Physical activity among employee women based on transtheoretical model

Firoozeh Mostafavi, Asiyeh Pirzadeh
Department of Health Education and Promotion, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran

ABSTRACT

Introduction: Today, many jobs are associated with the inactivity or sedentary lifestyle. Employees’ health will be affected by their depriving of the benefits of physical activity (PA). Therefore, the present study was undertaken to determine the PA among employee women in Isfahan University of Medical Sciences based on the transtheoretical model.

Materials and Methods: This is a cross-sectional study has been performed in Isfahan University of Medical Sciences employee women (2013). A convenience sample of 100 women was selected. Data were collected by validated and reliable questionnaire in three parts (demographics information, PA scale, and TTM constructs). Data were analyzed by SPSS SPSS (version 16.0; SPSS, IBM, Inc, Chicago, IL, USA) and descriptive and analytical statistics such as ANOVA and independent t-test were used. A two-tailed P < 0.05 was considered statistically significant.

Results: The mean of PA was 21.17 ± 27.30 min in a day. Weekly heavy, moderate, and light exercise mean was 0.72 ± 1.81, 0.89 ± 1.87 and 0.57 ± 1.57 days, respectively. In this study, 26% of women were in contemplation, 22% in contemplation, 20% in preparation, 13% in action, and 19% in the maintenance stage. Furthermore, there were significant differences between consciousness raising, dramatic relief, counter-conditioning, stimulus control, helping relationships, reinforcement management, and self-liberation with stages of change constructs. Conclusion: Because of a significant relationship between cognitive and behavioral processes and PA in this group, designing and implementing an educational program based on the transtheoretical model may be useful in promoting PA of a female employee.

Key words: Behavior and behavior mechanisms, employment, exercise, model

INTRODUCTION

Exercise is recognized as an important health-related behavior conducive to good mental and physical health and well-being.[1-3] Regular physical activity (PA) has many health benefits, including reduced risk of cardiovascular disease,[4] ischemic stroke,[5] noninsulin-dependent diabetes (type 2),[6-9] colon cancers,[10,11] osteoporosis,[12,13] and depression.[14]

Despite these benefits, a large proportion of the population in many countries fails to participate in sufficient PA to achieve these outcomes.[15-17] PA among US adults is lower than of recommended level for health promotion[18-20] and this issue determines as a target of public health intervention.[21]

Review of studies have shown that PA is low in Iran (68.7–70.8%).[22]
Today, many jobs have been created with advances in technology; unfortunately, these jobs are associated with the inactivity or sedentary lifestyle. Employees’ health will be affected by their depriving of the benefits of PA.\textsuperscript{[23]}

In Finland, more than one-third of the working population engages in PA less than recommended for health.\textsuperscript{[24]} One study in female Japanese have shown that a high percentage of employees did not have enough PA.\textsuperscript{[25]}

In Iran, a study conducted by Robabi et al. in bank employees (Iranshahr) have shown that a high percentage of employees did not have enough PA.\textsuperscript{[26]} Also in Jalilian et al. study, on employees women in Hamadan University of Medical Sciences, indicated that 65% of women employees did not have sufficient PA.\textsuperscript{[27]}

Based on our knowledge, there are no any available data regarding the PA levels and its relevant affecting factors in Isfahan University of Medical Sciences employees.

Nowadays, health educators use health education models to explore health promotion behaviors and behavior change. The transtheoretical model is one of the exploratory models. The transtheoretical model (also called the stages of change model), developed by Prochaska and DiClemente in the late 1970s.\textsuperscript{[28]} The TTM model has four constructs; stages of change, self-efficacy, decisional balance, and processes of change.

The TTM consists of five stages of exercise behavior change: (1) Precontemplation, (2) contemplation, (3) preparation, (4) action, and (5) maintenance.\textsuperscript{[29]}

Processes of change are divided into two categories of cognitive and behavioral processes. Cognitive processes are consciousness raising, dramatic relief, self-reevaluation, environmental reevaluation, and self-liberation and behavioral processes are social liberation, counter-conditioning, stimulus control, reinforcement management, and helping relationships.\textsuperscript{[30]}

Another construct of the model is decisional balance that focuses on the importance of perceived positive (pros) and negative (cons) outcomes of a behavior change.\textsuperscript{[31]}

Self-efficacy is one’s perceived confidence in the ability to carry out a specific behavior successfully;\textsuperscript{[32]} and thus have different levels of confidence in their ability to maintain exercise benefits and to overcome exercise barriers.\textsuperscript{[33]}

The mentioned model has been applied.

In Nishida et al. study in Japanese female employees and showed that 90% of subjects were in inactive stages (precontemplation to preparation).\textsuperscript{[34]}

In Iran also, Jalilian et al. study showed 45.7% of employees women placed in precontemplation, contemplation and preparation stage and a significant relationship was found between the benefits, barriers, self-efficacy and stages of change.

Mazloomy Mahmoudabad et al. study also stated that more than 70% of the people in Yazd were investigated in preaction stages.\textsuperscript{[35]}

The aim of this study was to determine the PA among employee women in Isfahan University of Medical Sciences based on the transtheoretical model.

**MATERIALS AND METHODS**

This cross-sectional study was conducted in 100 female employees of Isfahan University of Medical Sciences in 2013.

The participants were a convenience sample of employees. All participants were informed about the details of the study and were asked to read and sign a consent form.

The following are criteria for inclusion of women to the study: Ruled employment as employees for more than 6 months, the desire to participate in the study, and not being pregnant.

Data collected by self-administered questionnaire. The demographic information (age, weight, height, number of child, level of education) were obtained. For measuring exercising behaviors, weekly PA was used.\textsuperscript{[36]}

In order to measure exercise behavior, the stage of exercise behavior change questionnaire developed by Marcus and Forsyth used in this study.\textsuperscript{[37]} Stage of exercise behavior change was assessed using 5-item.

Another structure in this model is processes of change. This structure was measured by the process of change questionnaire developed by Nigg et al.\textsuperscript{[38]} This questionnaire contains 30 items that measure the 10 process of change (cognitive and behavioral process). In this questionnaire, participants were asked to determine the frequency of occurrence of each item on a five-point Likert scale ( ranging from 1, “never” to 5, “repeatedly”).

The decision balance scale for exercise, developed by Plotnikoff et al.\textsuperscript{[39]} with 10 items based on Lickert scale was used to assess pros and cons participants were asked to determine, on a five-point Likert scale ( ranging from 1, “not at all important” to 5, “extremely important”).

The perceived self-efficacy scale consisted of 6 items with four point scale ranging from 1 (cannot do) to 4 (certainly can do).\textsuperscript{[40]}

All the questionnaires were translated using forward translation, back-translation in Farmanbar et al. study and reliability and validity has been confirmed.\textsuperscript{[41]}

Based on the transtheoretical model, employees' health will be affected by their depriving of the benefits of PA. This study was conducted in 100 female employees of Isfahan University of Medical Sciences in 2013. Participants were a convenience sample of employees. The aim of this study was to determine the PA among employee women in Isfahan University of Medical Sciences based on the transtheoretical model. The TTM model has four constructs; stages of change, self-efficacy, decisional balance, and processes of change.
Finally, content validity of questionnaires was assessed by an expert panel (five experts in health education and PA). It showed good acceptance and was adopted in this study. Expert panel was used for content validity too. The reliability was determined by Cronbach’s alpha, and the scores of alpha for the process of change, self-efficacy, and decisional balance were 0.94, 0.81, and 0.78 continuously. Approximate time to answer questions was 30 min.

Statistical analyses were performed using SPSS software (version 16, IBM Inc., Chicago, IL, USA). We used descriptive (mean and frequency) and analytical statistics (independent t-test and one-way ANOVA test). ANOVA test was used to compare the mean of processes of change construct and self-efficacy with stages structure. A two-tailed \( P < 0.05 \) was considered statistically significant.

**RESULTS**

The study was conducted on 100 female employees. The results showed that the average age was 37.61 ± 7.99, and there was no significant relationship between age and level of PA. The relationship between PA and other demographic information can be found in Table 1.

Distribution of people in stages of change was as follows: 26% precontemplation, 22% contemplation, 20% preparation, 13% action, and 19% maintenance. There were significant differences between consciousness raising, dramatic relief, counter-conditioning, stimulus control, helping relationships, reinforcement management, and self-liberation with stages of change constructs [Table 2].

Furthermore, ANOVA test showed there was no significant difference between environmental reevaluation, self-reevaluation, and helping relationship with stages of change constructs [Table 2].

Figure 1 shows significant improvements in self-efficacy from precontemplation to maintenance.

The mean of pros are, respectively, as follows: Precontemplation 58.15 ± 22.29, contemplation 70.73 ± 22.81, preparation 73.00 ± 19.59, action 75.69 ± 16.93, maintenance 86.10 ± 18.40. The statistical test showed there were significant differences between pros and stages of change (\( F = 5.304, P = 0.001 \)).

In this study, 26% of women were in contemplation, 22% in precontemplation, 20% in preparation, 13% in action, and 19% in maintenance. Indeed, 68% of subjects were inactive, and 32% were active. It consist with Jalilian et al. study that 65% of women did not have enough PA.[27]

In Iran, Mazloomy Mahmoudabad et al. showed that 26.4% of subjects were active. It consist with this study, and this matter could be due to cultural similarities between people in two city (Isfahan and Yazd).[35]

There were significant differences between consciousness raising, dramatic relief, counter-conditioning, stimulus control, helping relationships, reinforcement management, and self-liberation with stages of change construct, also with progressing to maintenance, the mean of constructs is increasing. These results are in consist with Lee et al. study.[42] But in the Nigg et al. study, all structures of the model were significantly different in stages of change.[43]

In Kirk et al. study, helping relationships, self-liberation, and consciousness raising increased from precontemplation to maintenance.[44]

**DISCUSSION**

This study was conducted with the aim of determining the PA among women employees in Isfahan University of Medical Sciences based on the transtheoretical model.
Table 2: The relation between stages of change and processes of change

| Processes of change variable | Precontemplation | Contemplation | Preparation | Action | Maintenance | P    |
|-----------------------------|------------------|---------------|-------------|--------|------------|------|
| Consciousness raising       | 37.18 (19.79)    | 41.21 (18.31) | 50.00 (13.96) | 47.69 (13.30) | 62.11 (24.04) | 0.000 |
| Dramatic relief             | 75.90 (51.17)    | 69.70 (22.32) | 64.00 (18.40) | 67.70 (23.23) | 86.67 (19.88) | 0.012 |
| Environmental reevaluation  | 72.82 (23.78)    | 72.73 (26.74) | 76.00 (21.46) | 70.77 (20.46) | 85.96 (23.71) | 0.307 |
| Self-reevaluation           | 72.56 (20.68)    | 79.00 (27.16) | 80.66 (24.17) | 82.56 (17.32) | 90.88 (18.49) | 0.115 |
| Helping relationship        | 63.07 (18.78)    | 65.45 (20.22) | 60.33 (19.76) | 60.00 (19.43) | 54.73 (17.99) | 0.474 |
| Counter-conditioning        | 32.56 (12.83)    | 39.09 (15.97) | 40.33 (11.54) | 52.30 (25.21) | 65.26 (18.53) | 0.000 |
| Stimulus control            | 34.61 (13.47)    | 47.57 (24.37) | 50.33 (15.96) | 41.54 (20.02) | 52.63 (24.73) | 0.022 |
| Helping Relationships       | 53.33 (21.24)    | 70.00 (23.61) | 70.00 (21.24) | 73.84 (18.35) | 85.97 (18.84) | 0.000 |
| Reinforcement management    | 39.49 (15.07)    | 59.70 (22.20) | 56.00 (18.27) | 66.67 (20.18) | 82.80 (17.54) | 0.000 |
| Self-liberation             | 35.12 (20.79)    | 47.87 (22.21) | 42.33 (23.42) | 56.41 (26.47) | 78.94 (25.94) | 0.000 |
| Pros                        | 58.15 (22.29)    | 70.73 (22.81) | 73.00 (19.59) | 75.69 (16.93) | 86.10 (18.40) | 0.001 |
| Cons                        | 82.00 (11.66)    | 77.82 (13.11) | 76.00 (15.41) | 70.15 (14.11) | 75.58 (17.17) | 0.169 |
| Self-efficacy               | 32.69 (9.70)     | 37.50 (10.37) | 39.79 (13.68) | 49.36 (11.26) | 58.11 (19.12) | 0.000 |

It seems that special attention needed to environmental reevaluation, self-reevaluation, and helping relationship for women.

Based on the findings, the mean of self-efficacy is increasing from precontemplation to maintenance and the mean of action and maintenance stage is more than other stages.

In Marcus et al. study, finding show that people who were physical active had higher self-efficacy than inactive people.\[45\]

Other studies such as Nishida et al. and Gorely and Bruce stated that those who have high self-efficacy for PA, they are more physically active.\[34,46\] Purath and Miller also showed women have more self-efficacy with an increase in the stages of change.\[47\]

Results indicated that in the movement from precontemplation to maintenance pros are increasing, and cons are decreasing. It is consist with Purath and Miller and Kim study.\[47,48\] Gorely also emphasized the role of cons as an influencing factors on the PA.\[16\]

**Limitation**

This study has been done among the women, so there was no chance for inter gender comparison of PA in staff and also this limitation led to the small sample size. Long questionnaire and impossibility of assessing PA in different jobs were other limitations of this study.

**CONCLUSION**

Because of a significant relationship between cognitive and behavioral processes and PA in this group, designing and implementing an educational program based on the transtheoretical model may be useful in promoting PA of a female employee.

**Acknowledgment**

The authors would like to thank the women employees who participated in this study.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

1. Acil AA, Dogan S, Dogan O. The effects of physical exercises to mental state and quality of life in patients with schizophrenia. J Psychiatr Ment Health Nurs 2008;15:808-15.
2. Callaghan P, Eves FF, Norman P, Cheung YL, Chang AM. Applying the transtheoretical model of change to exercise in young Chinese people. Br J Health Psychol 2002;7:267-82.
3. Callaghan P. Exercise: A neglected intervention in mental health care? J Psychiatr Ment Health Nurs 2004;11:476-83.
4. Wannamethee SG, Shaper AG. Physical activity in the prevention of cardiovascular disease: An epidemiological perspective. Sports Med 2001;31:101-14.
5. Hu FB, Stampfer MJ, Colditz GA, Ascherio A, Rexrode KM, Willett WC, et al. Physical activity and risk of stroke in women. JAMA 2000;283:2961-7.
6. Hu FB, Manson JE, Stampfer MJ, Colditz G, Liu S, Solomon CG, et al. Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. N Engl J Med 2001;345:790-7.
7. Hu FB, Leitzmann MF, Stampfer MJ, Colditz GA, Willett WC, Rimm EB. Physical activity and television watching in relation to risk for type 2 diabetes mellitus in men. Arch Intern Med 2001;161:1542-9.
8. Pfohl M, Schatz H. Strategies for the prevention of type 2 diabetes. Exp Clin Endocrinol Diabetes 2001;109 Suppl 2:S240-9.
9. Fulton-Kehoe D, Hamman RF, Baxter J, Marshall J. A case-control study of physical activity and non-insulin dependent diabetes mellitus (NIDDM). The San Luis Valley Diabetes Study. Ann Epidemiol 2001;11:320-7.
10. Dosemeci M, Hayes RB, Vetter R, Hoover RN, Tucker M, Engin K, et al. Occupational physical activity, socioeconomic status, and risks of 15 cancer sites in Turkey. Cancer Causes Control 1993;4:313-21.
11. Giovannucci E, Ascherio A, Rimm EB, Colditz GA, Stampfer MJ, Willett WC. Physical activity, obesity, and risk for colon cancer and adenoma in men. Ann Intern Med 1996;122:327-34.
12. Rubin K, Schirduan V, Gendreau P, Sarfarazi M, Mendola R, Dalsky G. Predictors of axial and peripheral bone mineral density in healthy children and adolescents, with special attention to the role of puberty. J Pediatr 1993;123:863-70.
13. Kohrt WM, Sneed DB, Slatsopolsky E, Birge SJ Jr. Additive effects of weight-bearing exercise and estrogen on bone mineral density in older women. J Bone Miner Res 1995;10:1303-11.

14. Fox KR. The influence of physical activity on mental well-being. Public Health Nutr 1999;2:411-8.

15. Al-Nozha MM, Al-Hazzaa HM, Arafah MR, Al-Khadra A, Al-Mazrou YY, Al-Maataouq MA, et al. Prevalence of physical activity and inactivity among Saudis aged 30-70 years. A population-based cross-sectional study. Saudi Med J 2007;28:559-68.

16. Najdi A, El Achhab Y, Nejjar C, Norat T, Zidouh A, El Rhazi K. Correlates of physical activity in Morocco. Prev Med 2011;52:355-7.

17. Missoni E, Kern J, Missoni I. Physical inactivity changes in Croatia: The CroHort study. Coll Antropol 2012;36 Suppl 1:257-9.

18. U.S. Department of Health and Human Services. Healthy People 2020. Washington, D.C.: U.S. Department of Health and Human Services; 2000.

19. Centers for Disease Control and Prevention (CDC). Prevalence of regular physical activity among adults – United States, 2001 and 2005. MMWR Morb Mortal Wkly Rep 2007;56:1209-12.

20. Barnes P. Physical activity among adults: United States, 2000 and 2005. Hyattsville, MD: US Department of Health and Human Services, CDC; 2007. Available from: http://www.cdc.gov/nchs/products/pubs/pubd/hestats/physicalactivity/physicalactivity.htm. [last accessed on 20 July 2015]

21. U.S. Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans. Washington, D.C.: U.S. Department of Health and Human Services; 2008.

22. Maddah M. The factors associated with adult obesity in Iran: A review. Iran J Nutr Sci Food Technol 2012;7:119-27.

23. Thorp AA, Owen N, Neuhaus M, Dunstan DW. Sedentary behaviors and subsequent health outcomes in adults: A systematic review of longitudinal studies, 1996-2011. Am J Prev Med 2011;41:207-15.

24. Norouzi A, Ghofranipour F, Heidarnia A, Tahmasebi R. Determinants of physical activity based on Health Promotion Model (HPM) in diabetic women of Karaj diabetic institute. Iran South Med J 2010;13:41-51.

25. Gorely T, Bruce DA. 6-month investigation of exercise adoption from the contemplation stage of the transtheoretical model. Psychol Sport Exerc 2000;1:89-101.

26. Robabi H, Eghbali K, Zareban I, Karimy M, Mirhaghi AH, Saninaasab H. An assessment of physical activity levels among bank employees in Iranshahr in 2011. Journal of Torbat Heydariyeh University of Medical Sciences 2011;36:587-95.

27. Jalilian F, Emdadi SH, Mirzaie M, Barati M. The survey physical activity status of employed women in Hamadan University of Medical Sciences 2013;1:55-62.

28. Prochaska JO, Marcus BH. The transtheoretical model: Application to exercise. In: Dishman RK, editor. Advances in Exercise Adherence. Champaign, IL: Human Kinetics; 1994. p. 161-80.

29. Marcus BH, Rossi JS, Arlakhi M, Harlow LL. Self-efficacy, decision-making, and stages of change: An integrative model of physical exercise. J Appl Soc Psychol 1994;24:489-504.

30. Nishida Y, Suzuki H, Wang DH, Kira S. Psychological determinants of physical activity in Japanese female employees. J Occup Health 2003;45:15-22.

31. Marshall SJ, Biddle SJ. The transtheoretical model of behavior change: A meta-analysis of applications to physical activity and exercise. Ann Behav Med 2001;23:229-46.

32. Bandura A. Perceived self-efficacy in cognitive development and functioning. Educ Psychol 1993;28:117-48.

33. Marcus BH, Eaton CA, Rossi JS, Harlow LL. Self-efficacy, decision-making, and stages of change: An integrative model of physical exercise. J Appl Soc Psychol 1994;24:489-504.

34. Plotnikoff RC, Blanchard C, Hotz SB, Rhodes R. Validation of the decisional balance scales in the exercise domain from the transtheoretical model: A longitudinal test. Meas Phys Educ Exerc Sci 2001;5:191-206.

35. Nigg CR, Forby LH. Motivating People to be Physically Active. USA: Human Kinetics; 2003.

36. Norouzi A, Ghofranipour F, Heidarnia A, Tahmasebi R. Determinants of physical activity based on Health Promotion Model (HPM) in diabetic women of Karaj diabetic institute. Iran South Med J 2010;13:41-51.

37. Marcus BH, Forsyth LH. Motivating People to be Physically Active. USA: Human Kinetics; 2003.

38. Nigg CR, Normn GJ, Rossi JS, Benisovich SV. Processes of Exercise Behavior Change: Redeveloping the Scale. Poster Presented at the Society of Behavioral Medicine Meeting, San Diego, CA; 1999.

39. Plotnikoff RC, Blanchard C, Hotz SB, Rhodes R. Validation of the decisional balance scales in the exercise domain from the transtheoretical model: A longitudinal test. Meas Phys Educ Exerc Sci 2001;5:191-206.

40. Lee YM, Park NH, Kim YH. Process of change, decisional balance, self-efficacy and depression across the stages of change for exercise among middle aged women in Korea. J Korean Acad Nurs 2006;36:587-95.

41. Farmanbar R, Niknam SH, Hijarnia AR, Hajizade E. Prediction of exercise behavior among college student based on transtheoretical model and self-determination theory using path analysis. Payesh J 2010;10:27-37.

42. Lee YM, Park NH, Kim YH. Process of change, decisional balance, self-efficacy and depression across the stages of change for exercise among middle aged women in Korea. J Korean Acad Nurs 2006;36:587-95.

43. Farmanbar R, Niknam SH, Hijarnia AR, Hajizade E. Prediction of exercise behavior among college student based on transtheoretical model and self-determination theory using path analysis. Payesh J 2010;10:27-37.

44. Farmanbar R, Niknam SH, Hijarnia AR, Hajizade E. Prediction of exercise behavior among college student based on transtheoretical model and self-determination theory using path analysis. Payesh J 2010;10:27-37.

45. Al-Nozha MM, Al-Hazzaa HM, Arafah MR, Al-Khadra A, Al-Mazrou YY, Al-Maataouq MA, et al. Prevalence of physical activity and inactivity among Saudis aged 30-70 years. A population-based cross-sectional study. Saudi Med J 2007;28:559-68.

46. Najdi A, El Achhab Y, Nejjar C, Norat T, Zidouh A, El Rhazi K. Correlates of physical activity in Morocco. Prev Med 2011;52:355-7.