



## Research article

## Effects of educational program based on Precede-Proceed model in promoting low back pain behaviors (EPPLBP) in health care workers Shahid Beheshti University of medical sciences: randomized trial

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## ABSTRACT

The PRECEDE-PROCEED model is an adaptable planning model that could be served in public health issues. The purpose of this study is to investigate the effects of an educational program based on Precede-Proceed model on promoting Low Back Pain (LBP) behaviors among health care workers (HCWs). This Double-blinded randomized trial study was conducted on 112 from 120 HCWs aged from 30 to 55 years. The eligible HCWs were randomly divided to intervention group 1 (N = 38), respectively intervention group 2 and control group (N = 37) for which the Precede-Proceed - based educational program was implemented and control group (N = 37). The random multi-stage cluster sampling method was used to recruit HCWs. HCWs completed a self-reported questionnaire on their Low Back Pain Behaviors assessment questionnaire based on the Precede-Proceed Model and a visual analogue scale (VAS) was also used. The data were gathered at initial of the study, 6 and 12 months follow-ups from three groups and were analyzed through SPSS version 19. There was a significant interaction between the factors "group" and "test time" ( $p < 0.05$ ,  $p < 0.001$ ) of knowledge, perceived self-efficacy, and attitude, reinforcing factors, enabling factors, public health, quality of life and LBP preventive behaviors of the intervention group., although, no significant alternate became located in the mean score of above structures of the control group. The findings of the present study confirmed the effectiveness of the PRECEDE-PROCEED model-based educational program on preventing LBP by enhancing scores of model constructs. However, these results should be repeated in further studies to be able to apply this program in health system.

## 1. Introduction

Musculoskeletal Pain Disorders (MSPD) are the most common prevalent and disabling situations worldwide (National Academies of Sciences and Medicine, 2020). Work-associated musculoskeletal problems (WMSDs) are the most common and frequent factors of all occupational diseases in losing the damage to the workforce (Coggon et al., 2019). Musculoskeletal disorders are injuries to people who have an inappropriate physical condition or non-ergonomic conditions while doing their jobs and tasks, and these disorders cause pain in the organs, the body (Alnaami et al., 2019). The previous research suggested that the most common reason about absence of employees in the workplace is

musculoskeletal disorders (Mauramo et al., 2019) of LBP (LBP) is one of the most prevalent abnormalities or disorders (Coggon et al., 2019).

LBP is a major public health which could lead to extensive and significant negative social, psychological and economic consequences (Alnaami et al., 2019).

LBP Individuals who work in some occupations like HCWs may probably suffer more from LBP (Green and Kreuter, 2005; Gielen et al., 2008; Harcombe et al., 2010; Alnaami et al., 2019; Paolucci et al., 2019; Takahashi et al., 2019). LBP in health care workers (HCWs) has several reasons including: long-standing, long-sitting, repeated movements, psychosocial stress and several factors in the area of workplace and personnel used to increase and change the risk of LBP amongst.

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The HCWs have long been sitting on their desk for a long time to record the information on the electronic health system (Alnaami et al., 2019). Those problems are related to main non-public and occupation-ally associated outcomes, consisting of frequent inability and common absenteeism (Alnaami et al., 2019). These factors that we mentored have seen in more than fifty percent of HCWs (Alnaami et al., 2019).

Although several factors play a role for LBP in HCWs, one of the most important reasons for LBP due to occupation among HCWs is behavioral factors (Harcombe et al., 2010). Up to our knowledge, few previous research have focused on preventing LBP risk Behaviors, Further, few researches used promoting models like PRECED\_PROCEED (Green and Kreuter, 2005; Gielen et al., 2008; Fertman and Allensworth, 2016), LBP

## PRECEDE-PROCEED Framework

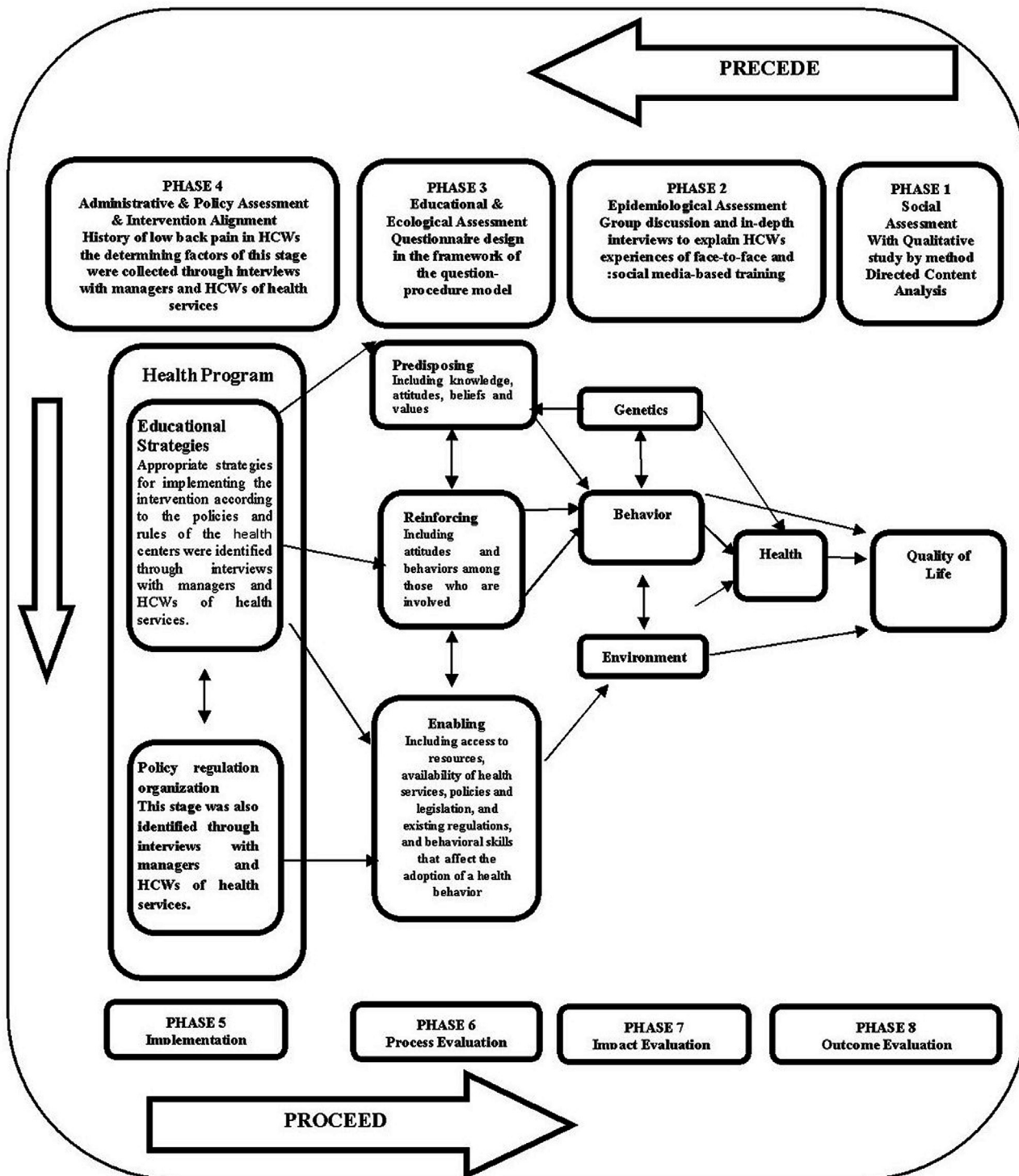


Figure 1. PRECEDE-PROCEED model.

As, LBP is a multi-factorial health problem, in which all social, behavioral and environmental factors could interfere, designing multidisciplinary interventions based on this comprehensive model is guaranteed (Green and Kreuter, 2005; Gielen et al., 2008; Fertman and Allensworth, 2016).

LBP in other words, it is argued that if HCWs could take care about their behaviors during working hours then it would be possible to reduce their pain and suffering (Yassi and Lockhart, 2013). Thus we decided to indicate behavioral factors that cause LBP among HCWs and we designed and developed an appropriate intervention based on the Precede model and finally implement the intervention. On this version there are specific phases of PRECEDE-PROCEED framework can also appear (Figure 1) the phases of PRECEDE-PROCEED planning model.

The PRECEDE-PROCEED model is a comprehensive structure for assessing health needs for designing, implementing, and evaluating health promotion and other public health programs to meet those needs. PRECEDE provides the structure for planning a targeted and focused public health program. PROCEED provides the structure for implementing and evaluating the public health program (Green and Kreuter, 2005; Gielen et al., 2008).

The model assumes that different phases, consisting of the policies, regulatory and organizational constructs for educational and environmental development as a PRECEDE phase, but the other part is PRECEDE (Green and Kreuter, 2005). A behavior can be influenced by predisposing, reinforcing, enabling factors and an educational intervention or program based on the PRECEDE model seeks to identify these three factors and then if it's necessary it can make changes to predisposing factors (including knowledge, attitudes, beliefs and values), Reinforcing factors (including attitudes and behaviors among those who are involved), and enabling factors (including access to resources, availability of health services, policies and legislation, and existing regulations, and behavioral skills that affect on the adoption of a health behavior) (Green and Kreuter, 2005). "PROCEED" was added to the framework in consideration of the recognition because of the expansion of health education to encompass policy, regulatory and related ecological/environmental factors, in determining health and health behaviors (Green and Kreuter, 2005).

Therefore, the cause of using this model to is in educational media intervention for the prevention of LBP, is mostly coming from the multidimensional nature of job-related LBP. In reality, this study attempts to find the predisposing, reinforcing and enabling factors that could be applied to a program in a workplace program to reduce LBP among HCWs.

Former health centers with renamed as comprehensive health service centers, receive referrals related to target diseases (infectious and non-communicable), nutrition counseling and clinical psychology, occupational health services, dentist, Para clinic from the health base and in addition they are in charge of managing the health centers they cover. The population covered by the centers is between 25 and 50 thousand people. The priority of the centers in recruiting the required personnel, respectively, regarding the medical and non-medical health workers, including: health experts; Midwives; Nurses are mental health and nutrition experts. For every 2 to 4 health centers (population 25 to 50 thousand people), a comprehensive health service center is considered.

It is argued that the main barriers to HCWs education are a time constraint, shortness of classrooms in comprehensive service centers, several job commitments. Indeed to overcome these limitations we decided to use an interactive educational media intervention. The use of educational media interventions are increasingly becoming popular in public health and a number of studies showed that they were a promising Framework for promoting healthy behaviors especially when they were theory driven (Simeon et al., 2020). As in health care system of Iran, there are so limitations to implement the educational program for preventing LBP, and on other hands, the existed programs do not pay attention to all aspects of LBP reasons, this study aimed to investigate the

effects of a designed educational program based on Precede-Proceed model in promoting LBP preventive behaviors among HCWs.

## 2. Methods

This is a randomized trial study. Ethics committee of Shahid Beheshti approved with the EC ID: IR.SBMU.RERECH.REC. 1396.626, and Trial registration numbers: TCTR20190811003 proved the study. All participants gave informed written consent. First, a list of health networks was prepared; the health nets were then numbered and the numbers were placed in a container. The individual neutral took the three numbers out of the box by chance. Three health networks were allocated by lot to two intervention groups and one control group. Three comprehensive service centers through multi-stage cluster sampling randomization was applied by which in the first stage 3 health networks were selected randomly and by which two centers were selected and assigned as to different intervention groups or one center assigned to control group setting.

In the next stage from intervention center 80 HCWs in 2 groups and from control center 40 HCWs who were eligible and satisfied to enter into the study were selected randomly. Consequently, at each setting, 40 HCWs included healthcare assistants or experts, nurses, physicians, Midwives and others example mental health and nutrition experts were selected randomly and were assessed for intervention group 1, HCWs (N = 38) and intervention group 2 (N = 37) who received a PRECEDE-PROCEED based educational program and 40 HCWs for the control group (N = 37) didn't receive education. HCWs were assessed at three points of time: at baseline, six and twelve months follow up Figure 2 shows the flow diagram of HCWs recruitment and assignment.

The study procedures from enrollment through follow up data collection and analysis are shown in Figure 2. The study groups were recruited from HCWs working in comprehensive service Centers affiliated to Shahid Beheshti University of medical sciences.

The inclusion criteria were being graded, HCWs working in comprehensive service center having access to, and skills to work with the Internet and online services, 30–55 years' old, having non-specific job-related LBP with any pain duration of time period of time. And the exclusion criterion was that having any illness or problems that prevent a person from participating in the study for any reasons and, having a pathological LBP and taking medication for LBP.

### 2.1. Participants

For sampling, first, we provide a list of all health networks and centers affiliated to Shahid Beheshti University of medical sciences and 3 health networks and health centers was selected randomly and assigned randomly to either intervention or control groups (2 health networks as intervention groups and 1 health networks control group).

### 2.2. Trial design

One hundred twenty HCWs were enrolled in the trial complying with the Consort checklist Retrieved on from, <http://www.consort-statement.org/checklists/view/32-consort-2010/66-title> (Page number1, 2). In the next stage from intervention center 40 HCWs and from control center 40 HCWs who were eligible and satisfied to enter into the study were selected randomly. Finally at 6 and 12 months follow-ups – because of attrition) 38 HCWs in intervention group 1 and 37 HCWs respectively in intervention group 2 and control group were assessed. Figure 2 shows the complete procedure of sampling. In each health networks proportion to the number of HCWs working in each comprehensive service center, individuals were randomly selected via multi-stage cluster sampling method with double blocking to complete the sample size. Participants did not know which group they belonged to in terms of the type of intervention (intervention 1,2 or control) and this subject is considered as a Blinding. HCWs that carried out the randomization also played a role

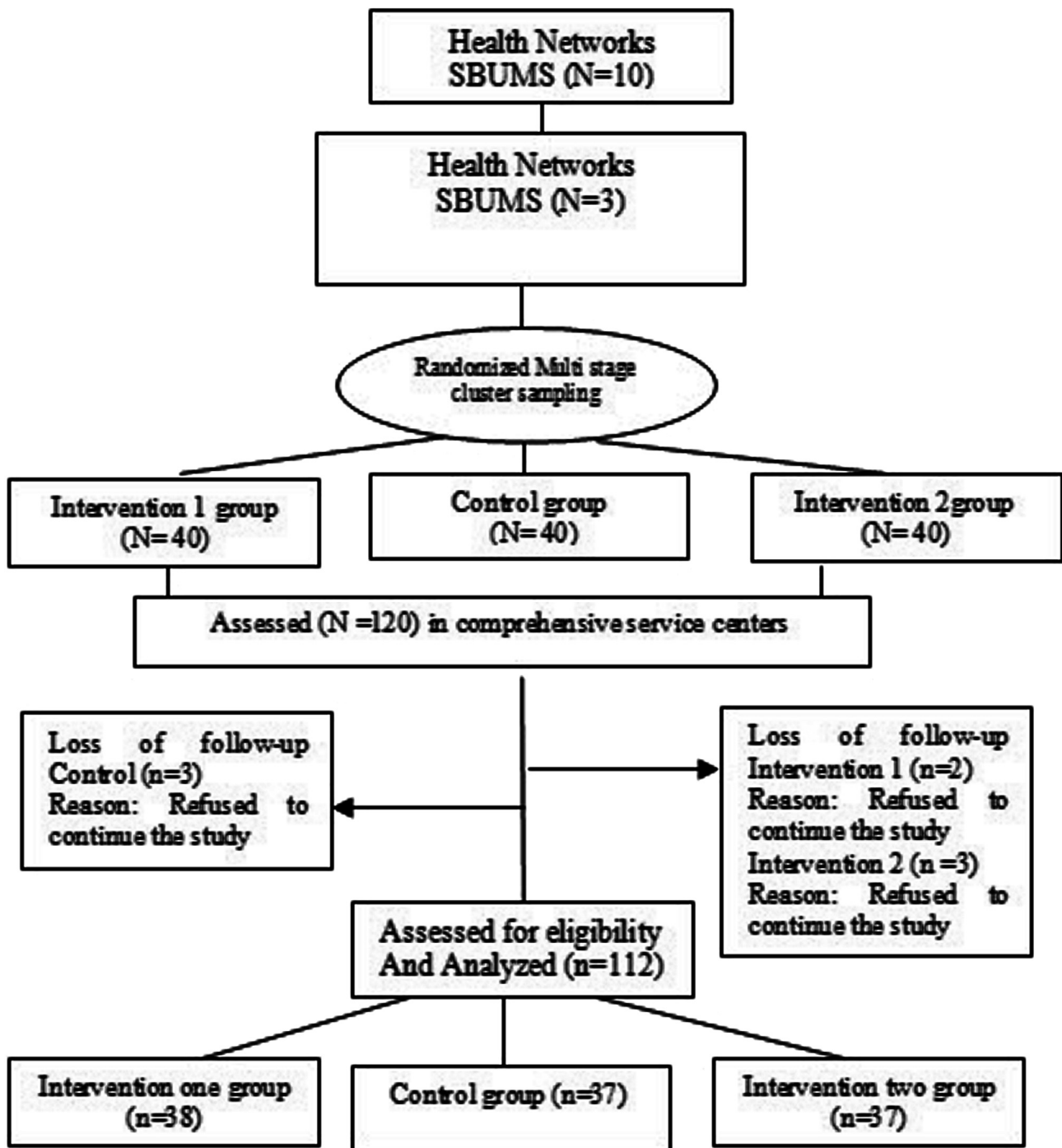


Figure 2. Flow diagram of HCWs recruitment.

in other aspects of this study, such as its evaluation based on the RE-AIM model in the university.

### 2.3. Preparation for intervention

After identifying the individual and environmental factors affecting LBP. In phase 1, called situational analysis with in-depth interview method and with the aim of identifying predisposing, reinforcing, enabling and environmental factors that affect occupational behaviors in the first step and also in step 2: a questionnaire was designed. At this stage, a qualitative study was conducted by using Directed Content Analysis. It is believed that behavior can be motivated by predisposing,

reinforcing, and enabling factors and as a consequence, a program based at the precede-continue model seeks to identify these three factors which are very relevant to LBP prevention behaviors among HCWs. The predisposing factors include knowledge, attitudes, beliefs, values, and self-efficacy. The reinforcing factors encompass rewards or punishments that result from a behavior, along with social and enabling factors and peer support to include access to resources, availability of health services, guidelines, legislation, and current rules example existing regulations and behavioral skills that are affecting the adoption of health behavior (Green and Marshall, 2005).

Recognizing the risk factors and factors influencing the improvement of lumbar preventive behaviors, we designed an intervention program

from the PRECEDE-PROCEED model. The findings of this phase will be obtained through semi-structured interviews. This educational material was evidence-based and elaborated using understandable language and different formats, in the mobile application. Based on the educational and environmental evaluation stage, the factors of behavior change and also the continuity of behavior change were determined. According to administrative and policy assessment phase, we identified resources, organizational barriers and facilitators, and policies for intervention implementation and sustainability (Green and Marshall, 2005). Intervention group 1 were received the intervention via a mobile application through interactive educational media. They were received training how to use the application and monitored. They received a weekly reminder during the study period. - Sending a reminder message in intervention group 1: Every week a reminder message (SMS) was sent via mobile phone for non-verbal encouragement - Sending a reminder message in intervention group 2: Every week a reminder message was sent through the website or social network. In addition to non-verbal encouragement, the reason for doing so was to ensure that participants logged in to the website or app and received feedback on whether they had any questions or problems about understanding the educational content. The content of the intervention was received based on the PRECEDE-PROCEED model containing that these issues are related to prevention of occupational LBP.

Intervention group 2 was receiving the intervention via in-person education. The educational program was designed for two sessions via 60 min per session and through group discussions, roleplaying, questions-answers, lectures, educational films and, animations. And they were received a weekly reminding message during the study period.

The control group didn't receive any training. However, after completion of the study, the control group received one of the interventions based on their interests.

#### 2.4. Sample size

112 from 120 HCWs working in comprehensive service centers affiliated to Shahid Beheshti University of medical sciences who were eligible to enter into the study were recruited. The sample size including 10% drop, 40 people were estimated for each study group in order to detect at least 20 percent differences. These HCWs were randomly divided into intervention group 1 (N = 38), intervention group 2 (37 HCWs).

#### 2.5. Measurement tool

##### 2.5.1. Primary outcome

The primary outcome was HCWs' job-related behavior. The measuring tool was a self-made questionnaire.

##### 2.5.2. Secondary outcomes

Secondary outcomes were as (a) LBP, (b) disability, and (c) quality of life.

#### 2.6. Data collection tools

The subsequent measures to assess secondary outcomes were as: a) Visual Analogue Scale (VAS) for measuring LBP. This scale has been broadly used for measurement of pain (Takahashi et al., 2019). The validity and reliability of this scale have been repeatedly confirmed (Nadrian et al., 2011; Paolucci et al., 2019; Takahashi et al., 2019). For measuring pain-related disability, the Quebec Back Pain Disability Scale (QBPDS) was used.

This tool has developed and used in different populations (Paolucci et al., 2019). The QBPDS is a 20-item instrument designed to assess the level of pain-related disability in individuals with back pain (Verburg et al., 2019). Each item is rated on a 5-point Likert scale ranging from 0 to 5 giving a total score of 20–100. Higher scores indicate greater disability.

The validity and reliability of the Iranian version of the questionnaire have confirmed (Navabian Ghamsari, Goodarzi et al., 2019).

#### 2.7. Data analysis

Elsewhere. A secondary outcome was increased quality of life. In this study we compared the data that we received from HCWs in 3 time points. In this study HCWs were 3 groups that they should be compared in 3 time points by ANOVA (repeated measure analysis test). As such the study had the power of 95 percent at 5% significant level with the assistant of Pass 15 software and SPSS 19.

### 3. Results

The present study was conducted on HCWs aged 30 to 55 (The Subjects 75 Intervention Into two group1, 2 and 37 control groups) in the comprehensive Service centers. The mean age of the intervention group was  $46.34 \pm 1.18$ , and the mean age of the control group was  $47.23 \pm 1.15$  years ( $p = 0.598$ ) (Table 1).

The ANOVA test displayed no significant difference between the 3 groups in terms of primary and secondary outcomes. For analysis assessing the association between demographic variables considered by Chi-square test. Chi-square test confirmed that was not significant association among the intervention and control group in terms of educational level ( $P = 0.82$ ), employment status ( $P = 0.28$ ), gender ( $P = 0.35$ ), marriage status ( $P = 0.81$ ).

The results of the study displayed that based on the ANOVA test, there was no significant a difference among mean score of knowledge (0.367) and attitude ( $p = 0.328$ ), in forcing factors ( $p = 0.437$ ), quality of life ( $p = 0.122$ ), enabling factors ( $p = 0.343$ ), perceived self-efficacy ( $p = 0.364$ ), public health ( $p = 0.153$ ) and LBP preventive Behaviors ( $p = 0.477$ ).

It is necessary to identify the factors that lead to the promotion of health behaviors and prevent the occurrence of unhealthy behaviors in the workplace. Therefore, two phases of educational/ecological diagnosis and administrative/policy diagnosis were used.

- History of low back pain in HCWs, Impacts on LBP professional life and relationships with colleagues were collected from various articles and sources.
- In the educational/ecological diagnosis stage, the determining factors of this stage were collected through interviews with managers and HCWs of health services. After determining the above items and evaluating the information collected in the pre-test stage, a training program was developed for the intervention group.

In order to get acquainted with the existing policies in health centers and the environmental factors governing them in order to implement educational programs, interviews were conducted with key people in the health centers under study.

- In the administrative diagnosis stage: Appropriate strategies for implementing the intervention according to the policies and rules of the health centers were identified through interviews with managers and HCWs of health services.
- In the policy recognition stage: This stage was also identified through interviews with managers and HCWs of health services.

Prior to the intervention, there was no significant difference between the two intervention groups and one control group. The repeated measure analysis test confirmed that was important and significant difference 6 and 12 months after the Intervention. There was a significant interaction between the factors "group" and "test time" ( $p < 0.05$ ,  $p < 0.001$ ).

Increasing the mean score of attitude, knowledge, perceived self-efficacy, enabling factors, reinforcing factors, quality of life, public health, and preventive behaviors of LBP in intervention group ( $p < 0.05$ ,

**Table 1.** Demographic characteristics of studied HCWs in all three groups at the beginning of the study.

Group variable number	Intervention		Control (N = 37) N (%)	P-value
	1 Group (N = 38) N (%)	2 Group (N = 37) N (%)		
<b>Age (Yrs)</b>				0.78
30- 40	16 (42.1)	14 (37.8)	15 (40.4)	
41-50	18 (47.4)	20 (54.1)	18 (48.6)	
51.00+	4 (10.5)	3 (8.1)	5 (13.5)	
<b>Educational level</b>				0.82
Associate Degree	8 (21.1)	9 (24.4)	8 (21.7)	
Undergraduate	13 (34.2)	14 (37.8)	15 (40.5)	
Masters+	17 (44.7)	14 (37.8)	14 (37.8)	
<b>Gender</b>				0.35
Male	7 (18.4)	6 (16.2)	8 (21.6)	
Female	31 (81.6)	31 (83.8)	29 (78.4)	
<b>Marriage status</b>				0.81
Single	17 (44.7)	19 (51.4)	18 (48.6)	
Married	21 (55.3)	18 (48.6)	19 (51.4)	
<b>Employment Status</b>				0.28
Formal	15 (39.5)	14 (37.8)	15 (40.5)	
Informal	23 (60.5)	23 (62.2)	22 (59.5)	
<b>Profession</b>				0.34
healthcare experts	13 (34.2)	11 (29.7)	12 (32.4)	
Nurses	3 (7.9)	2 (5.4)	3 (8.1)	
physicians	2 (5.3)	2 (5.4)	3 (8.1)	
Midwives	10 (26.3)	12 (32.4)	10 (27.1)	
mental health	4 (10.5)	6 (16.2)	5 (13.5)	
Nutrition experts	6 (15.8)	4 (10.9)	4 (10.9)	

$p < 0.001$ ), but no significant change in mean score of knowledge, attitude, Self-efficacy, quality of life, general health, reinforcing factors, enabling factors and preventive behaviors of LBP in the control group ( $P > 0.05$ ) (Table 2).

#### 4. Discussion

The evidence-based approach to develop an educational media intervention for HCWs in general practice was constitute the LBP of this study and a novel contribution. In truth, this study a effort to enhance HCWs' health in general and reduce LBP in this profession specially. The reason for this study is to evaluate a theory-based interactive educational media intervention in order to reduce occupational LBP in HCWs working in comprehensive service centers, Tehran city, Iran.

The results of the study show the effectiveness of the intervention that it is totally at the PRECEDE-PROCEED for raising LBP behaviors in HCWs. These findings of study confirmed that attitude and knowledge in control group were much lower than the both intervention groups after program. Moreover this improvement increased at 6 and 12 months after the educational intervention. This finding is in accordance with Nadrian study, the mean scores the knowledge, self-efficacy, enabling factors and attitude toward LBP preventive behaviors were at the same level (Nadrian et al., 2011). However, these study, Green et al declared that prepared factors are knowledge, attitudes, beliefs, values, and self-efficacy of a person that elevates health behaviors (Green and Marshall, 2005). Although many researches were done with this model in advanced countries, a wide range of these researches in developing countries are very few. This study determined that intervention group 1, 2 had more self-efficacy in Competition to control group.

Precede-proceed model had a significant effect on behaviors as a factor that increases the quality of lifestyles of LBP patients (Fertman and Allensworth, 2016). The present study, confirmed that the intervention based on the precede-proceed model suggests better scores of

predisposing factors within the intervention group. The consequences of other studies that are completely based on the previous model similarly consistent with these effects (Nadrian et al., 2011; Ansari et al., 2019; Paolucci et al., 2019). Sezgin's study showed predisposing factors were screening of the film at the ICU (Sezgin and Esin, 2018). The Deng study has referented the role of self-efficacy in the therapy of prophylactic behavior of rheumatoid arthritis (Deng and Hu, 2013). The mean score for studied factors before the intervention 1 and 2 were at low range, but after the intervention, significantly accelerated. However, these factors remained steady inside the control group. With regards to the considerable differences between the two intervention groups 1 and 2 in the number of the PRECEDE-PROCEED factors, it can be said that the situation of an individual media-based education program is better than the in-person educational program. Thus, HCWs education considered as a method of proscribing prevention in LBP diseases and enhancing pleasant of lifestyles. HCWs had more self-efficacy, attitude, and knowledge to successfully deal with their pain Now they don't only get more facts about the disease but they also have different tips to help different factors. They realized that it was not just HCWs who suffered from the disorder, and that many HCWs were in similar situation. The above-mentioned common reviews and evaluations coping strategies with each other in Sezgin's study showed the quality of life scores and general health status were desirable (Sezgin and Esin, 2017). In this regard Ganiyu's study, the quality of life scores was relatively in unfavorable (Ganiyu et al., 2015). Education through social media has also been effective. Toelle et al. (2019) (Toelle et al., 2019) in a randomized controlled trial of a companion health plan for LBP called the Kaia App was evaluated. They found that Kaia, as a multidisciplinary application for low back pain, was an effective treatment for patients with low back pain within 3 months of follow-up and it was superior to physiotherapy in combination with online training (Toelle et al., 2019). The results of another study showed that an interactive self-management website program for patients with chronic low back pain leads to improved pain (O'Brien et al., 2018).

**Table 2.** Comparison of mean scores of Precede-Proceed Structures of LBP HCWs of all three groups at before and 6 and 12 months after the intervention and control groups of the study.

Variables	Groups	Before intervention	6 months After intervention	12 months After intervention	test <sup>a</sup>	
Predisposing factors	Knowledge	Intervention 1	13.82 ± 2.68	19.44 ± 2.14	17.14 ± 3.35	0.001
		Intervention2	14.44 ± 1.65	20.04 ± 1.19	18.23 ± 2.18	0.001
		Control	13.07 ± 1.08	14.08 ± 2.06	13.23 ± 1.67	0.16
		test <sup>b</sup>	0.367	<0.05	<0.001	
	Attitude	Intervention 1	15.32 ± 1.65	20.12 ± 1.04	18.04 ± 0.14	0.001
		Intervention2	15.54 ± 2.05	20.24 ± 2.08	19.03 ± 1.09	0.001
		Control	11.08 ± 0.12	12.13 ± 1.13	11.13 ± 2.07	0.18
		test <sup>b</sup>	0.328	<0.05	<0.001	
	Self-efficacy	Intervention 1	23.13 ± 0.98	27.02 ± 1.02	25.68 ± 4.01	0.001
		Intervention2	24.37 ± 1.08	28.12 ± 2.18	26.01 ± 4.52	0.001
		Control	22.45 ± 3.14	23.13 ± 1.56	22.35 ± 3.36	0.11
		test <sup>b</sup>	0.364	<0.05	<0.001	0.001
Enabling factors	Intervention1	28.12 ± 1.56	33.15 ± 2.43	30.23 ± 2.80	0.001	
	Intervention2	29.34 ± 0.36	34.12 ± 0.24	31.03 ± 1.76		
	Control	28.18 ± 0.13	28.14 ± 1.04	27.78 ± 4.02	0.17	
	test <sup>b</sup>	0.343	<0.05	<0.001	0.001	
Reinforcing factors	Intervention	32.78 ± 1.18	38.26 ± 1.05	36.36 ± 3.14	0.001	
	Intervention2	33.18 ± 0.28	38.98 ± 4.08	36.16 ± 2.10	0.001	
	Control	33.01 ± 0.01	32.86 ± 7.77	33.10 ± 0.08	0.32	
	test <sup>b</sup>	0.437	<0.05	<0.001	0.001	
LBP preventive behaviors	Intervention1	22.54 ± 2.67	28.76 ± 3.21	26.35 ± 3.21	0.001	
	Intervention2	23.34 ± 1.28	27.30 ± 1.28	27.02 ± 1.32	0.001	
	Control	22.18 ± 2.35	23.01 ± 1.24	22.46 ± 2.23	0.34	
	test <sup>b</sup>	0.477	<0.05	<0.001	0.001	
General health	Intervention1	10.12 ± 1.18	18.15 ± 3.57	16.74 ± 2.17	0.001	
	Intervention2	11.07 ± 2.56	19.45 ± 0.33	17.70 ± 3.99	0.001	
	Control	9.97 ± 7.78	10.01 ± 0.01	9.88 ± 9.67	0.26	
	test <sup>b</sup>	0.153	<0.05	<0.001	0.001	
Quality of life	Intervention 1	36.44 ± 1.28	41.16 ± 1.04	38.07 ± 1.16	0.001	
	Intervention2	35.97 ± 3.55	40.15 ± 2.36	37.95 ± 3.97	0.001	
	Control	36.31 ± 1.24	35.01 ± 1.07	36.02 ± 1.72	0.32	
	test <sup>b</sup>	0.122	<0.05	<0.001		

Healthcare workers (HCWs), Health care workers are people whose job it is to protect and improve the health of their communities. Together these health workers, in all their diversity, make up the global health workforce. Low back pain, a common muscle disorder PRECEDE–PROCEED model is a model that help health program planners, policy makers and other evaluators, analyze situations and design health programs efficiently. It provides a comprehensive structure for assessing "health and quality of life needs, and for designing, implementing and evaluating health promotion and other public health programs to meet those needs.

<sup>a</sup> Repeated measure analysis Test.

<sup>b</sup> ANOVA Test.

Irvine et al. (2015) demonstrated that an independent web-based intervention and tailored to users' interests is an effective tool in managing low back pain and improving quality of life. They first evaluated the program online initially, for 2 and 4 months. After baseline evaluations, the intervention was performed through the Mobile-Web application. The results showed that low back pain improved more in FitBack users compared to the other two groups (Irvine et al., 2015). This study was designed to utilize LBP patients' experiences of LBP preventive behaviors, so that people's attention to the serious and complex complications of the disease can lead to a decrease in physical and mental health and quality of life. After the educational intervention, LBP preventive behaviors improved and health and quality of life increased as well.

#### 4.1. Strengths of this study

Strengths of this study include the randomized controlled study design of the community and this study added according to specific planning a according to specific planning and implemented on a comprehensive model. The interactive social media was provided flexibility and convenience for participants, by supporting adherence to the program.

#### 4.2. Limitations to this study

There are some limitations to this study. First, the statistics used in this evaluation were collected through their self-report. Moreover, this observes totally changed on a consolation sample, so that its finding might not be generalized to all Iranian HCWs groups to evaluate behaviors and effective factor on them. Other limitations include the intervention itself is based on a phone application.

#### 4.3. Conclusions

Given that LBP is an important health problem in HCWs, those who are well-planned and practice educational interventions, focus on favorable preventing behaviors in order to prevent. In this regard, utilizing health behavior change models similar to the PRECEDE-PROCEED model could be applicable. It can be useful in analyzing needs, needs dissociation, adequate training plans with assessment. The subsequences demonstrates health education and promotion using the PRECEDE-PROCEED model and increases the model constructor's score, and finally this helped to increase and enhance LBP behaviors, was as essential. Effective stages into raising lifestyles quality and LBP behaviors

can be taken. HCWs Awareness of the importance of healthy behaviors for low back pain does not mean that they practice healthy behaviors for themselves. Theoretical educational intervention for low back pain was effective in improving knowledge, attitude, and self-efficacy, reinforcing factors, enabling factors and behavior immediately after 6–12 months of intervention. However, the social media approach to maintaining behavior for a long time (6 months) was more successful than the face-to-face approach. Health behaviors require context and access to education through the best and easiest channels, which seems to be appropriate for social media.

Different educational approaches can be effective in reducing low back pain, disability and improving the HCWs life. The social media approach has been more successful than long-term face-to-face intervention, and may be a better way to deliver training programs because of its ease of access and reduced operating costs.

The findings of the present study can be used to prevent and even improve self-care capabilities for HCWs who suffer from low back pain or are vulnerable to work-related pain.

## Declarations

### Author contribution statement

M. Delshad: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

F. Pourhaji: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

S. Niknami: Performed the experiments.

S. Tavafian: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data.

F. Pourhaji: Contributed reagents, materials, analysis tools or data.

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### Competing interest statement

The authors declare no conflict of interest.

### Additional information

The clinical trial described in this paper was registered at Thai Clinical Trial Registry under the registration number TCTR20190811003.

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