 2006; 55(3): 206-16.

[11] Pender N, Murdaugh C, Parsons M. Health Promotion in nursing practice. Fourth edition 2002; p: 58-100.

[12] Sallis J, Prochaska J, Taylor W. A review of correlates of physical activity of

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

children and adolescents. Medicine and science in sports and exercise. 2000; 32(5): 963-75.

[13] Aghamolaei T, Tavafian S, Hassani L. Exercise Self-efficacy, Exercise Perceived Benefits and Barriers among Students in Hormozgan University of Medical Sciences IJE. 2009; 4(3-4): 9-15.

[14] Mazloomy Mahmoudabad S, Mohammadi M, Morovati Sharifabad M. [Exercise and Its Relation to Self Efficacy Based on Stages of Change Model in Employees of Yazd in 2008]. Journal of Kerman University. 2010; 17: 346-54. (Persian).

[15] Moeini B, Jalilian F, Jalilian M, Barati M. [Predicting Factors Associated with Regular Physical Activity among College Students Applying BASNEF Model]. Sci J Hamadan Univ Med Sci 2011; 18(3): 70-6. (Persian).

[16] Mohammadi Zeidi I, Ziaeiha M, Khalaj M, Mohammadi Zeidi B, Morshedi H. [Predicting the stages of change in physical activity behavior of QUMS students with Pender's model]. JQUMS 2010; 14(3): 58-66. (Persian).

[17] Rejali M, Mostajeran M. [Assessment of physical activity in Medical and Public Health Students of Isfahan University of Medical Sciences]. HSR 2008; 6(2): 35-40 and 173-8. (Persian).

[18] Bauman A, Bull F, Chey T, Craig C, Ainsworth B, Sallis J, et al. The International Prevalence Study on Physical Activity: results from 20 countries. IJBNPA 2009; 6(1): 21.

[19] Oyeyemi AL, Oyeyemi AY, Adegoke BO, Oyetoke FO, Aliyu HN, Aliyu SU, et al. The Short International Physical Activity Questionnaire: cross-cultural adaptation, validation and reliability of the Hausa language version in Nigeria. BMC Med Res Methodol 2011; 11: 156.

[20] Taymoori P, Lubans DR. Mediators of behavior change in two tailored physical activity interventions for adolescent girls. Psychol Sport Exerc 2008; 9(5): 605-19.

[21] Sechrist KR, Walker SN, Pender NJ. Development and psychometric evaluation of the exercise benefits/barriers scale. Res Nurs Health 1987; 10(6): 357-65.

[22] Seyed-Emami R, Eftekhar-Ardebili H. [Effect of a Health Education Intervention on Physical Activity Knowledge, Attitude and Behavior in Health Volunteers]. HAYAT 2010; 16(3-4): 48-55. (Persian).

[23] Norouzi A, Ghofranipour F, Heydarnia A, Tahmasebi R. [Determinants of physical activity based on Health Promotion Model (HPM) in diabetic women of Karaj diabetic institute]. ISMJ 2010; 13(1): 41-51. (Persian).

[24] Sallis JF, Haskell WL, Wood PD,

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

Fortmann SP, Rogers T, Blair SN, et al. Physical activity assessment methodology in the Five-City Project. Am J Epidemiol 1985; 121(1): 91-106.

[25] Morowatisharifabad MA, Ghofranipour F. [Modification of Health Promotion Model and It's Application Together With Adult Education Theory in Changing Heath Promoting Behaviors of Older Adults in Yazd]. School of Medical Sciences: Tarbiat Modares University; 2005.

[26] Stuifbergen AK, Seraphine A, Roberts G. An explanatory model of health promotion and quality of life in chronic disabling conditions. Nurs Res 2000; 49(3): 122-9.

[27] Pirasteh A, Hidarnia A, Asghari A, Faghihzadeh S, Ghofranipour F. Stages of Changes for Physical Activity among Iranian Adolescent Girls. World Academy of Science, Engineering and Technology 2011; 53: 1146-8.

[28] Farmanbar R, Niknami S, Hidarnia A, Hajizadeh E. [Prediction of Exercise Behavior among College Students Based on Transtheoretical Model and Self-determination Theory Using Path Analysis]. GUMS 2009; 18(71): 35-46. (Persian).

[29] Pitsavos C, Panagiotakos D, Lentzas Y, Stefanadis C. Epidemiology of leisure-time physical activity in socio-demographic, lifestyle and psychological characteristics of men and women in Greece: the ATTICA Study. BMC Public Health 2005; 5(1): 37.

[30] Al-Tannir M, Kobrosly S, Itani T, El-Rajab M, Tannir S. Prevalence of physical activity among Lebanese adults: a cross-sectional study. Journal of Physical Activity & Health 2009; 6(3): 315-20.

[31] Patterson E, McGeough D, Cannon E, Hagströmer M, Bergman P, Kearney J, et al. Self-efficacy, stages of change and physical activity in Irish college students. J Public Health 2006; 14(2): 81-6.

[32] Madanat H, Merrill RM. Motivational factors and stages of change for physical activity among college students in Amman, Jordan. Promotion & Education. 2006; 13(3): 185-90.

[33] Keshavarz Z, Simbar M, Ramezankhani A. [Effective Factors on exercise behavior of Female Workers: A Qualitative Approach based On Integrated Model of Planned Behavior and Self-efficacy]. J Mashhad School Nurs Midw 2010; 10(2): 19-30. (Persian).

[34] Yamaguchi Y, Miura S, Urata H, Himeshima Y, Yamatsu K, Otsuka N, et al. The Effectiveness of a Multicomponent Program for Nutrition and Physical Activity Change in Clinical Setting: Short-term Effects of PACE+ Japan. JSHS 2003; 1(2): 229-37.

[Downloaded from hehp.daneshafarand.org on 2026-11-13]

[35] Pullen C, Walker SN, Fiandt K. Determinants of Health-Promoting Lifestyle Behaviors in Rural Older Women. Famil & Community Health 2001; 24(2): 49-72.

[36] Nutbeam D, Harris E. Theory in a Nutshell: A practical guide to health promotion theories. Mc Graw- Hill Australia Pty Ltd. 2004; Second edition.

[37] Norouzi A, Ghofranipour F, Haidarnia A, Tahmasbi R. [Promoting physical activity in diabetic women with using stage of change construct in health promotion model] [persian]. Faculty of Medical Sciences: Tarbiat Modares University, Tehran, 2010.

[38] Levy SS, Cardinal BJ. Factors Associated With Transitional Shifts in College Students' Physical Activity Behavior. Research Quarterly for Exercise and Sport 2006; 77(4): 476-85.

[39] Alinia A, Vahdian-Shahrodi M. [study of the Effects of educational interventions based on trans-theoretical model on physical activity in student's Tonekabon] [persian]. School of Health: Mashhad University of Medical Sciences; 2012.

[40] Buckworth J, Granello DH, Belmore J. Incorporating Personality Assessment Into Counseling to Help College Students Adopt and Maintain Exercise Behaviors. JCC 2002; 5(1): 15-25.

[41] Sullum J, Clark MM, King TK. Predictors of exercise relapse in a college population. Journal of American college health: J of ACH 2000; 48(4): 175-80.

[42] Thrasher JF, Campbell MK, Oates V. Behavior-specific social support for healthy behaviors among african american church members: applying optimal matching theory. Health Educ Behav 2004; 31(2): 193-205.

[43] Wu T-Y, Jwo JL. A prospective study on changes of cognitions, interpersonal influences, and physical activity in Taiwanese youth. Research quarterly for exercise and sport. 2005; 76(1): 1-10.

[44] Biddle SJH, Mutrie N. Psychology of Physical Activity: Determinants, Well-Being and Interventions. Loughborough University, UK: Taylor & Francis Group; 2008.

[Downloaded from hehp.daneshafarand.org on 2026-11-13]