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The effect of theory-based educational intervention on correct principles of manual material handling among men

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Abstract:

BACKGROUND: Changing human behavior for the purposes of improving the way people work is an integral part of most educational interventions. This study aimed to evaluate the effect of a model based on the theory of planned behavior (TPB) on correct principles of manual material handling (MMH) among male soldiers.

SUBJECTS AND METHODS: This study was a quasi-experimental, pretest-posttest research with a control group. Furthermore, 140 soldiers, from an area located in the city of Bandar Abbas, Iran, were selected through a simple random sampling and they were divided into two groups: intervention and control (70 subjects in each group). The data were collected using a three-part questionnaire including demographic information, the theory constructs, and MMH behavior. The intervention group was given the relevant education, and after 2 months, the both groups were evaluated.

RESULTS: Based on regression analysis, attitude toward behavior and perceived behavioral control were predictors for correct principles of MMH. There were significant differences between the mean scores of the theory constructs before and after the education in intervention group ($P < 0.001$); however, no significant differences were observed in the theory constructs in the control group after the intervention. Before the education, the mean score of MMH of the intervention group was 38.30 ± 6.45; but after, the education, this changed into 44.20 ± 6.01, and significantly increased ($P < 0.001$).

CONCLUSIONS: Educational intervention based on the TPB was effective in improving behavior for correct MMH in soldiers. Thus, the use of such educational programs according to the constructs of the planned behavior theory is recommended.

Keywords:

Educational intervention, manual material handling, musculoskeletal disorders, planning behavior

Introduction

Musculoskeletal disorders (MSDs) are some of the most common occupational injuries and disabilities in developing and industrialized nations.[1] These disorders are responsible for half of all occupational diseases, as well as the main cause of lost work time, absenteeism, increased costs, and human injuries.[2] According to reports, MSDs account for 40% of all occupational worker's compensation payments.[3,4] The risk factors involved in MSDs are varied. Awkward postures and incorrect ways of manual material handling (MMH) are most important and correcting these issues greatly helps the reduction of MSDs.[5]

MSDs are costly and can cause back pain, arthritis of the knees and joints, bone damage, and general deformation of the body's shape.[6-9] Research shows that ergonomic tool design is effective in reducing the damage caused by MMH

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though this is costly and cannot be used in developing countries. Even in more developed nations, proper manual handling techniques are implemented in manual labor.[10-12] Researchers have suggested a set of rules called the correct principles of MMH to prevent such injuries.[10]

In industries, factories and service sectors, soldiers perform various manual handling tasks; unfortunately, many of the soldiers do not follow these principles and may be at risk of developing MSDs leading to back pain, herniated disks, and knee pain.[7-12] There are many reasons why these principles are not followed by them and a lack of awareness can be one of them.[13,14] Achieving absolute safety in different activities and obtaining a burgeoning safety culture require a set up fundamental steps in all areas, most important of which is creating conditions for an increased level of awareness and changing the outlook of personnel in occupational environments.[15] The role of training is important for progress and development in reducing injuries in the manual handling of materials. Extensive and continuous planning and implementation of training programs for personnel is effective in reducing injuries caused by MMH because they also increase the level of skill, safety regulations, and protocols in tasks and improve the moral and self-confidence of the personnel.[15-17]

Apparently, different factors reflect human behavior and health education is known as the central pillar of health activities and programs. It should be noted that health education requires the understanding of behavior and factors affecting it order to be effective in changing or mitigating existing behavior and replacing them with new ones.

This issue determines the role of theories and models of behavioral studies in health education.[14,18] In this regard, it is expected that with the teaching of correct principle of MMH, the awareness and behavior of soldiers, who follow them, will change. The process of behavioral change is affected by many factors which have been studied by researchers and many theories have been presented.[14,18]

The theory of planned behavior (TPB) was suggested in 1987 by Ajzen and Fishbein. This model predicts the occurrence of a particular behavior on the condition that the subject has the intention of performing that behavior. This model considers intention as the determining factor in behavior. Intention is predicted using three constructs including attitude toward behavior, perceived behavioral control and subjective norm. Attitude toward behavior is the positive or negative evaluation of performing that behavior and consists of two subconstructs: behavioral beliefs and behavioral results evaluation.[19] Subjective norm refers to the perceived social pressure regarding the execution of that behavior. People usually act based on their understanding of what others think and their intention in potentially accepting a behavior is influenced by those who they have a close relation with. Perceived behavioral control is a measure of the person's perception of how easy or hard it is to perform a particular behavior. Behavior is always after intention and is connected to it. This behavioral theory is under the control of behavioral intention.[20,21] Moreover, perceived behavioral control can directly influence behavior.[13,19] Figure 1 shows the model of the TPB.

The TPB has been used in various health-related issues for decision making regarding a particular behavior.[14,22,23] and has had a positive effect on changing people's behavior in many studies of health-related behavior.[24,25] Since soldiers are constantly moving heavy objects manually, a lack of awareness and training in proper posture and correct handling of materials is prevalent. However, no research has been conducted on the effectiveness of educational intervention models in the behavior of soldiers. Therefore, this study was designed to assess the effect of the educational intervention based of the TPB on MMH Behavior.

Subjects and Methods

Research design and participants

This study was a quasi-experimental research, pretest-posttest research with a control group. The study population in this study comprised of soldiers tasked with the MMH in various occupations such as technical or floating factories, hospitals and service tasks in an area located in Bandar Abbas, Iran. Moreover, in this study, a control group was used. The study proposal was approved by the committee of ethics (Ethical code. IR.AJAUMS.REC.1397.103) prior to its execution. After procuring permits from the relevant authorities and sending out the required notifications, 148 participants were enrolled into the proper handling the materials training program. After determining the study objectives, the subjects were invited to participate and they were required to sign a consent form knowingly.

The criteria for entry into the program included: having physical and mental health using a using self-report questionnaire, literacy and at least 1 month of work experience in the field. The participants who missed any session of the training were excluded from the program. The intervention group was given the relevant educational intervention and after 2 months, both groups were evaluated. Eight subjects were excluded from the study based on the criteria. Finally, the participants were randomly assigned into the intervention group and control group, both of equal size (70 people in each group) [Figure 2]. To track short-term behavioral

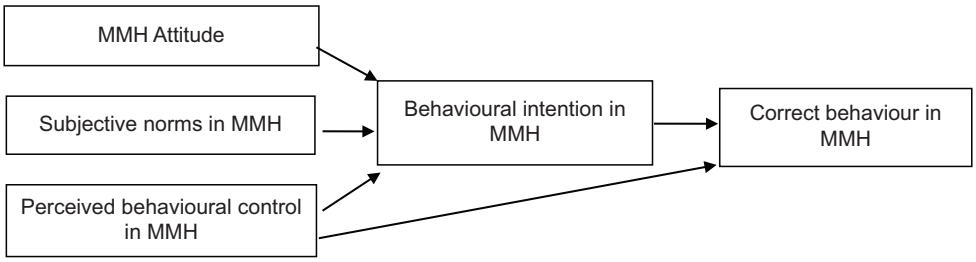

Figure 1: Overall schematic of the theory of planned behavior in the present study

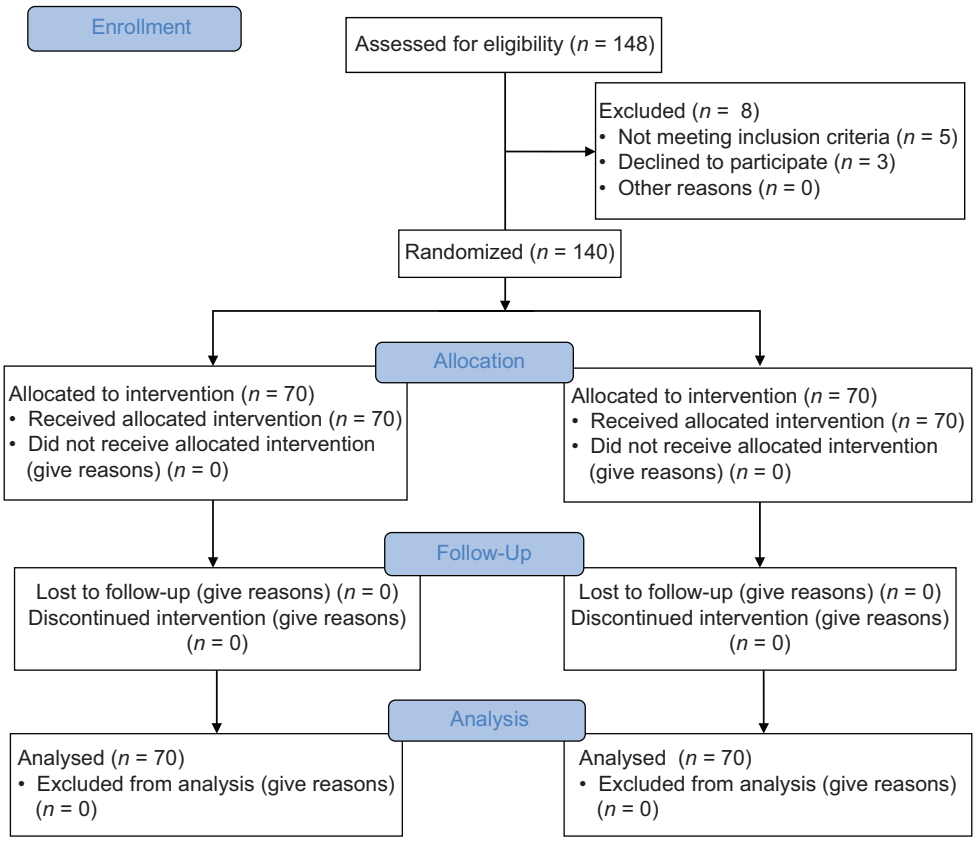

Figure 2: Consort 2010 flow diagram

changes in educational interventions using a TPB, according to previous studies and the Ajzen guide, usually 6–12 weeks are considered.[26-31] In addition, due to the limitation of the study site and time limited for the implementation of the project, it was not possible to spend more than 2 months. It should be noted that only the intention and change of behavior are considered, not the maintenance of behavior. In the present descriptive study, the regression method and structural modeling analysis were used for testing and examining the model structures and the relative weight of each structure for community understanding and intervention was examined and measured.[32]

Data collection tools

The data were collected using a three-part questionnaire. The first part acquires demographic information such as age, marital status, level of education, physical and mental health status, and training history. The second part included questions that measured the constructs of the TPB such as behavioral intention, attitude toward behavior, subjective norms, and perceived behavioral control. A question sample for each of the TPB structures is presented in Table 1. Attitude structure was divided into two parts: experimental and instrumental attitudes, each of which was measured directly and indirectly. In addition, indirect structures are behavioral beliefs. Attitude toward behavior was measured using 7 questions with a score from 7 to 35, that included 3 questions experimental attitude with direct measurement (2 questions) and indirect (1 question), 4 questions of instrumental attitude with direct measurement (3 questions), and it was indirect (1 question). Subjective norm was measured using 4 questions with a score from

Table 1: Questions sample for each of the theory of planned behavior structures

TPB structures	Questions sample
MMH attitude	What do you think about of MMH as expressed?
	1. Totally agree, 2. Agree, 3. No comments, 4. Against, 5. Completely against
Subjective norms in MMH	Most people who are respectful to me (such as parents and spouses) encourage me to MMH in the mentioned way
	1. Totally agree, 2. Agree, 3. No comments, 4. Against, 5. Completely against
Perceived behavioral control in MMH	The weight of the loads I carry is within my power
	1. Totally agree, 2. Agree, 3. No comments, 4. Against, 5. Completely against
Behavioral intention in MMH	I want to act the way I do every time I carry a load.
	1. Totally agree, 2. Agree, 3. No comments, 4. Against, 5. Completely against
Behavior in MMH	The MMH distance is minimal.
	1. Totally agree, 2. Agree, 3. No comments, 4. Against, 5. Completely against

TPB=Theory of planned behavior, MMH=Manual material handling

4 to 20 that 1 question was a subjective norm with direct measurement and 3 questions were normative beliefs with indirect measurement. Perceived behavioral control was measured using 4 questions with a score from 4 to 20, which included 1 question of the perceived control with direct measurement, 2 questions of control belief with indirect measurement, 1 question of self-efficacy with direct measurement and behavioral intention was measured using 3 questions with a score from 3 to 15. The Likert scale was used to determine the questions from 1 (strongly agree) to 5 (strongly disagree). The third part of the questionnaire contained questions regarding the behavior of correct material handling (27 questions). Of these 27 questions, 15 were related to behavior with a score from 15 to 75 and the remaining 12 questions were complimentary questions that measured other issues involved with correct handling of materials. These questions were also determined using the Likert scale with the options ranging from 1 (never) to 5 (always). The first and second parts of the questionnaire were self-administered while the third part was done through observations by the researcher. This questionnaire for MMH was designed by Kuchi *et al*. and its validity and reliability were being confirmed.[33] In order to assess the content validity quantitatively, two indicators of content validity ratio (CVR) and content validity index (CVI) were used. First, to determine the CVR, 10 occupational health and health education professionals were asked to review the designed questions of each item based on a three-part spectrum (necessary, useful, but not necessary, and not necessary). According to the Lawshe's table, to determine the minimum value of the index of CVR, the questions, which had a numerical value of CVR based on the evaluation of 10 experts higher than 62%, were considered statistically significant ($P < 0.05$) and maintained. Then, in order to assess the CVI based on the Walts and Bausell CVI, any question whose CVI was higher than 0.7 was accepted and the rest were deleted.[29] To determine the reliability of the questionnaire, Cronbach's alpha coefficient of the questions was calculated for each TPB structure, which was attitude (0.86), subjective norms (0.81), perceived behavioral control (0.88), behavioral intention (0.91), and behavior of MMH (0.89). Finally, the Cronbach's alpha of the whole questionnaire was 0.87.

Intervention

After conducting the pretest stage, an educational program was devised based on the results for the amelioration of behavior regarding correct MMH. In order to focus more on a TPB structure, the regression model was used. Attitude and perceived behavioral control were two parameters with higher predictive effect; therefore, further training intervention emphasized these two constructs. Four 60-min training intervention sessions were carried out (one each week) for the intervention group. The training program incorporated speeches, educational videos, animations, pamphlets, banners, question, and answer sessions and live demonstrations showing the correct handling of materials by each soldier within the intervention group (role-play). The film screening, brainstorming and group discussion on the benefits of the correct principles of MMH were used to change the attitude. In order to adjust the perceived behavioral control, the facilitating factors of behavior in groups were discussed and the subjects answered the questions. In addition, the correct principles of MMH were taught step by step. Group discussion was used to influence subjective norm and motivate. In addition, the guidance by Sharma was used to modify each of the model structures.[19] Two months after the intervention, questionnaires were again given to both groups as posttests to evaluate the achievement of the study objectives.

Data analysis

The data were analyzed using SPSS software version 20 (SPSS INC, Chicago, IL, USA).In order to calculate before and after averages for each construct, paired sample *t*-test was used. The mean scores of each group were compared using an independent *t*-test. The qualitative characteristics of the two groups were compared using the Chi-squared test. Predicting the intention of MMH was done using multivariable regression analysis. $P < 0.05$ was considered as statistically significant.

Results

A total of 140 the soldiers were enrolled into the intervention program. The mean age and work experience of the participants were 25.44 ± 7.77 and 4.63 ± 5.64 years, respectively. The highest level of education among the two groups was high school diploma for the test group (71.4%) and for the control group (72%). The results of the Chi-Squared test are presented in Table 2. It was shown that there was no significant demographic difference between the two groups as they were homogeneous ($P > 0.05$).

In this study, multivariable regression was used to predict the correct behavior of MMH using each of the model instruments. As shown in Table 3, the results of the multivariable regression analysis showed that perceived behavioral control is a predictor of intention for performing the behavior of correct MMH. The multivariable regression analysis also indicated attitude towards behavior and perceived behavioral control were better predictor of the behavior of correct MMH.

Table 2: Demographic information of the two participant groups (*n*=140)

Variable	Case (*n*=70)	Control (*n*=70)	*P*
Marital status			
Single	42 (60)	46 (65.7)	0.484
Married	28 (40)	24 (34.3)	
Education			
Primary	2 (2.9)	2 (2.9)	0.741
Secondary	7 (10)	3 (4.3)	
High school	50 (71.4)	51 (72)	
University	11 (15.7)	14 (20)	
Occupation			
Services	23 (32.9)	25 (35.7)	0.724
Technical	47 (67.1)	45 (64.3)	
Shift work			
Morning shift	46 (65.7)	43 (61.4)	0.601
Afternoon shift	24 (34.3)	27 (38.6)	
Work experience (year)			
<1	16 (22.9)	17 (24.3)	0.714
1-2	34 (48.6)	35 (50)	
>2	20 (28.6)	18 (25.7)	
Previous educational courses			
Yes	23 (32.9)	23 (32.9)	1
No	47 (67.1)	47 (67.1)	

The findings of the independent *t*-test presented in Table 4 indicated that before training intervention, no significant difference in scores existed for behavioral intention, attitude toward behavior, subjective norm and perceived behavioral control between the two groups ($P > 0.05$). After the intervention, however, a significant difference in mean scores was observed for the aforementioned constructs between the two groups ($P < 0.001$).

Based on the paired sample *t*-test results, a comparison of the mean scores for attitude toward behavior, subjective norm, perceived behavioral control and behavioral intention in the intervention group showed a significant difference between scores and the effect of the devised educational intervention in improving the level of these constructs ($P < 0.001$). No significant difference was seen in the mean scores for behavioral intention, attitude toward behavior, subjective norm, and perceived behavioral control in the control group after educational intervention ($P > 0.05$). In addition, the results showed that, before educational intervention, no significant difference existed regarding the behavior of correct handling of materials between the two groups ($P > 0.05$) [Table 4].

After the intervention, a significant increase was observed in the mean state of the behavior of correct handling of materials ($P < 0.001$). The state of the behavior of correct MMH had no significant difference among the participants in the control group ($P > 0.05$).

Discussion

Health organizations currently consider behavior as a key factor and a foundation for common disorders and health issues. Thus, it is suggested that, in order to reduce occupational hazards, a combination of ergonomic interventions and health promotion programs can be used; this results in behavior modification.[34,35] Training interventions can influence the behavior of people in

Table 3: Regression analysis of theory of planned behavior variables for predicting of correct handling of materials before intervention in both the study groups (*n*=140)

Parameter	Variables	R^2	Regression coefficient (β)	95% CI	*P*
Behavioural intention	Attitude	0.60	0.149	0.15-0.159	0.18
	Subjective norms		0.157	−0.002-0.30	0.54
	Perceived behavioral control		0.582	0.331-0.559	<0.001
MMH	Attitude	0.48	0.311	0.235-0.883	0.001
	Subjective norms		−0.100	−0.969-0.386	0.397
	Perceived behavioral control		0.309	−0.126-1.334	0.018
	Behavioral intention		−0.087	−1.017-0.482	0.482

CI=Confidence interval, MMH=Manual material handling

Table 4: Comparison of the statistical mean of scores for theory of planned behavior constructs and manual material handling in both groups before and after intervention (*n*=140)

Variable	Mean±SD		*t*, *P*
	Case	Control	
Attitude			
Before	25.18±4.09	24.38±3.59	−1.229, 0.221
After	27.75±3.53	24.65±3.45	−5.249, <0.001
t, *P*	−8.470, <0.001	−1.315, 0.193	
Subjective norms			
Before	13.02±2.62	13.27±2.10	0.604, 0.547
After	14.41±2.03	13.3±2.18	−3.121, 0.002
t, *P*	−6.183, <0001	−0.341, 0.734	
Perceived behavioral control			
Before	11.00±3.03	10.98±2.85	−0.029, 0.977
After	13.48±2.16	10.95±2.75	−6.033, <0.001
t, *P*	−10.050, <0.001	0.424, 0.673	
Behavioral intention			
Before	8.37±2.47	8.51±2.05	0.375, 0.708
After	10.45±1.81	8.78±1.87	−5.374, <0.001
t, *P*	−7.567, <0.001	−1.260, 0.06	
MMH			
Before	38.30±6.45	38.34±7.42	0.036, 0.971
After	44.20±6.01	38.57±6.99	−5.11, <0.001
t, *P*	−9.863, <0.001	−1.460, 0.149	

SD=Standard deviation, MMH=Manual material handling

occupational environments and enables them to improve their ability to adapt to these environments by changing their work behavior and prevent occupational MSDs.[36] The results of the present study showed that, among the TPB constructs, attitude toward behavior and perceived behavioral control were predictors of the safe material handling behavior. In other words, those workers who had a more positive attitude toward MMH and higher perceived behavioral control were more likely to perform the safe material handling behavior. It was found that TPB structures can predict 60% of the intention to perform the correct behavior of MMH; and among these structures, perceived behavioral control is most effective ($R^2 = 0.60$, $P < 0.001$). The findings also showed that TPB structures predicted 48% of MMH behavior; and among these structures, attitude and perceived behavioral control had the most impact and significance ($R^2 = 0.48$, $P < 0.01$). The observations reported by Warner *et al*.'s study showed that perceived behavioral control is a good predictor of changes in MMH behavior, which are consistent with those of the present study. Morowatisharifabad *et al*. predicted unsafe intentions and behaviors and they stated that the more perceived behavioral controls and intention the higher growth, the more they are likely to perform safe behaviors; these accord with the results of the current study.[37] Moreover, Ajzen showed that perceived behavioral control is the most important factor in behavior. Therefore, when people are unsure about their ability to perform a particular behavior, perceived behavioral control assessment can help predict these behaviors.[31]

Another study based on TPB was designed with the aim of predicting safe driving behavior among truck drivers; the findings of this study revealed that in those drivers who had a positive attitude towards behavior and higher perceived behavioral control, the intention of performing safe driving behavior was more likely, which was consistent with the present study.[38]

In this study, the structure of subjective norms was not a predictor of performing safe handling behavior ($P > 0.05$). The results of a study by Ashoogh *et al*. showed that subjective norms cannot predict the safety driving behaviors in truck drivers, which are consistent with the present study.[38] Furthermore, the results of Shalmaii *et al*.'s study indicated that subjective norms played the least role in predicting preventive behaviors of aggression, which is consistent with the results of the present study.[26] The results of the study by Mazloumi *et al*. depicted that subjective norms were more effective in predicting intention than other constructs.[39] In the study by Kuchi *et al*., subjective norms were predictors of intention, while behavioral intention and perceived behavioral control were also suitable predictors of change in the behavior of correct handling of materials.[33] Thus, the results of the studies by Mazloumi *et al*. and Kuchi *et al*. were not in agreement with the present study. The reason behind these contradicting results must be sought in different natures of the behavior under study and the different personal, social, and cultural characteristics of the participants.[33,39] Previous studies have shown that the effectiveness of an educational model can change

psychological, occupational, and social conditions of the participants.[6,7] That is, the reason why subjective norms were not predictors of intention may be due to environmental conditions of soldiers, which are different from other industrial and occupational environments. In industrial environments, correct handling of materials is dependent on the person's perception of approval by their superiors and managers, as the more emphasis is placed by them on performing safe behavior, the more those behaviors will be carried out and made into norms and values among workers and soldiers. This enforcement however may not be present in military environments.

In this study, TPB construct scores included behavioral intention, attitude toward behavior, subjective norms and perceived behavioral control had a s increase in significant he intervention group when compared with the control group ($P < 0.05$). Findings also indicated that, in the evaluation conducted 2 months after the intervention; these scores had a significant increase in the group that underwent intervention ($P < 0.05$). Another result of the study was the behavior improvement of the correct way of MMH after the training intervention in the intervention group compared to the control group ($P < 0.05$). In other words, the results of this study proved the effectiveness of the TPB in improving the MMH behavior. Similar studies conducted by other researchers had obtained similar results. Researchers working on the TPB had congruent results with the present study. The observations reported by Zeidi *et al*. indicated that educational intervention based on TPB can affect workers' awareness, attitude toward behavior, subjective norms, and perceived behavioral control regarding unsafe behavior and can improve their safety performance.[40] Besides, they reported that a significant difference was observed in the TPB construct scores in the intervention group.[38] Matlabi *et al*. conducted a study to determine the effectiveness of TPB educational programs in improving breast self-examination among women. The mean scores for TPB constructs displayed a significant increase in the intervention group when compared with the control group.[41] In a study by Fakhri *et al*., TPB educational intervention increased the use of hearing protection devices among workers.[42]

Based on the results of perceived behavioral control, more subjects can control the weight of the load, working conditions, equipment, and facilities; this causes they can easily withstand MMH.[38] It can also be concluded that by increasing subject's motivation to perform the correct mode of MMH, the MMH behavior is also improved.[38] Therefore, subjects tend to perform the correct principles of MMH more by training programs.

This study, like any other study, had certain strengths and limitations. The use of a model in the educational intervention along with allocating and pursuing subjects based on the target population are some of the strengths of this study. The literature review illustrated that there are very limited studies on the use of TPB in ergonomic interventions, including MMH. In addition, no research on PTPB in MMH among soldiers has been conducted to date. The self-report data and the fact that the intervention was only done in soldiers are some of the limitations of this study. A suggestion for future studies is the administration of the intervention among those in industrial occupations at the same time. Another suggestion is the comparison of this particular educational model with other models evaluating personal and social factors at the same time.

Conclusions

The results of this study showed that an educational intervention based on the TPB is able to change soldiers' awareness, attitude toward behavior, subjective norms, and perceived behavioral control regarding the correct principles of MMH and can improve their safety. Thus, the use of this behavior change model in other occupational environments and for other occupational behaviors regarding occupational safety is recommended.

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Conflicts of interest

There are no conflicts of interest.

References

1. Khandan M, Mosaferchi S, Koohpaei A. Assessing exposure to risk factors for work-related musculoskeletal disorders using ART method in a manufacturing company. Arch Hyg Sci 2017;6:259-67.
2. Amaro J, Magalhaes J, Leite M, Aguiar B, Ponte P, Barrocas J, *et al*. Musculoskeletal injuries and absenteeism among healthcare professionals–ICD-10 characterization. PLoS One 2018;13:1-13 [doi: 10.1371/journal.pone. 0207837].
3. Habibi E. Relationship between work ability and mental workload with musculoskeletal disorders in industrial jobs. J Prev Med 2016;2:29-38. Available from: http://jpm.hums.ac.ir/article-1-120-en.html
4. Newington L, Harris EC, Walker-Bone K. Carpal tunnel syndrome and work. Best Pract Res Clin Rheumatol 2015;29:440-53.
5. Ghanbary-Sartang A, Habibi E. Evaluation of musculoskeletal disorders risk using PATH method in construction workers. J Prev

Med 2016;2:14-20. [Accessed June 28,2020]. Available from: http://jpm.hums.ac.ir/article-1-118-en.html. [Last accessed on 2020 Jun 28].
6. Du Changwei ZC, Yuhui W, Fei Q, Xiao-Dan Q, Wen-Ying Z, Lin S, *et al*. Investigation into efficacy of psychological crisis intervention on post-accident radar soldiers in remote area. Clin J Med Officers 2013;2:190-191+206
7. Cohen SP, Gallagher RM, Davis SA, Griffith SR, Carragee EJ. Spine-area pain in military personnel: A review of epidemiology, etiology, diagnosis, and treatment. Spine J 2012;12:833-42.
8. Baidwan NK, Gerberich SG, Kim H, Ryan AD, Church TR, Capistrant B. A longitudinal study of work-related injuries: Comparisons of health and work-related consequences between injured and uninjured aging United States adults. Inj Epidemiol 2018;5:35.
9. Reme SE, Shaw WS, Steenstra IA, Woiszwillo MJ, Pransky G, Linton SJ. Distressed, immobilized, or lacking employer support? A sub-classification of acute work-related low back pain. J Occup Rehabil 2012;22:541-52.
10. Plamondon A, Larivière C, Delisle A, Denis D, Gagnon D. Relative importance of expertise, lifting height and weight lifted on posture and lumbar external loading during a transfer task in manual material handling. Ergonomics 2012;55:87-102.
11. Avci C, Yayli A. Examining safety behaviour with the safety climate and the theory of planned behavior. Int J Arts Sci 2014;7:611-26.
12. Aboulafia-Brakha T, Suchecki D, Gouveia-Paulino F, Nitrini R, Ptak R. Cognitive-behavioural group therapy improves a psychophysiological marker of stress in caregivers of patients with Alzheimer's disease. Aging Ment Health 2014;18:801-8.
13. Nurse Rainbolt G, Onozaka Y, McFadden DT. Consumer motivations and buying behavior: The case of the local food system movement. J Food Products Market 2012;18:385-96.
14. Khalili Z, Tosanloo MP, Safari H, Khosravi B, Zakerian SA, Servatian N, *et al*. Effect of educational intervention on practicing correct body posture to decrease musculoskeletal disorders among computer users. J Educ Health Promot 2018;7:166.
15. Liu S, Chen L, Wang J, Wang D, Jiang F. Research on mode and system of individualized safety education. Procedia Eng 2012;45:281-6.
16. Dizdar EN, Ünver M. The assessment of occupational safety and health in Turkey by applying a decision-making method; MULTIMOORA. Hum Ecol Risk Assess Int J 2019;:1-12. [doi.org/10.1080/10807039.2019.1600399].
17. Kwon H, Lee J, Moon I. Development of a safety education system for SMB operation. Computer Aided Chemical Engineering. Vol. 30Elsevier; 2012. p. 1417-21. [doi.org/10.1016/B978-0-444-59520-1.50142-1].
18. Fathi Y, Bashirian S, Barati M, Hazavei SM. Tramadol abuse status and related factors among three college students in Hamadan. Avicenna J Clin Med 2012;19:23-9. Available from: http://sjh.umsha.ac.ir/article-1-172-en.html. [Last accessed on 2020 Jun 28].
19. Sharma M. Theoretical Foundations of Health Education and Health Promotion.Canada: Jones & Bartlett Publishers; 2016.
20. Alami A, Rezaeian-Kochi MH, Moshki M. Application of theory of planned behavior in predicting intention and action of preventing tobacco use among students of gonabad university of medical sciences. Iran J Health Educ Health Promot 2016;3:340-8. Available from: http://journal.ihepsa.ir/article-1-265-en.html. [Last accessed on 2020 May 25].
21. Vederhus JK, Zemore SE, Rise J, Clausen T, Høie M. Predicting patient post-detoxification engagement in 12-step groups with an extended version of the theory of planned behavior. Addict Sci Clin Pract 2015;10:15.
22. Hernández-Arellano JL, Serratos-Perez JN, Coronado PP. Ergonomic assessment of material handling in CV joint assembly. Handbook of Research on Managerial Strategies for Achieving Optimal Performance in Industrial Processes: IGI Global; 2016. p. 101-15.
23. Sheeran P, Maki A, Montanaro E, Avishai-Yitshak A, Bryan A, Klein WM, *et al*. The impact of changing attitudes, norms, and self-efficacy on health-related intentions and behavior: A meta-analysis. Health Psychol 2016;35:1178-88.
24. McDermott MS, Oliver M, Svenson A, Simnadis T, Beck EJ, Coltman T, *et al*. The theory of planned behaviour and discrete food choices: A systematic review and meta-analysis. Int J Behav Nutr Phys Act 2015;12:162.
25. Steinmetz H, Knappstein M, Ajzen I, Schmidt P, Kabst R. How effective are behavior change interventions based on the theory of planned behavior? Zeitschrift Psychol 2016;224 (3),216-233. [Doi: 10.1027/2151-2604/a000255].
26. Shalmaii MR, Rakhshani F, Ramezankhani A, Soori H. Effect of education based on the theory of planned behavior on preventive behaviors of aggression. Safety Promot Injury Prev 2016;4:39-46.
27. Sargazi M, Mohseni M, Safar-Navade M, Iran-Pour A, Mirzaee M, Jahani Y. Effect of an educational intervention based on the theory of planned behavior on behaviors leading to early diagnosis of breast cancer among women referred to health care centers in Zahedan in 2013. Iran Q J Breast Dis 2014;7:45-55. Available from: http://ijbd.ir/article-1-342-en.html. [Last accessed on 2020 Apr 25].
28. Ebrahimipour H, Jalambadany Z, Peyman N, Ismaili H, Vafaii Najjar A. Effect of sex education, based on the theory of planned behavior, on the sexual function of the woman attending Mashhad health centers. J Birjand Univer MedSci 2013;20:58-67. Available from: http://journal.bums.ac.ir/article-1-1236-en.html. [Last accessed on 2020 Jun 28].
29. Delshad Noghabi A, Moshki M. The impact of education on the basis of the theory of planned behavior on the level and method of supervision of their parents on watching television by students. J Health Chimes 2014;1 (4): 7-17. Available from: http://eprints.gmu.ac.ir/id/eprint/147. [Last accessed on 2020 Apr 28].
30. Peyman N, Charoghchian KE, Moghzi M. The impact of education on the basis of the theory of planned behavior on junk food consumption in high school in Chenaran. RJMS 2016;23 (149):62-72.
31. Ajzen I. Behavioral Interventions Based on the Theory of Planned Behavior, 2006. Internet Website; 2015.
32. Glanz K, Rimer BK, Viswanath K. Health Behavior: Theory, Research, and Practice. San Ferancisco: John Wiley & Sons; 2015.
33. Kuchi MJ, Zare M, Aghamolaei T. The effectiveness of" theory of planned behavior" in training the correct principles of manual material handling. Int J Environ Health Eng 2016;5:1.
34. Sorensen G, McLellan DL, Sabbath EL, Dennerlein JT, Nagler EM, Hurtado DA, *et al*. Integrating worksite health protection and health promotion: A conceptual model for intervention and research. Prev Med 2016;91:188-96.
35. Rahman MNA, Mohamad SS. Review on pen-and-paper-based observational methods for assessing ergonomic risk factors of computer work. Work 2017;57:69-77.
36. Sowah D, Boyko R, Antle D, Miller L, Zakhary M, Straube S. Occupational interventions for the prevention of back pain: Overview of systematic reviews. J Safety Res 2018;66:39-59.
37. Morowatisharifabad MA, Momeni Sarvestani M, Barkhordari Firoozabadi A, Fallahzadeh H. Predictors of unsafe driving in Yazd City, Based on protection motivation theory in 2010. Horizon Med Sci 2012;17:49-59. Available from: http://hms.gmu.ac.ir/article-1-1019-en.html. [Last accessed on 2020 Jun 28].
38. Ashoogh M, Aghamolaei T, Ghanbarnejad A, Tajvar A. Utilizing the theory of planned behavior to Prediction the safety driving behaviors in truck drivers in Bandar Abbas 1392. Iran J Health Educ Health Promotion 2013;1:5-14. Available from: http://journal.ihepsa.ir/article-1-56-en.html. [Last accessed on 2020 Jun 28].
39. Mazloumi MS, Bajalan M, Dormohammadi TT, Tarahi M,

Bonyadi F. The Effect of Training on Adopting Behaviors Preventing from Knee Osteoarthritis Based on Planned Behavior Theory; 2015.

40. Zeidi MI, Hajiagha AP, Zeidi MB. Evaluation of educational programs based on the theory of planned behavior on employees' safety behaviors. J Mazandaran Univer Med Sci 2013;22:166-77. Available from: http://eprints.mazums.ac.ir/id/eprint/2193. [Last accessed on 2020 May 20].
41. M.atlabi M, Khajavi A, Askari F, Saberi M. The impact of educational intervention based on theory of planned behavior in breast self-examination of women referred to health centers. Q Horizon Med Sci 2018;24 (2):132-138. Available from: http://hms.gmu.ac.ir/article-1-2527-en.html. [Last accessed on 2020 Jun 28].
42. Fakhri A, Morshedi H, Zeidi I. Effect of an educational intervention based on the theory of planned behavior on the use of hearing protection devices. Sci J Kurdistan Univer Med Sci 2017;22 (2):80-95. [DOI: 10.22102/22.2.80]. Available from: http://sjku.muk.ac.ir/article-1-3114-en.html. [Last accessed on 2020 Jun 28].