

A Study on Effect of Trance theoretical Model-based Educational Intervention on Degree of Exercising by Female Adolescent, Tonekabon Township, 2011

Adeleh Alinia¹; Mohammad Vahedian²; Payam Alizadeh³; Reza Attarzadeh⁴; Habibollah Esmaeili⁵; Mohammad Hadi Asgari⁶

¹ Master's student in Health Education, School of Health, Mashad University of Medical Sciences and Health Services

² Member of Board, School of Health, Mashad University of Medical Sciences and Health

³ Family Physician, Mazandaran University of Medical Sciences, Tonekabon Health and Medicine Network.

⁴ Assistant professor at Physical Education Department, School of Physical Education, Ferdosi University of Mashad.

⁵ Associate professor at Vital Statistics Department, School of Health, Mashad University of Medical Sciences and Health

⁶ Department of Business Management & Accounting, Tonekabon branch, Islamic Azad University, Tonekabon, Mazandaran Iran

ABSTRACT

Introduction and Purpose: A regular physical activity is regarded as an important behavior in enhancing health qualities. Exercising has numerous positive effects and advantages among different classes of the society, especially the adolescent. Research in Iran indicates that sedentary is a typical general health problem. The purpose of this study is to find out the effect of educational intervention based on the Trance theoretical Model (TTM) on performing exercise by the female adolescent in Tonekabon Township.

Materials and Methods: The study is a semi-experimental research, an educational intervention based on TTM. To this end, 80 first-year high school female students in 2011 completed to the demographic and TTM constructs questionnaires a month before and after the intervention. The training sessions based on the model were held in the forms of speech, group discussion, educational booklets and pamphlets distribution, wall newspaper contests, sports events, and sport scientific meetings. The collected data were analyzed by SPSS software program using Paired T, X^2 , and Wilcoxon tests.

Results: According to the results, the intervention led to the reduction of individuals with light or no physical activity in the intervention group from 62.5% (25 individuals) to 22.5% (nine individuals) with light physical activity.

Discussion and Conclusion: the results of the study showed that the design and execution of educational interventions based on TTM can lead to some significant differences at students' change stages, change process, balance in decision making, and self-efficacy. Therefore, the utilization of the educational models in educational programs is recommended.

KEY WORDS: Exercise, Student, Model, Trance theoretical Model

PROBLEM STATEMENT

The reduction in physical activities is one of the consequences of machine life and technological progressions in this century (1). The regular physical activity is an important behavior that enhances health qualities and prevents or defers several types of chronic diseases and premature (2-3), enhances mental health, reduces the symptoms of depression and anxiety, increases life satisfaction and enhances life quality as well (4-6). The regular physical activity has been listed among the 15 priorities for the change in behavior in order for the health to be improved (7). There is convincing evidence demonstrating that physical activities decrease the risk of depression's progression. Exercise interventions are related to the decrease in anxiety (8). Various studies have shown that many factors - such as demographic variables, attitudes, personal beliefs as well as environmental and social factors - are effective on performing physical activities (9-10). The period of adolescence and youth is the gate for passing from childhood to adulthood; naturally, the life habits, such as regular exercise, start and continue to exist in this period. Unfortunately, the level of physical activity in this period is consistently reduced (11). Doing exercise by different classes of the society, especially the adolescent, results to many positive consequences and advantages including the control and prevention of hypertension, cardiac diseases, diabetes (12), prevention of weight gain (13), increase in bone density (14), improvements in life quality, decrease in anxiety and depression (15), decrease in stress (16), and increase in self-esteem (17-19). In addition, doing physical activity can inhibit the adolescent from orienting towards unhealthy entertainments, crime, and addiction (20). Despite the fact that the physical activity is regarded as an important health behavior for preventing the incidence of diseases and mortality, in many countries, as well as Iran, a great number of individuals do not have regular exercises. Research in Iran shows that about 70 to 80 percent of people do not

*Corresponding Author: Mohammad Hadi Asgari, Department of Business Management & Accounting, Tonekabon branch, Islamic Azad University, Tonekabon, Mazandaran, Iran

have sufficient physical activity, and sedentary is regarded as a typical health problem as well (21).

In developed countries, 11.7% of the total causes of mortality originate from the lack of physical activity. It is estimated that two millions of mortality cases are because of this issue (22). Education is one of the important strategies for enhancing exercise behaviors in the adolescent and the young (23), for the behaviors starting in adolescence are more likely to continue in the adulthood (22).

Girls are more exposed to the risk of sedentary than boys, for their physical activities are lower than that of boys in all ages (23). Therefore, girls' training for increasing physical activities is of paramount importance (22).

Prochaska, the founder of transtheoretical model, claims that the model of change stages, which is the first construct of TTM (24), focuses on the way how behavior changes at stages and considers five stages for progression in changing behaviors (12). The adoption and preservation of an active lifestyle is possible by passing individuals through different stages of preparation for performing physical activities. TTM is the most applicable stage-based model of behavior change in the field of exercising (25). For example, regarding the construct of perceived advantages as a component of balance in decision making construct, we can say that individuals commit to some patterns of behavior when they are able to predict the benefits and advantages resulting from such behavior. As another example, regarding the construct of perceived self-efficacy, it causes individuals to commit to expressing a special behavior and, as a result, causes individuals commitment to reducing or increasing the expression of a behavior (22).

Furthermore, TTM is used in many studies for a more effective planning of exercise interventions (26-31). Many studies, most of which conducted in the West, have found a significant relationship between exercise behavior and the constructs of TTM for more than a decade (32). In this study, the main problem is also the measurement of the effective psychological and social factors related to exercise using the transtheoretical model.

Thus, it seems necessary to examine the constructs of TTM and the level of their effectiveness on performing exercise and that in which stage individuals are, since the understanding of the effective factors for performing regular exercises as well as knowing the stage at which individuals are can be useful in the understanding of the effective factors for the change in behavior and the design and execution of the interventions that lead us to the enhancement of doing exercise in the adolescent.

MATERIALS AND METHODS

The present study is a semi-experimental research, an educational intervention based on the transtheoretical model. The sampling method used was the two-stage Nonprobability method. At the first stage, from eight public and private female high schools consisting of 587 first-year high school students, 512 students (87.12%) entered the study according to the inclusion and exclusion criteria. Totally, 423 questionnaires were returned to the researchers from 512 distributed. After the preliminary investigations and statistical analyses regarding the predictive construct for the design of training sessions, two high schools were selected based on the simple random method (one as the control group and the other as the intervention group) were selected; further, two classes were randomly selected from each of the two high schools. Next, with regard to the determined sample size, 34 participants were considered as the intervention group and 34 other participants as the control group. Finally, for the intervention group of the high school A the classrooms 07 and 09 (45 students), and for the control group of the high school B, classroom A and B (47 students) were selected. The qualification criteria for entering the study:

1. Students should be girls and study at the first year level;
2. They should not have any impairments that inhibits the regular exercise;
3. They should not have any specific disease that inhibits the regular exercise;
4. They should have the tendency for participating in the study;
5. They should attend all of the sessions of educational intervention;
6. They should complete the pre-intervention and post-intervention questionnaires.

In the intervention group, three students were absent in the phases of completing the questionnaires, and two other were not present in all of the training phases. In addition, seven students were absent at the questionnaire completing phase. Ultimately, 80 students (40 in the control group and 40 in the intervention group) participated in the study.

The utilized instruments in the study are:

1. The demographic questionnaire that includes questions regarding students; age, parents' education, parents' occupation, parents' age, number of family members, students' order in the family, family's housing status, and family's average monthly income.
2. *Stage of Exercise Change Questionnaire* that consists of five questions designed by Marcus et al (33) measured by the five-item algorithm (Yes or No). The mentioned stages according to the exercise behavior are:

Pre-reflection: individuals are physically inactive and do not have any plans of starting exercise in the upcoming six months.

Reflection: Individuals are physically inactive but have plans for starting exercise in the upcoming six months.

Readiness: Individuals exercise irregularly, less than three times a week, each time for 30 minutes.

Operation: Individuals exercise regularly but for less than six months.

Preservation: Individuals have a regular and sustainable exercise plan for more than six months.

The adequate exercise refers to performing exercise at least three times a week, each time for 20 minutes or more (34-35).

3. *Stages of Change Questionnaires* by Mazloomi Mahmood Abad et al introduced in a study with the title “A Study on relationship of balance in decision making and doing exercise among employees of Yazd Township based on Trancetheoretical Model”. The questionnaire’s validity and reliability were examined respectively by peer review and test-retest. The results indicated that both measures were acceptable (95%) (36). The validity of the questionnaire was also measured 76% by Ghahramani et al (2007) in their study, “Enhancement of Elderly Males’ Physical Activities Based on Stages of Preparedness Model” (37).
4. *Balance in Decision Making Questionnaire* that includes the perceived advantages and focuses on the positive and negative consequences of the change in behavior. The questionnaire was designed in compliance with the proposed questionnaire by Blanchard et al (33), which includes 17 questions (9 for perceived advantages, and 8 for perceived barriers). Each question has 5 choices based on Lickert five-item scale (Absolutely not, Little, To some extent, Relatively Highly, and Very highly) and each respond gains a score in the range of 1-5. The domain of acquirable score for this instrument is between 17 and 85.
5. *Perceived Self-Efficacy Measurement Questionnaire:* Self-efficacy exhibits an individual’s confidence for doing physical activities. The design of the questionnaire was based on the questionnaire proposed by Nigg et al (33).

In order to determine self-efficacy’s relationship with exercise, the 11-question questionnaire designed based on Lickert scale will be used. The scale in the questionnaire was graded from one to five: No confidence (score 1), Little confidence (score 2), Moderate confidence (score 3), High confidence (score 4), Complete confidence (score 5).

The lowest score of self-efficacy in relation with exercise is 11 and the highest score is 55. Higher scores indicate more self-efficacy.

6. *Change Process Measurement Questionnaire* that includes cognitive and behavioral processes as the covert and overt processes of behavior and cognition used by individuals in their stages of behavior for progression. The questionnaire includes 18 questions (8 questions for cognitive processes and 10 questions for behavioral processes). The questionnaire is based on the one proposed by Norman et al (33). Each question has five items scored in the range of 1-5. The lowest score is 18 and the highest one is 90.

The above questionnaire have been used in Iran by Dr. Kambiz Karim Zadeh Shirazi et al (33), Matlab Rahimi (38), and Dr. Moeini (1) and their validity and reliability are supported. In addition, the reliability of the final questionnaire was measured by the researchers in a study on 40 students (10 percent of the total samples) that were similar to the study population regarding their demographic specification. The reached Cronbach’s Alpha in the sections of Change process, Balance in decision making, and self-efficacy were respectively 0.86, 0.72, and 0.90.

7. *The International Physical Activity Questionnaire (IPAQ) - Short Form (39)* : This questionnaire includes seven questions about intense physical activity, moderate physical activity, walking, and sitting in the previous seven days. The physical activity for each activity was calculated based on Metabolite Equivalent (MET) per minutes/week (40). Based on the IPAQ’s scoring protocol, the intensity of physical activities can be reported in two ways (41):

- a. *The total amount of physical activities of individuals in the previous week based on Met-min/week:* MET is a unit used for estimating the consumed energy required for physical activities. All kinds of physical activity can be classified as a multiple of the amount of energy consumption at rest. In this questionnaire, walking measures 3.3 MET, moderate physical activity 4, and intense physical activity 8. In order to calculate the intensity of physical activity during a week, the following formula is used:

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

Moderate physical activity MET-min/week = 4 × time of moderate physical activity in minutes × days of performing physical activity

Intense physical activity MET-min/week = 8 × time of intense physical activity in minutes × days of performing intense physical activity

Total amount of physical activity in the previous weeks = Walking MET-min/week + Moderate physical activity MET-min/week + Intense physical activity MET-min/week

- b. In case the combination of the intense physical activity, moderate physical activity, and walking has reached to the minimum of 600 MET-min/week in the previous five days at least, the intensity

of the physical activity is regarded as moderate. We consider the activity as intense if one of the following conditions is met: 1) the total consumed energy for the physical activity in at least the three previous days has reached to 1599 MET-min/week, 2) the total consumed energy during seven previous days for performing a combination of intense physical activity, moderate physical activity, and walking has reached to at least 3000 MET-min/week. If no activity is reported or the above conditions are not met, the activity is classified in the group of little or light physical activity. The activities less than 10 minutes were not considered (41). Based on this questionnaire, the intense activities are those activities that make individuals breathe faster and more intense than the normal situation, such as lifting heavy objects, digging, aerobic, fast bicycling, soccer, and running. The moderate physical activities refer to those activities that make individuals breathe a little faster than the normal situations, such as carrying light objects, moderate speed bicycling, or volleyball. Walking also includes walking in the workplace, at home, passing a way from one place to the other, or any kind of walking for the purposes of entertainment, sports, physical exercises, or leisure (39,41-42).

The self-report data were collected with the IPAQ-SF (43). The questionnaire was normalized in Iran by Karim Zadeh et al (2008) (44).

After conducting the preliminary test and collecting the basic information, the training sessions based on TTM were held for the intervention group. The intervention program was designed to include training with the emphasis on enhancing self-efficacy of the adolescent through setting short-term and long-term goals, verbal encouragement, importance and advantages of exercise, problems originating from sedentary or inadequate exercise, importance of planning and supporting exercise objectives, and training for increase in the processes of altering and controlling variables as well as perceived advantages and barriers to exercise and setting exercise goals. The training program was carried out through speech, group discussion, design and distribution of educational booklets and pamphlets, wall newspaper contest, sports events in schools and giving gifts as well as practical exercise sessions.

In the first session, a speech was delivered on the importance, role, and consequences of regular exercise based on the constructs of the model and using slides. The students were divided into five groups in order for wall newspaper contest. In the second session, a speech was made on the effects of sedentary and the role of exercising against chronic diseases in compliance with the model's constructs; also a group discussion was held and a pamphlet compiled by the researcher and about the benefits of exercising for body was handed out to the students. In the third session, another speech was made on the role of regular exercise in the health of mind and the benefits of group exercising according to the constructs of the model. The fourth and sixth sessions were held actively in the school yard by the exercise coach for doing anti-stress exercise activities. The fifth and seventh sessions were also about women and physical activity and the familiarity of the adolescent with different kinds of exercise and the appropriate strategies for doing regular exercise and the ways for reducing the individual as well as environmental barriers of regular exercising based on the model's constructs and in the form of speech and group discussion. The eighth session was held for the sports event and wall newspaper contest. After a month, the questionnaires would be responded again in order to measure the effect of the training sessions. In order to observe the ethical principles, the control also underwent the relevant trainings after the conduction of the study, and got the pamphlet and the educational booklets.

In this study, the data were analyzed by SPSS software program. Then, their conditions regarding their normality or abnormality were examined by Kolmogorov-Smirnov test. The difference between the groups was analyzed by the independent T test and Mann Whitney test. In order to compare the mean score of the change stages, change process, balance in decision making (perceived barriers and advantages), self-efficacy, and pre and post intervention performance of each group and between the two groups, the paired T test and the T test were respectively used.

RESULTS

In the research, the median of the intervention and control groups' age was 15 years that, with regard to Mann Whitney test, there was no significant variation between the two groups ($p > 0.001$). In addition, with respect to other demographic variables like parents' age, parents' education, and parents' occupation, housing status, number of family members, and the order of birth among children, there was no significant variation between the two groups, and they were consistent in this regard.

A great number of the study subjects (60% in the intervention group and 50% in the control group) were at the pre-reflection and reflection stages. According to the results obtained from measuring the change stages before the execution of the training intervention, there was not significant statistical difference between the two groups and they were consistent in this regard too ($p = 0.251$). The results of Wilcoxon's test indicate that there was no significant difference in the control group at the stages of physical activities change, and pre and post intervention stages ($p = 0.175$). Further, the results indicate that 12.5% of the participants in the intervention group were at the preparedness stage before the execution of the training program. However, the figure rose to

50% after the program. The results of Wilcoxon's statistical show a significant difference in the adoption of physical activities' change stages before and after the execution of the training intervention ($p = 0.000$). The students of the intervention group expressed a noticeable progress in passing the stages of change in adopting physical activities in comparison with the control group. Such a matter shows the positive effect of the training intervention on directing the students of the intervention group through the pre-operational stages to the operational stage of physical activities' adoption (45%). The determination and comparison of the constructs of the change process model in doing physical activities in the intervention and control groups indicate that there was no significant difference between the two groups before the execution of the intervention regarding self-efficacy, balance in decision making, stages of change, and the cognitive factors of change process as well as the levels of performing physical activities. However, a month after executing the intervention, a significant difference was found in all constructs ($p = 0.000$). Before the training intervention, there was no significant difference between the two groups at the cognitive and behavioral levels of change processes except for reinforcement management ($p = 0.021$). Nevertheless, the mean score of the levels of change processes has increased in the intervention group in relation to the control group, except for the stimulus control ($p = 0.109$) and helping relationships ($p = 0.068$). The results indicate the positive effect of the training program on increasing the adoption of change processes (cognitive or behavioral) by the participants in the prevention group. There was also a significant increase in the mean level of the change processes (except the social liberation, $p = 0.909$) in the intervention group before and after the intervention. In this group, 62.5% of the subjects (25 students) experienced the light intensity exercise or sedentary and 22.5% of them (9 students) experience the moderate physical activities before the training intervention. After the intervention, nevertheless, only 22.5% of the participants (9 students) had light activities and 72.5% (29 students) performed the moderate physical activities, and 5% of them (2 students) also experienced intense activities.

Table 1: Self-efficacy, balance in decision making, change process, perceived advantages and barriers, cognitive and behavioral factors of change process in the intervention group after the training intervention

Change stages	PC n=1		C n=1		P n=20		A n=12		M n=6		Kruskal Wallis Test. Sig.
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Processes	27.00	0.00	28.00	0.00	33.95	2.78	40.67	4.16	50.17	5.04	0.000
Self-efficacy	27.00	0.00	28.00	0.00	33.95	2.78	40.67	4.16	50.17	5.04	0.000
Balance in decision-making	77.00	0.00	77.00	0.00	75.75	4.49	77.42	4.60	78.00	4.65	0.796
Change process	69.00	0.00	73.00	0.00	70.15	10.27	73.67	8.83	73.00	3.95	0.850
Perceived advantages	42.00	0.00	42.00	0.00	39.85	4.09	40.33	3.72	40.17	3.31	0.962
Perceived barriers	35.00	0.00	35.00	0.00	35.90	3.09	37.08	1.73	37.83	1.60	0.412
Cognitive factors	41.00	0.00	45.00	0.00	42.25	4.98	43.75	5.59	43.17	3.37	0.904
Behavioral factors	28.00	0.00	28.00	0.00	27.90	5.97	29.92	5.93	29.83	3.64	0.870

Table 1 shows the relationship between the change stages of physical activity and other constructs of the model in the intervention group after the execution of the training intervention. Among these constructs, only self-efficacy ($p = 0.000$) exhibits a significant relationship with the change stages of physical activity. After the execution of the program in the intervention group, the results indicate the increase in the level of other constructs by the progress of students through the stages of change. Despite such increase in not significant, the level of self-efficacy of the students in doing physical activities significantly increased.

Table 2: Relationship between levels of physical activity and change stages of physical activity in intervention group after execution of program

Levels of activity	Light n = 9		Moderate n = 29		Intense n = 2		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Change stages								
Pre-reflection	1	100	0	0.00	0	0.00	1	100
Reflection	1	100	0	0.00	0	0.00	1	100
Preparedness	7	35.0	13	65.0	0	0.00	20	100
Operation	0	0.00	12	100	0	0.00	12	100
Preservation	0	0.00	4	66.7	2	33.33	6	100
Total	9	22.5	29	72.5	2	5.0	40	100
Result of test	Fisher s Exact Test: Exact.Sig.(2-tailed) = 0.001							

Before the execution of the program in the intervention group ($p = 0.131$) and in the control group ($p = 0.410$), there is not any significant relationship between the levels of physical activity and change stages of physical activity. But such relationship in the intervention group became significant ($p = 0.001$) after the intervention (Table 2).

DISCUSSION

According to the results of comparing the stages of change in physical activities in the intervention and control groups, only 7.5% of participants (three students) of the control group entered the operational stage;

however, they had a noticeable progress in passing the stages of change in adopting the physical activities as 55% of participants passed the stages of pre-reflection and reflection to the higher stages of adopting physical activities, and 14.5% of participants passed from the pre-operational stage to operation.

The results of the study of Merifindorf *et al* (2007) on 272 70 year old women during 28 weeks of training programs for physical activity based on the stages of change model and pursuing physical activities for one year indicates the effect of the program on passing the individuals from the pre-operational stages to operation. In their study, 83% of the participants in the intervention group and 17% of the participants in the control group entered the operational stage (operation and preservation) after one year of pursuing (45). The findings of Ghahramani *et al* (2009) showed that there was a significant difference in the experiment group regarding the construct of the stages of change before and after the intervention, yet such a difference was not observed in the control group (37).

The findings of our study are consistent with that of Karim Zadeh Shirazi *et al* (2007) too (33). Thus, the increase in the number of participants of the intervention group at the stages of preparedness and operation at the end of the joint part of the study can be associated with the training strategies used in this part. The construct of the stages of change is based on the fixed assumption that training is able to progress individuals during the stages (47).

The examination of the constructs of balance in decision making, the cognitive and behavioral factors of change process, and the perceived barriers of doing exercise in the intervention group before and after the training program showed that the mean score of all of the constructs of the model was increased. This score, further, was significant among all constructs except change process. In addition, our findings suggest the increase in the mean score of the model's constructs in the intervention group in relation with the control group after the execution of the program. Such an increase was statistically significant among all of the constructs after the training intervention. As a results, the findings of the study show the effectiveness of the designed intervention on improving the performance of the participants in the intervention group in the model's constructs. In their intervention study on 116 45-60 year old women suffering from osteoporosis, Karim Zadeh Shirazi *et al* (2007) examined the effect of the exercise program based on stages of change model. They reported that the mean of the model's constructs increased after the execution of the training intervention (33). Their study is consistent with our findings. In addition, our findings are consistent with the results of the study of Trish Gorelyet *al* (2000) on 18-60 year old individuals (48).

The results of examining the relationship between the construct of stages of change and other constructs suggest the existence of such a relationship between all constructs, except balance in decision making and the perceived barriers before the training program in the intervention group as well as the relationship between all constructs except balance in decision making and the perceived barriers and advantages before the intervention in the control group. Moreover, after the intervention in the control group, a significant relationship between the stages of change and other constructs of the model, except the perceived advantages, was not observed. In the intervention group, nevertheless, the progress of students during the stages of change increased the level of other constructs, but only self-efficacy exhibited a significant relationship with stages of change. Such a relationship between the two constructs is consistent with the findings of Garret Dutton (2009) who studied on 57 year old diabetic patients (49). On the other hand, the results of the study of Plotnicoff *et al* (2001) on 683 men and women showed that there is a significant relationship between the constructs of balance in decision making, cognitive and behavioral processes of change, and self-efficacy on the one hand and progress during the stages of change on the other hand. Based on the results of our study (50), however, only self-efficacy is significantly associated with the stages of change in physical activity.

In their study on the application of the stages of change model for identifying the effective factors for doing physical activity, Kim *et al* (2007) reported no significant relationship between all of the model's constructs and stages of change after the end of the training intervention. They also pointed out in the study that there is no significant relationship between the stages of change and balance in decision making, but they reported the significant relationship between the former and the constructs of change processes and self-efficacy in doing physical activity (51). The matter of no significant relationship between the stages of change and the model's constructs in their study is consistent with the findings of our study. Such a non-relation can imply that more theoretic session should have been held in the intervention process. The amount of utilizing the levels of cognitive and behavioral processes increases with the progress of individuals during the stages of change. That is, individuals use more cognitive processes at the stages of pre-operation and more behavioral processes at the stages of operation. Such amatter can be implied from the findings of comparing the intervention and control groups after the execution of the program; in the intervention group, the amount of utilizing the processes of change at the levels of consciousness raising, dramatic relief (dramatic stimulation), environmental reevaluation, self-reevaluation, helping relationships, reinforcement management, counter conditioning, self-liberation, and stimulus control were increased significantly. However, the increase in social liberation was not significant. Moreover, the comparison of the two groups shows that the intervention group underwent a significant increase in all of the levels of cognitive and behavioral processes (except helping relationships and stimulus control) in relation with the control group. In their study about the role of learning the cognitive processes in the

preservation and continuity of physical activity on 108 men and women, Losco et al (2003) reported the increase in the levels of environmental reevaluation, self-reevaluation, counter conditioning, stimulus control, reinforcement management, and self-liberation after the execution of their program (52). Such a matter points to the fact that our study was more successful in increasing the utilization of change processes.

According to the results of the studies conducted by Prochaska (53) and Plotnicoff (50), the role of behavioral or environmental processes among the processes of change is more evident than the role of cognitive or experimental processes for predicting the passing of individuals through the stages of change. In the studies of Prapavis, two behavioral processes of counter conditioning and self-liberation were the predictors of exercise behavior (54).

Before and after the prevention, there is no significant relationship between the intervention group and the control group. Our results are contrary to the study carried out on inactive diabetic individuals by Kirk et al (2004). In their study, they observed a significant difference between the two groups in doing physical activities (55).

According to the basic transtheoretical concepts, the degree of behavior adoption increases with the progress of individuals through the construct of stages of change. Our findings of examining the relationship between physical activity and stages of change imply this matter. Before the execution of the program, no relationship was observed in the two groups between the stages of change and the levels of physical activity. In the training program of the control group, all of the 13 students with light physical activity (no physical activity) were at the pre-operational stages of change. Also among 25 students with moderate physical activity, all of them were at the preparedness, operation and preservation stages of change, and the two students with the intense physical activity are at the preservation stage. Further, the results of our investigation indicate the significant relationship between the intensity of physical activity and the stages of change ($p = 0.000$). All of the nine students with the light physical activity (no physical activity) are at the pre-operational stage of change, and all of 29 students with moderate physical activity, and two students with intense physical activity were at the operational stages of change. In addition, the results of Fisher's test indicate the significant relationship between the intensity of physical activity and stages of change in the activity.

The results of our study are consistent with the findings of Kirk (55) and Kim (51) about the enhancement of physical activity and progress during the stages change. No significant relationship between physical activity and the constructs of the model was observed in the control group after the execution of the program. The results of testing the intervention group after the program show the significant relationship between physical activity and self-efficacy ($p = 0.001$). In other words, the increase in self-efficacy leads to the increase in doing exercise.

Kim (51) and Kirk (55) reported the relationship between physical activity and all of the transtheoretical constructs. Therefore, our findings are contrary to these studies. One of the reasons behind such contrariness can be the variation of age group, education, or cultural differences of the studies.

After the execution of the intervention, no significant relationship was observed between physical activity and the constructs of the model in the control group (except the level of helping relationships, $p = 0.008$; stimulus control, $p = 0.037$). although there is no significant relationship between the levels of change processes and physical activity, individuals with intense physical activity have higher mean scores in environmental reevaluation, self-reevaluation, helping relationships, reinforcement management, self-liberation, and stimulus control than individuals with light physical activity.

Losco et al (2004) reported in their study after the execution of their program that self-reevaluation and stimulus control are strong predictors of doing physical activity (52).

Conclusion

The results of our study indicated that planning and executing the training interventions according to transtheoretical model lead to significant differences in the stages of change, change process, balance indecision making, and self-efficacy of students. Such a matter shows that the intervention program has a positive effect and suggests the necessity of using training interventions planned for increasing exercise. Thus, the utilization of this model is recommended in the training programs for increasing the intensity of performing physical activities.

REFERENCES

1. Moeini BR, M; Hazaveie, S; Allahverdipoor, H; Moghimbeygi, A; Mohammadfam I. Effect of education based on trans-theoretical model on promoting physical activity and increasing physical work capacity. *Iranian Journal of Military Medicine*. 2010;12(3):1230.-3
2. Daskapan A TE, Esker L. Perceived barriers to physical activity in University Students. 2006(5):615-20.

3. Connaughton AV WR, Connaughton DP. Graduating Medical Students' Exercise Prescription Competence as Perceived by Deans and Directors of Medical Education in the United States: Implications for Health People 2010. 2001(116):226-34.
4. Assis M, Mello M, Scorza F, Cadrobbi M, Schoedel A, Silva S, et al. Evaluation of physical activity habits in patients with posttraumatic stress disorder. *Clinics*. 2008(63):473-8.
5. EW. M. Physical activity in the prevention and treatment of anxiety and depression. *Nord J Psychiatry*. 2008:25-9.
6. Giacobbi PR JR SM, Hardin B, Bryant L. Physical activity and quality of life experienced by highly active individuals with physical disabilities. *Adapt Phys Active Q*. 2008(25):189-207.
7. Norouzi AGp, F; Heidarnia , A R; Tahmasbi, R. Determinants of physical activity based on Health Promotion Model (HPM) in diabetic women of Karaj diabetic institute Southern Medical Journal. 2010;13(1):41-51.
8. Martinsen E. Physical activity in the prevention and treatment of anxiety and depression. *Nordic Journal of Psychiatry*. 2008;62(S47):25-9.
9. Martin K, Schoster B, Shreffler J, Meier A, Callahan L. Perceived barriers to physical activity among North Carolinians with arthritis: findings from a mixed-methodology approach. *North Carolina medical journal*.68(6):404.
10. Thøgersen Ntoumani C. An ecological model of predictors of stages of change for physical activity in Greek older adults. *Scandinavian Journal of Medicine & Science in Sports*. 2009;19(2):286-96.
11. Alagh T, Omokhodion F. Health related practices of students of the University of Ibadan. *Afr J Med Med Sci*. 2004;33(2):109.
12. Taymoori PN, 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 university*. 2006(4):393-406.
13. Azadi AA, M; Alhani, F; Hagi zade, E. The effect of implementation of health promotion program in school to control risk factors for obesity in adolescents Iranian South Medical Journal. 2009;11(2):153-62.
14. Ferin NR, A Z; Mahbob, S; Kolahi, S; GHavami, M. The relationship between physical activity and bone mineral density in postmenopausal women. *Medical Journal Tabriz of University of Medical Sciences & Health Service*. 2008;30(1):79-83.
15. Antunes H, Stella S, Santos R, Bueno O, Mello M. Depression, anxiety and quality of life scores in seniors after an endurance exercise program. *Revista Brasileira de Psiquiatria*. 2005;27:266-71.
16. Salmon P. Effects of physical exercise on anxiety, depression, and sensitivity to stress: A unifying theory. *Clinical Psychology Review*. 2001;21(1):33-61.
17. Frost JM, SJ. The relationship of self-esteem and body satisfaction to exercise activity for male and female elementary school, high school, and university students. *Athletic Insight: The Online Journal of Sport Psychology*. 2005;7(4):36-49.
18. Ghaffari FF, Z; Mazloom, R. The effect of regular exercise program on self esteem of nursing students. *Journal of Babol University of Medical Sciences*. 2005(1):52-7.
19. Shabaz zadegan BF, R; Ghanbari, A; Atrkar roshan, Z; Adib, M. The Study of the Effects of the Regular Exercise Program on the Self-Esteem of the Elderly in the Old People Home of Rasht. *Scientific Journal of Ardebil University of Medical Science* 2008;8(4):387-93.
20. Kirkcaldy B, Shephard R, Siefen R. The relationship between physical activity and self-image and problem behaviour among adolescents. *Social psychiatry and psychiatric epidemiology*. 2002;37(11):544-50.
21. Sheikholeslam R, Mohamad A, Mohammad K, Vaseghi S. Non-communicable disease risk factors in Iran. *Asia Pac J Clin Nutr*. 2004;13(^ s2.(
22. Teymouri PN, 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 *journal armaghan danesh*. 2006;12(2):47-59.
23. Ward D, Saunders R, Felton G, Williams E, Epping J, Pate R. Implementation of a school environment intervention to increase physical activity in high school girls. *Health education research*. 2006;21(6):896.

24. Saffari MS, D; Ghofranipour, F; Heydarian , A ; Pakpour , A. Health Education & Promotion Theories, Models & Methods. tehran: sobhan; 2001.
25. Karimzadeh Shirazi KN, 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 Research Journal. 2007;10(2):34-42.
26. Plotnikoff R, Hotz S, Birkett N, Courneya K. Exercise and the Transtheoretical Model: A Longitudinal Test of a Population Sample* 1. Preventive Medicine. 2001;33(5):441-52.
27. Tung W, Gillett P. Stages of change for physical activity among family caregivers. Journal of advanced nursing. 2005;49(5):513-21.
28. De Bourdeaudhuij I, Philippaerts R, Crombez G, Matton L, Wijndaele K, Balduck A, et al. Stages of change for physical activity in a community sample of adolescents. Health education research. 2005;20(3):357.
29. Dumith S, Gigante D, Domingues M. Stages of change for physical activity in adults from Southern Brazil: a population-based survey. International Journal of Behavioral Nutrition and Physical Activity. 2007;4(1):25.
30. Boyle R, O'Connor P, Pronk N, Tan A. Stages of change for physical activity, diet, and smoking among HMO members with chronic conditions. American Journal of Health Promotion. 1998;12:170-5.
31. Berry T, Naylor P, Wharf-Higgins J. Stages of change in adolescents: an examination of self-efficacy, decisional balance, and reasons for relapse. Journal of adolescent health. 2005;37(6):452-9.
32. Buckworth J WL. Application of the transtheoretical model to physically active adults. Journal of Sports Medicine and Physical Fitness. 2002(42):360-7.
33. Karimzadeh Shirazi KL, M Wallace; Nikhnami, Sh; Hidaria, A; Torkamam G, Mollie Gilchrist, 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 education research. 2007;22(3):305-17.
34. Nigg C, Courneya K. Transtheoretical model: Examining adolescent exercise behavior. Journal of adolescent health. 1998;22(3):214-24.
35. Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard C, et al. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. Jama. 1995;273(5):402.
36. Mazloomi mahmoudabad SM, M; Moravtisharifabad, M A; Fallah zade, H. *A Study of the Role of Decisional Balance in Exercise Status Among Yazd's Staff Based on Transtheoretical Model*. 2009:57-65.
37. Ghahremani L NS, Mosavi MT, Heidarnia AR, Karimzadeh Shirazi K, Babaei GH. Transtheoretical Model-Based (TTM) Interventions to Improve Physical Activities in Elderly Men armaghan danesh. 2008;13(1).
38. Rahimi M. Evaluation of Effectiveness " Physical Activity Promoting s Program " on Promotion physical Activity and Increasing Physical Work Capacity U Sing the Transtheoretical Model at ASSAD Employees. Ath: Hamadan University of medical science; 2009.
39. International Physical Activity Questionnaire
<http://www.ipaq.ki.se/ipaq.htm>.
40. Kazemi AE-A, H; Nekuei-Zahraei, NS. Pattern of physical activity and the promoters among adolescent girls of Isfahan. Journal of Ghazvin University of Medical Sciences. 2010;15(1):39-47.
41. IPAQ Scoring Protocol. <http://www.ipaq.ki.se/scoring.htm>.
42. Protocol. IS. <http://www.ipaq.ki.se/scoring.htm>.
43. Kathleen Y. Wolin DPH, Sandy Askew, Charles E. Matthews, and Gary G. Bennet. Validation of the International Physical Activity Questionnaire- Short Among Blacks. J Phys Act Health. 2008 September 5(5):746-60.
44. Karimzadeh Shirazi K. A Home-Based, transtheoretical change model designed strength training intervention to increase exercise to prevent osteoporosis in Iranian women aged 40-65 of shiraz. Tehran: Tarbiat modarres; 2006.
45. Findorff MJ, Stock HH, Gross CR, Wyman JF. Does the Transtheoretical Model (TTM) explain exercise behavior in a community-based sample of older women? Journal of aging and health. 2007;19(6):985-1003.

46. Molaison EY, MK. Stage of change and fluid intake in dialysis patients. *Patient Educ Couns.* 2003;49:141-9.
47. Casazza K CM. The method of delivery of nutrition and physical activity information may play a role in eliciting behavior changes in adolescents. *Eating Behaviors.* 2007;8(1):7382.-
48. Gorely T, Bruce D. Six month investigation of exercise adoption from the contemplation stage of the transtheoretical model. *Phschol Sport Exer.* 2002;1:89-101.
49. Dutton GRT, F ; Provost, B C; Sorenson, J L; Allen, B; Smith, D Relationship between self-efficacy and physical activity among patients with type 2 diabetes. *J Behav Med.* 2009;32:270-7.
50. Plotnikoff RCH, S.B; Birkett, N.J; Courneya, K.S. Exercise and the transtheoretical model: a longitudinal test of a population sample. *Preventive Medicine.* 2001;33(5):441-52.
51. Kim YH. Application of the transtheoretical model to identify psychological constructs influencing exercise behavior: A questionnaire survey. *International journal of nursing studies.* 2007;44(6):936-44.
53. Levesque L, Gauvin L, Desharnais R. Maintaining exercise involvement: The role of learned resourcefulness in process of change use. *Psychology of Sport and Exercise.* 2003;4(3):237-53.
54. Prochaska JO, Redding CA, Evers KE. The transtheoretical model and stages of change .*Health behavior and health education: Theory, research, and practice.* 2002;3:99-120.
55. Prapavessis H, Maddison R, Brading F. Understanding exercise behavior among New Zealand adolescents: A test of the Transtheoretical Model. *Journal of adolescent health.* 2004;35(4):346. e17- e27.
56. Kirk A, Mutrie N, MacIntyre P, Fisher M. Effects of a 12-month physical activity counselling intervention on glycaemic control and on the status of cardiovascular risk factors in people with Type 2 diabetes. *Diabetologia.* 2004;27(4):289-96 .