

Effectiveness of an Educational Intervention to Participation in Physical Activity: A quasi-experimental model-based study

Saeideh Shahsavari

Hormozgan University of Medical Sciences Faculty of Medicine

Sakineh dadipoor

Hormozgan University of Medical Sciences

Mohtasham Ghaffari

Shaheed Beheshti University of Medical Sciences

Ali Safari-Moradabadi (✉ alisafari_31@yahoo.com)

Shahid Beheshti University of Medical Sciences <https://orcid.org/0000-0002-8310-5160>

Research

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Abstract

Background: The aim of the present study was to assess readiness to become or stay physically active according to the Stages of Change Model.

Methods: The present quasi-experimental study was conducted on 100 women working in the healthcare centres of Bandar Abbas, Iran. The sampling method is clustering in type. The subjects were assigned into two groups of intervention and control. The collected data were analysed by SPSS-16 software using descriptive and inferential statistics, including independent-sample t-test, paired-sample t-test and Chi-square test.

Results: Before the educational intervention, 19 subjects (0.38%) from the intervention group showed to have regular physical activity (4-5 stages). This number changed to 29 (0.58%) and 25 (0.50%) after three months and six months of intervention. A statistically significant difference was found before the intervention and 3 and 6 months afterwards ($P \leq 0.001$). In the control group, no statistically significant difference was found between the pre-intervention and post-intervention (three months ($P = 0.351$) and six months ($P = 0.687$)).

Conclusion: The educational intervention based on the stages of behaviour change model showed to be effective in promoting the physical activity of employed women. These findings may benefit health education researchers and practitioners who tend to develop innovative theory-based interventions and strategies to increase the level of physical activity in women.

Background

Physical activity (PA) is a key to maintain health, and has several advantages such as preventing or lowering the threat of cardiovascular diseases, hypertension, and diabetes [1, 2]. Furthermore, it helps to improve mental health, helps to manage stress, lower anxiety and depression, raise self-confidence and feelings of collaborative work and academic performance [3, 4].

Despite all the convincing evidence on the benefits of physical activities, healthy adults often have inadequate physical activity [5]. According to the reports of World Health Organization (WHO), About 3.2 million mortalities that occur annually are accounted for by inadequate physical activity. Moreover, in all WHO Regions, men showed to be more active than women. The widest divergence lay in the prevalence of the two sexes in Eastern Mediterranean region. It was true for about every country [6].

In the United States, a total rate of 8.3% of mortalities were attributed to insufficient levels of physical activity [7]. As revealed by the most recent Behavioural Risk Factor Surveillance System (BRFSS) data, Kentucky was found with the highest percentage of inactivity reported in adults at a rate of 32.3% [8].

As estimated by WHO, the rate of physical activity in Iranian population is about 34% and, if this rate continues, it is predicted to reach about 50% by 2020 [9]. The results obtained from a national survey by

WHO in Iran indicated that, the prevalence of physical inactivity in urban and rural areas, with an emphasis on exercising in leisure time, among 15-64 year-old men and women was respectively 76.3% and 58.8 [10]. Moreover, a review research reported the prevalence of inactivity in Iran as 30-70% [11]. A body of related research in Iran show the essentiality of a well-organized and systematic education for different classes of society to raise their awareness of the advantages of physical activity, pave the way for a healthy life-style and integrate more physical activity in routine life [12-15].

Theories and models of health behaviour

The value of health education and health promotion programs depends on their effectiveness, which in turn, depends on a proper use of existing models and theories of health education and promotion. In order to have an effective and beneficial intervention in physical activity, having a proper behaviour change model is vital. Different investigations have shown that most effective educational programs are based on theoretical approaches that are rooted in behaviour change models. Selecting the right model or theory is the primary step in the planning of educational programs [16].

Stages of behaviour change model

The model of stages of behaviour change is a model of behaviour change that has a key algorithmic framework. The assumption of this model is that people can be categorized at different stages of preparation for behaviour change. Thus, to change their behaviour, they go through five different stages, including pre-contemplation, contemplation, preparation, action, and maintenance. Pre-contemplation occurs when a person does not think about changing a behaviour for at least the next 6 months. Contemplation is when a person seriously thinks about changing a behaviour within 6 months, but he/she is not yet prepared to do so. In the preparation stage, a person seriously considers changing a behaviour and aims to make a big change in near future. In the action stage, a person has made appropriate changes to his/her life-style in the past 6 months. The maintenance stage is marked by sustained behaviour change for more than 6 months, but it requires more active and thoughtful attempts (Figure 1).

“Health Belief Model (HBM)” as a theoretical framework for intervention

The health belief model has been used to explain healthy behaviour and physical activity in different studies [17, 18]. According to HBM, perceived threat to health is influenced by general health values (interest in and concern about health) and believing in vulnerability towards a health threat and consequences of a health problem. Once people perceive a threat to their health, they begin to act (internally or externally), and if they perceive the benefits to be more than the barriers, they will most probably take a preventive action [19].

Hormozgan province in terms of Medical facilities is considered as the most disadvantage province of Iran. Considering the lack of diagnostic facilities, lack of education, and ignorance towards the principles of prevention, [20, 21]. Therefore, in this study, we planned to strategically employ the validated health

behaviour concepts (in HBM) alongside the domain-specific knowledge scales to readiness to become or stay physically active.

Method

Study Design and Sampling

In this quasi-experimental study, the target population was all women working in healthcare centres of Bandar Abbas, Iran. The sample size was estimated to be 100 individuals (50 in the intervention and 50 in the control group) using a formula with an attrition rate of 10%.

The sampling method is clustering in type. Firstly, from among 20 healthcare centers in Bandar Abbas as the clusters, 4 centers were selected on a random basis. From these 4, 2 were assigned to the intervention group based on a simple randomization and 2 were assigned to the control group. Finally, the subjects were selected from these centers and entered the study. This study was conducted between December 2017 and August 2018.

Inclusion and exclusion criteria

The inclusion criteria in this study were; to work as female employee at one of the healthcare centres of Bandar Abbas, to have at least 6 months of work experience before reaching the age of retirement, to give consent to take part in this research, and to have no specific disease that might impede regular physical exercises. The exclusion criteria included; not willing to take part in the study, having a problem or deficiency that could impede physical activity during the study, being absent for more than 2 training sessions.

Instrumentation

The data collection instrument was a tripartite questionnaire. The first part contained demographic questions about the age, gender, marital status and education.

The second part addressed: The stages of moving towards physical activity were measured by a specific question that aimed to categorize participants to one of five groups taken from Godin and Shephard [22] and extended by Prochaska et al. [23]. **Table 1** shows the readiness for physical activity stages of change scale and the constituent parts of the questionnaire.

TABLE 1: The readiness for physical activity stages of change scale

Stage	Questionnaire response categories	Motivational readiness for change
1	I am currently not physically active and do not intend to engage in physical activity in the next six months	Pre-Contemplation (PC) (Physically inactive, no intentions to change)
2	I am currently not physically active, but I am thinking about getting more physically active in the next six months	Contemplation (C) (Physically inactive, intentions to change)
3	I currently do some physical activity, but not regularly	Preparation (P) (Physically active, but not regularly)
4	I am currently physically active, but have only begun doing so within the last six months	Action (A) (Regularly active, but only recently)
5	I am currently physically active and have done so for more than six months	Maintenance (M) (Regularly active)

The criterion for physical activity in this study was to exercise at least 3-5 times a week and each time for at least half an hour during which, the heart and respiration rates would increase and would make the person to perspire such as jogging and biking.

The third part of the questionnaire was related to perceived benefits and barriers, which were taken from the Benefits/Barriers Scale developed by Sechrist et al. The questionnaire included 43 items, among which 29 were devoted to perceived benefits and 14 were related to perceived barriers. The higher score indicated the higher perception of existing barriers or benefits of physical activity [24]. Also, to evaluate the perceived self-efficacy, the 8-item Exercise Self-Efficacy Scale was used [25], (**Table 2**).

Table 2: Description of the research instrument

Construct	No. of Items (Format)	Scoring (Range)	Item Example
Perceived barriers: Health-related behaviors are also a function of perceived barriers to taking action.	14 items/ 4 point Likert Scale	Strongly Disagree=1, Agree=2, Disagree=3, Strongly Disagree=4 (14-56)	Exercising takes too much of my time
Perceived benefits: Health-related behaviors are also influenced by the perceived benefits of taking action.	29 items/ 4 point Likert Scale	Strongly Disagree=1, Disagree=2, Agree=3, Strongly Agree=4 (29-116)	Exercise improves my mental health
Self-efficacy: refers to an individual's perception of his or her competence to successfully perform a behavior	8 items/ 5 point Likert Scale	Not at all true=1, true=2, In-between=3, true=4, Very true=5 (8-40)	I could exercise even if I was tired

Ethical considerations

The study on which these data analyses are based was approved by the Ethical Board Committee of Shahid Beheshti University of Medical Sciences (Reference number IR.SBMU.PHNS.REC.1397.900). Once the required permissions were obtained from the University's deputy of research, the ethical considerations were taken into account. The participants were assured about the confidentiality of their information, and also they were told that their information will not be used for any instrumental purposes. An informed consent was obtained from all participants and only then, the study was conducted. The researcher visited the healthcare centres during daily shifts and provided information about the study plan and method, confidentiality of data and purpose of the study. At the end of study, the educational content used in the intervention group was also given to the subjects in the control group for ethical reasons.

Intervention

The pre-test was carried out in the intervention and control groups using relevant questionnaires (stages of change theory, perceived benefits/barriers, and perceived self-efficacy in HBM). The pre-test was done in two parts; the subjects in the first part were divided into five categories, including pre-contemplation, contemplation, preparation, action and maintenance. In the second part, participants were evaluated in terms of the aspects of the HBM (perceived benefits, barriers and self-efficacy). The results obtained from the pre-test along with the educational needs analysis helped to determine the educational materials and methods (educational package) and the number of educational sessions needed. For the intervention group, the educational sessions were held in the urban healthcare centre or healthcare base over a month. The educational content of each session was designed in accordance with the learners' understanding, use of valid scientific sources, teachers' comments and the constructs of HBM. Also, the target behavioural goals, the educational methods and the number and duration of required sessions were determined for each session. The content of each session was set in accordance with attendants' learning power (Pre-testing on 10 employed women with similar characteristics), use of credible scientific sources as well as field specialists' comments. Four 90-minute educational sessions were held in the form of lectures, and PowerPoint presentation of standard contents approved by the Ministry of Health. The educational contents included information that the female employee needed to know about the physical activity. Informative pamphlets were provided plus one session of group discussion for the intervention group as briefly addressed below:

Procedures of educational intervention:

1. **First session:** This session was held for those in the pre-contemplation and contemplation stages. In this session, the role of sports and physical activity was explained in relation to health along with the practical barriers to physical activity and useful strategies to overcome them. The materials used in this session were in the form of CD, poster and pamphlet.
2. **Second session:** This session of educational intervention was held by adding those at the preparation level. The educational contents of this category were presented in the form of lecture (PowerPoint presentation), question and answer in cognitive and affective domains. Also, to enhance the psychomotor domain, educational CDs were used.
3. **Third session:** This session was held in the presence of subjects at pre-contemplation, contemplation and preparation stages via question and answer. Then, the definition of physical activity, its types, duration and frequency of performance were explained.
4. **Fourth session:** This session was marked by the presence of those at the action and maintenance stages, whose presence could increase perceived self-efficacy. On the other hand, one's own perception of 'setting a good model for others' in the action and maintenance stages would add to the positive self-perception in this stage and would also add to the motivation for continuous physical activities. This session was held in the form of group discussions, question and answer and health education CDs.

The follow-up occurred three and six months after the educational intervention. It should be noted that, no intervention was done for the control group during the study. To provide a more accurate data and avoid any bias, the researcher was present during the questionnaire completion phase.

Data analysis

The collected data were analysed by SPSS-16 software using descriptive statistics (mean scores, standard deviation, frequency and percentage) and inferential statistics (independent-sample t-test, paired-sample t-test and Chi-squared test).

Results

As the results show, the mean age of the subjects in the intervention group was 34.02 ± 7.7 years and in the control group was 36.44 ± 9.34 years. Independent-sample T-test revealed no statistically significant difference between the two groups in terms of age before the intervention ($p=0.163$). The results of chi-squared test also showed no statistically significant difference between the control and intervention groups in terms of education level ($p \geq 0.05$).

Before the educational intervention, 19 subjects (0.38%) from the intervention group showed to have regular physical activity (4-5 stages). This number changed to 29 (0.58%) and 25 (0.50%) after three months and six months of intervention. A statistically significant difference was found before the intervention and 3 and 6 months afterwards ($P \leq 0.001$). In the control group, no statistically significant difference was found between the pre-intervention and post-intervention (three months ($P=.351$) and six months ($P=.687$)). (Table 3, Figure 2).

Table 3: Comparison of Participation of Regular physical activity Participants before and After Educational Intervention (Applying Change Stage Model)

Group	Before		After 3 Months		After 6 Months	
	Experimental N (%)	Control N (%)	Experimental N (%)	Control N (%)	Experimental N (%)	Control N (%)
Pre-contemplation	11(22)	10(20)	3(6)	9(18)	4(8)	9(18)
Contemplation	3(6)	5(10)	4(8)	9(18)	4(8)	4(8)
Preparation	17(34)	13(26)	14(28)	12(24)	17(34)	16(32)
Action	4(8)	8(16)	13(26)	6(12)	7(14)	7(14)
Maintenance	15(30)	14(28)	16(32)	14(28)	18(36)	14(28)
P-Value^A			<.001		<.001	
P-Value^B					.351	
					.687	

A: Compared 3 Months and 6 Months after intervention with before in Intervention Group

B: Compared 3 Months and 6 Months after intervention with before in Control Group

According to the repeated-measure test, statistically significant changes were observed in the intervention group in Psychological variable (perceived benefits, perceived severity and self-efficacy) affecting readiness to become or stay physically active in the three time spans. However, no significant difference was observed in the control group in this regard. Also, no statistically significant divergence was found between the control and intervention groups before and six months after the intervention in terms of above variables (except for the self-efficacy). However, the difference between the two research groups was statistically significant a three months after the intervention (**Table 4**).

Table 4: Comparison of the two research groups in terms of psychological variable post intervention, 3 and 6 months after the intervention

<i>Variable (Score rating)</i>	<i>Group</i>	<i>Rating</i>			<i>p- value**</i>
		<i>Before intervention</i>	<i>3 months after intervention</i>	<i>6 months after intervention</i>	
		Mean±SD	Mean±SD	Mean±SD	
Perceived barrier	experimental	30.06±7.27	23.86±6.66	26.5±5.71	.025
	Control	28.87±7.76	28.46±7.99	28.65±7.58	.504
	Mean difference	1.73	-4.6	-2.15	
	p-value*	.439	∅.001	.180	
Perceived benefits	experimental	96.58±15.62	102.47±11.10	100.95±12.84	.016
	Control	97.08±13.17	97.34±12.33	99.45±13.33	.053
	Mean difference	-0.5	5.13	1.5	
	p-value*	.823	.021	.602	
Self-efficacy	experimental	22.82±7.35	26.08±6.19	26.82±7.39	.002
	Control	23.45±7.42	23.56±5.81	24.24±5.12	.092
	Mean difference	-0.63	2.52	2.58	
	p-value*	.670	.039	.049	

* T-test

** R.M.ANOVA

The findings also showed a significant decrease in the trend of perceived barriers in the intervention group. But, no such significant change was observed in the control group. (**Figure 3**)

Discussion

Based on the stages of change model, the main purpose of intervention was to reduce the number of subjects at the inactive stages (pre-contemplation and contemplation stages) and promote them to the preparation and action stages. The results revealed that educational intervention caused significant changes in the number of subjects in the intervention group, as it promoted them from pre-contemplation and contemplation stages to preparation and action stages three and six months after the intervention. Especially, these changes were significant within three month time. Thus, transition from the early stages of change model and entry to preparation and action stages seemed to be correlated to the educational strategies used in the program. These findings can be compared to a body of research by Pirzadeh et al. [26], Titze et al.[27], Lach et al.[28], Taghipour et al.[29], Woods et al.[30], and Dallow et al.[31]that showed the subjects in the intervention group enjoyed a significant positive progress along the stages of change.

The results concerning the subjects' perceived barriers indicated that, the mean score of perceived barriers was significantly increased as a result of physical activities performed from the pre-contemplation and contemplation stages to maintenance from before the intervention to three months and then six months afterwards. However, this increase was not constant. In fact, only the mean score of perceived barriers after three months of intervention was significantly better than six months later. This improvement in the score of perceived barriers is in line with what was expected in the stages of change model. Moattari et al. in a research showed that, the score of perceived barriers was lower in students at higher stages of change [32]. Moreover, the research findings by Sarkin et al. [33] and Fahrenwald et al. [34] showed to be consistent with the findings of present study. However, the results obtained by Tung et al. [35] and Lee [36] are not consistent with the present study. It seems that, provision of proper sport facilities for the employed women can help to promote their physical activity in a regular basis.

The results concerning perceived benefits of physical activities in the present study revealed that, the mean score of perceived benefits was significantly improved in higher stages of change such as stage of maintenance. The mean score of perceived benefits showed a significant improvement three months and six months after the intervention. These findings are in line with a body of research by, Sarkin et al. [33] and Aghamolaei et al. [37], but are not consistent with the findings reported by Kirk et al. [38] and Young et al.[39]. In the light of present findings, it seems that health-related planning based on health education models/theories, and the use of messages to overcome perceived barriers and highlight the benefits of physical activities, along with the provision of required sport facilities, can lead to better and more regular physical activities in the employed women.

The results concerning the subjects' perceived self-efficacy in performing physical activity revealed that, the mean score of perceived self-efficacy induced by physical activity at higher stages of change (ie: the maintenance) significantly increased especially three and six months after the intervention. This finding is in line with several investigations [40, 41]. Aghamollaei et al. emphasized on the role of self-efficacy as a key component of performing physical activity [42]. Since self-efficacy affects people's motivation and pushes them toward taking preventive measures [43], special attention needs to be paid to the employed women's perceived self-efficacy in performing physical activity and using proper strategies to increase their level of physical activity.

Limitations of research

One of the limitations of the present study was the excessive number of items in the questionnaire, which could have affected the quality of responses. The short-term nature of educational programs was another limitation of the present study. It is, therefore, suggested in prospective investigations to use more extensive interventions with long-term follow-ups to apply behavioural models in life-long physical activity and its correlates. Self-reporting of the questionnaire can be considered as another limitation of this research. However, the use of such method is unavoidable in these studies and can cause a bias (researcher-desired report). In this research, anonymous questionnaires were used to minimize biases.

Conclusion

The present study provides useful information on the stages of change in physical activity and certain psychological factors (perceived self-efficacy, barriers and benefits) that can help to increase the physical activity of employed women at different stages. Further research are needed to employ strategies to increase the level of physical activity in terms of perceived self-efficacy and barriers.

Abbreviations

PA: Physical activity; WHO: World Health Organization; BRFSS: Behavioural Risk Factor Surveillance System; HBM: Health Belief Model

Declarations

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Ethics approval and consent to participate

The study on which these data analyses are based was approved by the Ethical Board Committee of shahid beheshti University of Medical Sciences. Participants were provided information about the study and consented by proceeding to take the survey; this implied consent was approved by the Ethical Board Committee of Shahid Beheshti University of Medical Sciences.

Consent for Publication

Not applicable.

Availability of data and material

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors have no conflicts of interest.

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Authors' contributions

SSH, SD, ASM, and MGH designed the study. ASM wrote the first draft. ASM conducted the analyses. All authors contributed to writing, revising, and approved the final manuscript.

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Figures

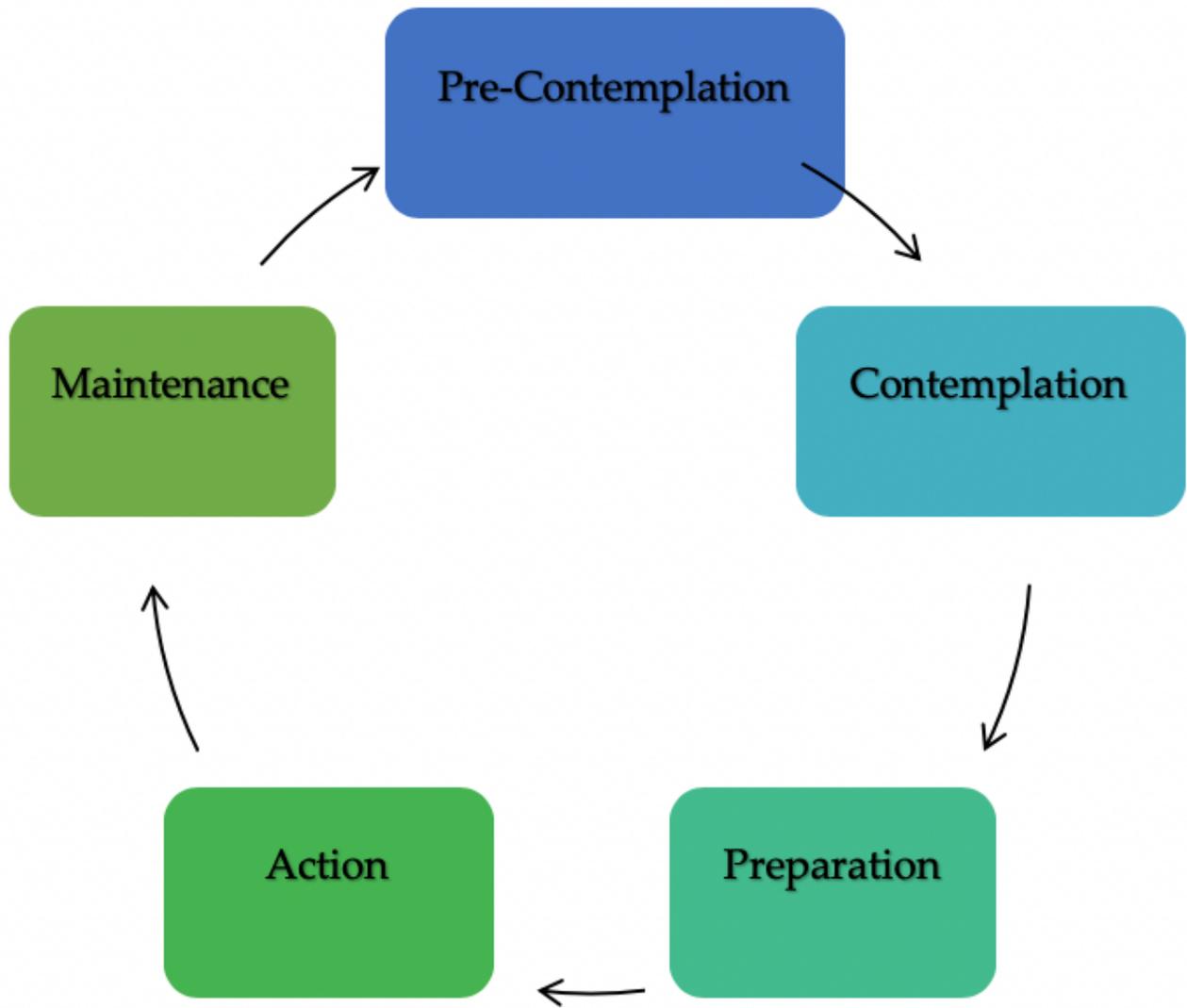


Figure 1

Stages of behavior change model (Source: Prochaska, J& DiClemente, C. (1995): Changing for Good: A Revolutionary Six-Stage Program for Overcoming Bad Habits and Moving Your Life Positively Forward. New York. Avon books)

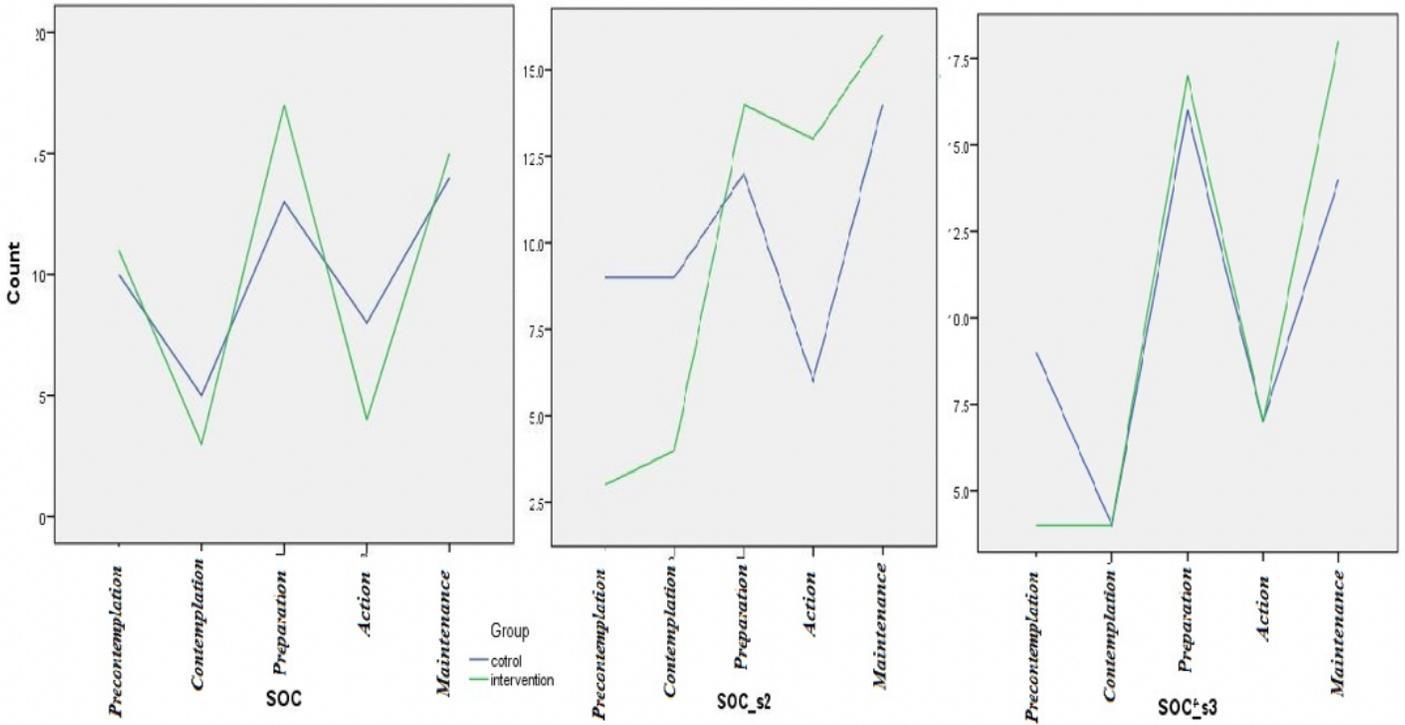


Figure 2

Compare the stages of change model in three different periods, three months and six months after the intervention in both experimental and control groups

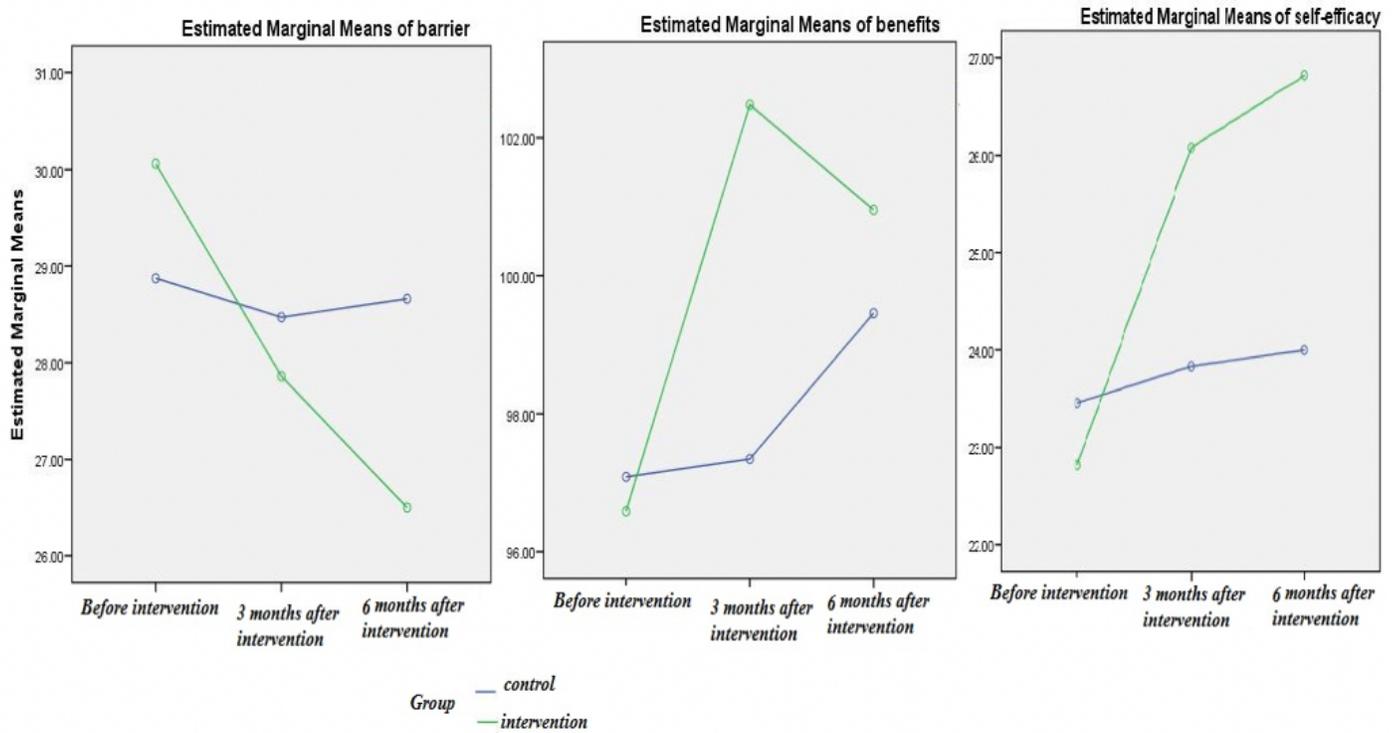


Figure 3

Changes in perceived benefits/barriers and self-efficacy before the intervention, three and six months after the intervention in the two research groups