



Assessment of Physical Activity Among Female Students of Tonekabon- Iran Based on Trans-theoretical Model

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ABSTRACT

Background: The studies show low level of physical activity among girls in different societies. Moreover, there are some cultural barriers for Iranian women exercising in public places. In addition, physical activity declines precipitously with increased age among adolescents, especially in girls.

Objectives: The aim of this study was to identify the relation between physical activity level and the structures of Trans-theoretical model (TTM).

Materials and Methods: This cross-sectional study was conducted on 423 female students of Tonekabon in Iran. Participants completed the demographic questionnaires, the TTM's structural questionnaires as well as the international physical activity questionnaire short form for assessing the levels of physical activity (IPAQ-SF).

Results: The age mean of the students was 15.34 ± 0.67 years. The balance decisional questionnaire (69.19 ± 8.35) and process of change (56.81 ± 12.76) questionnaire received the highest average scores. The majority of the students (67.4%) were at the pre-operational stage (pre-contemplation, contemplation, preparation); while 257 (60.8%) of students reported to have light physical activity or no activity. Self-efficacy had the strongest correlation with the levels of physical activity.

Conclusions: We identified the self-efficacy structure as the most effective factor of physical activity performance. Thus, enhancing the self-efficacy may be useful in order to promote the practice of physical activity.

Keywords: Motor Activity; Self Efficacy; Students

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1. Background

Regular physical activity has several physical, psychological and social benefits for all age groups such as prevention of obesity (1). Physical activity habits fostered and developed during the early stages of life may be expected to persist into adulthood and youth, reducing the incidence of chronic diseases associated with a sedentary lifestyle (2 - 3).

In general, girls are more likely to hold to a sedentary

lifestyle within adulthood in comparison with boys (4). Researches in different societies have reported low level of physical activity among girls (5, 6). There are some cultural barriers opposing the Iranian women for exercising in public places (7). In addition, physical activity declines precipitously with increased age among adolescents, especially in girls (8). However, the current studies on social and environmental determinants of physical activity behavior are limited to Western countries (9-12).

The most functional stage-based model of behavioral

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change in the field of physical activity is the trans-theoretical model (TTM) (13). The TTM has been described as an integrative and comprehensive model of behavior change that has drawn from all major theories of psychotherapy (7). This model has been introduced in the 80's with smoking cessation, and later it was expanded for several health-related behaviors, including physical activity. It postulates that behavior change has a dynamic nature as an individual moves through a series of stages in his/her attempt to adopt the desired behavior (2, 14).

2. Objectives

The aim of this study was to identify the relation between the level of physical activity and the structures of TTM. Therefore, we sought to identify the factors affecting the change in behavior, in order to design interventions that would lead to the promotion of physical activity in a sample of Iranian adolescents.

3. Materials and Methods

This cross-sectional study was performed among 423 female students living in Tonekabon- a city in northern Iran, Mazandaran province-from January 2010 to January 2011. The ethics committee of Mashhad university of medical sciences approved the study protocol. Also, the approval was obtained from the organization of education to conduct the study among the enrolled high schools. Completing the questionnaire was voluntary and students were thoroughly assured about the confidentiality of the data. Informed consent was obtained from all the subjects. Inclusion criteria for enrollment were as follows: studying at the first stage of high school, lack of any morbidity preventing the practice of physical activity, participation in training classes with regard to completing the questionnaires as well as being interested to take part in the study. Taking into consideration the proportion of different types of schools in Tonekabon (public or private), they were stratified according to the locales.

The demographic characteristics including age, parents' level of education and age, number of first-degree relatives, housing status and family monthly average income were obtained (7). The TTM is comprised of several questionnaires including the stage of change questionnaire, balance decisional questionnaire, perceived self-efficacy and process of change questionnaires. The balance decisional questionnaire was designed on the basis of the questionnaire proposed by Blanchard et al. (7) and includes perceived benefits and barriers that focus on the importance of the positive and negative consequences of behavioral change. This questionnaire includes 17 questions (nine for perceived benefits and eight for perceived barriers) and the ideal score dominate for this tool is 17 to 85 (15).

The perceived self-efficacy questionnaire was derived from the questionnaire of Nigg et al. and shows the indi-

vidual's confidence for performing physical activities (7). In order to determine self-efficacy in relation to exercise, this questionnaire with 11 questions -based on Lickert scale- was used. Thus, the minimum score of self efficacy for exercise is 11 while its optimum is 55 (15). Additionally, the process of change questionnaire was designed from the questionnaire of Norman et al. (7) and focuses on the hidden and obvious cognitive and behavioral activities being used by individuals during their behavioral stages. This questionnaire includes 18 questions (eight for cognitive process and 10 for behavioral process) and thereby, the minimum score of process of change to exercise is 18 and its optimum is 90. Mazloomi et al. used a panel of experts for assessing the validity of TTM questionnaires and performed a test-retest for evaluating its reliability. The results indicated that the instrument has an acceptable validity and reliability (95%). Therefore, we used a previously validated version of TTM.

The international physical activity questionnaire (IPAQ) consists of seven questions regarding intense physical activity, moderate physical activity, walking, and sitting in the previous seven days (16). The intense activities are defined as activities that result in faster and deeper breathing, such as lifting heavy objects, aerobic exercises, riding bicycles with fast speed, soccer and running. The moderate physical activities refer to those activities that make individuals breathe a little faster than their normal breathing, such as carrying light objects, riding bicycles with moderate speed or playing volleyball. Walking includes walking in the work place, home, walking from one place to another or any kind of walking that individuals perform as a leisure, sport, and physical exercise (16, 17).

In IPAQ, three levels of metabolic equivalent of task (MET) are considered including 3.3 METs for walking, 4 METs for moderate physical activities and 8 METs for intense physical activities. MET is a physiological measure for estimating the energy consumption during physical activity. In order to calculate the total physical activity during the week, the following equations are applied:

Walking MET.min/week = 3.3 × walking time in minutes × days of walking.

Moderate physical activity MET.min/week = 4.0 × moderate physical activity time in minutes × days of physical moderate activity.

Intense physical activity MET.min/week = 8.0 × intense physical activity time in minutes × days of intense physical activity.

Total physical activity in the previous week = Walking MET.min/week + Moderate physical activity MET.min/week + Intense physical activity MET.min/week

The activities shorter than 10 minutes are not considered in this measurement. If the combination of the intense physical activities, moderate physical activities and walking during at least the previous seven days reach to at least 600 MET.min/week, the intensity of students'

physical activity would be moderate. The physical activity is considered intense if it would have one of the following conditions: the total expended energy for the intense physical activity during at least three days of the previous seven days reaches to 1500 MET.min/week, or the total expended energy during the previous seven days for performing a combination of the intense activities, moderate activities, and walking reaches to at least 3000 MET.min/week. If students do not report any activities or do not meet the mentioned conditions, their activities are considered in the low intensity (light physical activity) group (17).

The data were analyzed using SPSS (statistical software program version 16.0). The relation between the physical activity levels with stages of change was assessed by Chi-square test. Correlations were also assessed between TTM's structures and physical activity levels. The linear regression analysis was performed between physical activity as the dependent variable and possible related variables. Also, Kruskal-Wallis test was performed to determine significant interactions of stages of change and TTM's structures. The significance level was set at $P < 0.05$.

4. Results

This study included 423 female students, with the mean age of 15.34 ± 0.67 years old. The results of the descriptive

statistics indicated that 257 students (60.8%) performed light physical activities or no activity, while 120 students (28.4%) and 46 students (10.8%) performed moderate and intense activities, respectively. In addition, 285 students (67.4%) were at the pre-operational stage (pre-contemplation, contemplation, preparation). Most of the students (144 students, 34%) were at the preparation stage, 61 students (14.4%) were at the action stage, and 77 students (18.2%) were at the maintenance stage. Significant relations were observed between the stages of change and self efficacy, balance decisional and process of change (dramatic relief, self-reevaluation, counter conditioning, helping relationships, management contingency, self-liberation, and stimulus control). As shown in *Table 1*, the balance decisional and process of change acquired higher average scores.

Also, there was a significant relation between the physical activity levels and the stages of change ($P = 0.011$) (*Table 2*). Correlations between TTM's structures and physical activity levels are shown in *Table 3*. All of the structures except perceived barriers with self-efficacy ($P = 0.633$) and the behavioral factors of change process ($P = 0.141$) were significantly correlated with each other. Among the structures, self-efficacy had the strongest correlation with the levels of physical activity.

Table 1. Mean and Standard Deviation of Scores of TTMs Structures

Variable	Mean	Standard Deviation
Self-efficacy	28.29	10.29
Process of Change	56.81	12.76
Balance Decisional	69.19	8.35
Perceived benefits	35.17	6.33
Perceived barriers	34.02	4.58

Table 2. Relations Between Physical Activity Levels and Stages of Change for Study Participants

Levels of Activity	Light	Moderate	Intense
Stages of change	%	%	%
Pre-Contemplation	80.3	11.6	8.1
Contemplation	50.9	36.4	12.7
Preparation	57.0	33.3	9.7
Action	55.8	31.1	13.1
Maintenance	57.1	29.9	13.0
Total	60.7	28.4	10.9
Test result	P= 0.011		

Table 3. Correlation Between TTMs Structures and Physical Activity Levels in the Study Sample

Structures	Physical Activity Levels	Stages of Change	Self-Efficacy	Perceived Benefits	Perceived Barriers	Cognitive Factors of Change Process	Behavioral Factors of Change Process
Physical activity levels	1						
Stages of change	0.121 ^a	1					
Self-efficacy	0.341 ^b	0.296 ^b	1				
Perceived benefits	0.184 ^b	0.209 ^b	0.404 ^b	1			
Perceived barriers	-0.023	0.104 ^a	0.072	0.192 ^b	1		
Cognitive factors of change process	0.240 ^b	0.268 ^b	0.415 ^b	0.681 ^b	0.159 ^b	1	
Behavioral factors of change process	0.319 ^b	0.354 ^b	0.628 ^b	0.591 ^b	0.055	0.643 ^b	1

^a At 0.01 significance level
^b At 0.05 significance level

The standardized coefficients of self-efficacy had the strongest effect, since for one unit of change in this vari-

able, 0.289 changes are made in the variable of students' level of physical activity *Table 4*.

Table 4. Linear Regression Analysis of Structures Studied With Physical Activity in the Study Sample

Model	Un Standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error			
Constant	0.642	0.189		3.391	0.001
Self-efficacy	0.019	0.004	0.289	5.00	0.000
Behavioral factors of change process	0.012	0.007	0.124	1.739	0.083
Cognitive factors of change process	0.012	0.007	0.120	1.753	0.080
Perceived barriers	-0.009	0.007	-0.082	-1.302	0.194
TTM ^a	-0.016	0.025	0.032	-0.660	0.510

^a Abbreviation: TTMs, structures and physical activity levels

5. Discussion

According to the results of this study performed on the physical activity of female students by TTM, most of the students reported low level of physical activity. The results of a research conducted by Ziaee et al. in 23 provinces of Iran showed that students who had low level of physical activity were more prevalent than the students of this study (5). The majority of students were at the pre-

operational stage (pre-contemplation, contemplation, preparation), which is consistent with previous reports (13, 18-20). Consistent with the results of Buckworth et al. and Sullum et al., the results of our study also indicated that self-efficacy is the most effective factor of physical activities. Therefore, interventions that target self-efficacy can be applied for the promotion and maintenance of physical activity among this group (21, 22).

One possible explanation for the apparent decrease in

the physical activity of female students could be the diminishing of their living places. The small places where students spend most of their time at, such as apartments and the not very well-developed schools provide less opportunity for performing the favorable physical exercises. Also, Iranian female teenagers may have limited chances for doing physical exercises publicly, which may further increase the tendency for adhering to a sedentary lifestyle. Therefore, obesity and other complications of sedentary lifestyle (i.e. cardiovascular diseases, diabetes, etc) may increase among the female in the near future (5).

In a study conducted to indentify the factors affecting the performance of physical activity, most of the students mentioned that doing physical activity wastes their time (23-26). Also, the results of the survey conducted by Kelishadi et al. indicated that students mentioned the lack of safe and accessible places for performing physical activity as well as the not supportive family as the main barriers, which was consistent with some other studies (1, 27-28).

This study has some limitations: first, this study has been done among the female so there was no chance for inter-gender comparison of physical activity. Secondly, the subjects were recruited from a small region of the country and the results may not be generalized to the whole nation. Additionally, the data relied on self-reports of physical activity and psychosocial variables. Despite the use of validated questionnaires, some over-reporting of physical activity may be present. In conclusion, some strategies for increasing physical activity with regard to the results of this report are as follows: practicing and adhering to alternative behaviors such as walking from home to school or work place instead of using vehicles, having a regular schedule for physical activity, performing group exercises with friends and classmates, increasing self-efficacy, perceiving the benefits and barriers of physical activities.

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References

1. Kelishadi R, Ghatrehsamani S, Hosseini M, Mirmoghtadaee P, Mansouri S, Poursafa P. Barriers to physical activity in a population-based sample of children and adolescents in Isfahan, Iran. *Int J Prevent Med*. 2010;**1**(2):131.
2. Pirasteh A, Hidarnia A, Asghari A, Faghihzadeh S, Ghofranipour F. Development and validation of psychosocial determinants measures of physical activity among Iranian adolescent girls. *BMC Public Health*. 2008;**8**:150.
3. Alagh TB, Omokhodion FO. Health related practices of students of the University of Ibadan. *Afr J Med Med Sci*. 2004;**33**(2):109-14.
4. Ward DS, Saunders R, Felton GM, Williams E, Epping JN, Pate RR. Implementation of a school environment intervention to increase physical activity in high school girls. *Health Educ Res*. 2006;**21**(6):896-910.
5. Ziaee V, Kelishadi R, Ardalan G, Gheiratmand R, Majdzadeh SR, Monazzam MM. Physical activity in Iranian students CASPIAN Study. *Iran J Pediatr*. 2006;**16**(2):157-64.
6. Aziz S, Noorulain W, Zaidi UE, Hossain K, Siddiqui IA. Prevalence of overweight and obesity among children and adolescents of affluent schools in Karachi. *J Pak Med Assoc*. 2009;**59**(1):35-8.
7. Shirazi KK, Wallace LM, Niknami S, Hidarnia A, Torkaman G, Gilchrist M, et al. A home-based, transtheoretical change model designed strength training intervention to increase exercise to prevent osteoporosis in Iranian women aged 40-65 years: a randomized controlled trial. *Health Educ Res*. 2007;**22**(3):305-17.
8. Taymoori P, Lubans D, Berry TR. Evaluation of the health promotion model to predict physical activity in Iranian adolescent boys. *Health Educ Behav*. 2010;**37**(1):84-96.
9. Brownson RC, Hoehner CM, Day K, Forsyth A, Sallis JF. Measuring the built environment for physical activity: state of the science. *Am J Prev Med*. 2009;**36**(4 Suppl):S99-123.
10. Sallis JF. Measuring physical activity environments: a brief history. *Am J Prev Med*. 2009;**36**(4 Suppl):S86-92.
11. Sallis JF, Linton LS, Kraft MK, Cutter CL, Kerr J, Weitzel J, et al. The Active Living Research program: six years of grantmaking. *Am J Prev Med*. 2009;**36**(2 Suppl):S10-21.
12. Timperio A, Giles-Corti B, Crawford D, Andrianopoulos N, Ball K, Salmon J, et al. Features of public open spaces and physical activity among children: findings from the CLAN study. *Prev Med*. 2008;**47**(5):514-8.
13. Karimzadeh Shirazi K, Niknami Sh, Heydarnia A, M Wallace L, Torkaman G, Faghihzadeh S. [Effects of a TTM-based osteoporosis preventive physical activity education, on increasing muscle strength and balance in women aged 40-65]. *Hakim Res J*. 2007;**10**(2):34-42.
14. Woods C, Mutrie N, Scott M. Physical activity intervention: a transtheoretical model-based intervention designed to help sedentary young adults become active. *Health Educ Res*. 2002;**17**(4):451-60.
15. Moeini B, Rahimi M, Hazaveie SM, Allahverdi Pour H, Moghim Beigi A, Mohammadfam I. Effect of education based on trans-theoretical model on promoting physical activity and increasing physical work capacity. *Mil Med J*. 2010;**12**(3):123-130.
16. Teymoori P, Niknami SH, Ghofranipour F. [Effects of a School-Based Intervention on the Basis of Pender's Health Promotion Model to Improve Physical Activity among High School Girls]. *J Armaghan Danesh*. 2006;**12**(2):47-59.
17. Taymoori P, Niknami SH, Ghofranipour f. [Cognitive and Psychosocial Factors of Physical Activities among Adolescents in Sanandaj by Frame Work of Pender's Health Promotion and Stage of Change Models (2006)]. *Kermanshah Univ*. 2006;**4**:393-406.
18. Saeid MM, Mohammadi M, Ali MSM, Hossein F. [A Study of the Role of Decisional Balance in Exercise Status Among Yazd's Staff Based on Transtheoretical Model]. *Zahedan J Res Med Sci*. **11**(2):57-65.
19. Buckworth J, Granello DH, Belmore J. Incorporating personality assessment into counseling to help college students adopt and maintain exercise behaviors. *J College Counsel*. 2002;**5**(1):15-25.
20. Sullum J, Clark MM, King TK. Predictors of exercise relapse in a

- college population. *J Am Coll Health*. 2000;**48**(4):175-80.
21. Mazloomi S, Mohammadi M, Morovati Sharifabad MA, Falahzade H. [A Study of the Decisional Balance's Role in Exercise Status Among Yazd's Staff on the Basis Process of Change Model]. *Zahedan J Res Med Sci*. 2009;**11**(2):57-65.
 22. Nigg CR. Explaining adolescent exercise behavior change: a longitudinal application of the transtheoretical model. *Ann Behav Med*. 2001;**23**(1):11-20.
 23. Foley L, Prapavessis H, Maddison R, Burke S, McGowan E, Gilanders L. Predicting physical activity intention and behavior in school-age children. *Pediatr Exerc Sci*. 2008;**20**(3):342-56.
 24. Agha MT, Tavafian SAS, Hasani L. [Exercise Self-efficacy, Exercise Perceived Benefits and Barriers among Students in Hormozgan University of Medical Sciences]. *Iran J Epidemiol*. 2008.
 25. Pan SY, Cameron C, Desmeules M, Morrison H, Craig CL, Jiang X. Individual, social, environmental, and physical environmental correlates with physical activity among Canadians: a cross-sectional study. *BMC Public Health*. 2009;**9**:21.
 26. McAuley E, Jerome GJ, Elavsky S, Marquez DX, Ramsey SN. Predicting long-term maintenance of physical activity in older adults. *Prev Med*. 2003;**37**(2):110-8.
 27. McAuley E, Blissmer B. Self-efficacy determinants and consequences of physical activity. *Exerc Sport Sci Rev*. 2000;**28**(2):85-8.
 28. Dishman RK, Motl RW, Saunders R, Felton G, Ward DS, Dowda M, et al. Self-efficacy partially mediates the effect of a school-based physical-activity intervention among adolescent girls. *Prev Med*. 2004;**38**(5):628-36.