Health Scope. 2019 August; 8(3):e82753. doi: 10.5812/jhealthscope.82753.

Published online 2019 August 28. **Research Article**

Education of Teachers with Chronic Low Back Pain Based on Integrative Model of Behavioral Prediction

Tahereh Kamalikhah [1], Fatemeh Rahmati-Najarkolaei [2,*], Nooshin Rouhani-Tonekaboni [3], Leila Sabzmakan [4], Hassan Okati-Aliabad [5] and Farid Rezaei Moghadam [6]

[1] Department of Health Education and Health Promotion, Semnan University of Medical Sciences, Semnan, Iran
[2] Health Research Center, Life Style Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran
[3] Department of Health Education and Health Promotion, School of Health, Guilan University of Medical Sciences, Rasht, Iran
[4] Department of Health Educations, Alborz University of Medical Sciences, Karaj, Iran
[5] Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
[6] Physical Medicine and Rehabilitation, Army University of Medical Sciences, Tehran, Iran

[*] *Corresponding author*: Health Research Center, Life Style Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran. Email: fatemeh_rahmati@bmsu.ac.ir

Received 2018 July 30; **Revised** 2019 February 07; **Accepted** 2019 April 15.

Abstract

Background: Individuals suffering from chronic low back pain (CLBP) experience major physical, social, and occupational disruptions. Strong evidence confirms the effectiveness of Alexander technique (AT) training for CLBP.
Objectives: The present study applied an integrative model of behavioral prediction (IM) to design AT training for education of teachers with CLBP.
Methods: This was a quasi-experimental study conducted on female teachers with non-specific LBP in southern Tehran in 2014. The intervention group consisted of 42 teachers (AT training based on IM) and the control group included 35 teachers (AT training only). The validity and reliability of the 108-item AT questionnaire based on IM constructs were confirmed using content validity (CVR 0.87, CVI 0.96) and Cronbach's α (0.84). Data were analyzed by Independent and Paired Sample *t*-test, Mann-Whitney U test, Wilcoxon, and covariance.
Results: The results of the study indicated that AT behaviors, skills and abilities, direct and indirect perceived behavioral control, indirect subjective norms, direct and indirect attitude, and perceived risk were higher in the intervention group three months after the intervention (all P values < 0.05). Disability score ($P < 0.001$), hand to floor test ($P = 0.023$), and pain frequency ($P = 0.022$) showed a significantly higher reduction in the intervention group.
Conclusions: The IM educational framework coupled with AT training may facilitate applying AT directions and finally, lead to pain reduction in CLBP.

Keywords: Complementary Treatment, Educational Model, Low Back Pain, Teachers

1. Background

Chronic low back pain (CLBP) is a source of great physical disability, role impairment, diminished psychological well-being, and low quality of life (1). In fact, CLBP is characterized by pain in the region between the costal margins and the inferior gluteal fold, with or without referred pain in the lower limbs, lasting more than 12 weeks (2). The majority of LBP patients (80% - 90%) suffer from non-specific LBP, leading to considerable pain-related disability, which is associated with no clear structural or anatomical reason. However, it causes limitation in daily activities due to actual pain (3). LBP has been one of the leading causes of years lost due to disability (YLD) counts. The geographical variation rate of YLD causes among countries in 2017 showed that LBP was the leading cause in 126 of 195 countries and territories (4).

LBP is a common symptom and an important cause of disease burden in Iran, in particular, in the most productive age of both genders. Epidemiologic data related to LBP are sparse from developing countries, especially Iran (5). The prevalence of musculoskeletal disorders (MSD) in school teachers is between 40% and 95%. Factors such as age, job experience, gender, long time staying in specific position, head-down posture for instance, in reading, grading papers and writing on a blackboard, and awkward posture are some of MSD causes (6). The American College of Physicians (ACP) guideline recommended initially selecting non-pharmacologic treatment for CLBP (7).

Although most CLBP patients are managed using interventions having unreliable scientific effectiveness evidence such as massage, acupuncture, manipulation (7, 8), a systematic review in 2012 concluded that Alexander technique (AT) has a strong effect on CLBP. Its effectiveness is more than exercise and massage (9). Indeed, AT is an educational method, which is helpful for coordination of posture and regulates the relationship between head, neck, and back (10). In health education, understanding intermediate factors other than knowledge by applying theories may cause successful behavioral changes (11).

Theory of reasoned action (TRA) and planned behavior (TPB) constructs such as perceived risk, self-efficacy, and behavioral beliefs are considered during the CLBP management (12), the prediction of doing exercise in people suffering from LBP, assessing patients' views about AT, and observing the proper posture (13). The intention can predict the behavior accompanied by supporting environmental factors (14). To choose appropriate model, health educators are recommended to consider the topic, type of the behavior, target group, models applied in previous successful programs, and models supported through previous research in the same area or related areas (15).

Hence, this study employed integrative model of behavioral prediction (IM). In this regard, Intention is determined by some combination of attitudes, perceived normative pressure, and/or perceived control over the behavior and also constructs such as skills and environmental constraints effects on performing or not performing the behavior (16). The behavioral intention has been predicted by IM in cancer self-examination and screening, vegetable and fruit consumption, and stopping the smoking and behaviors related to AIDS prevention (17, 18). Since health education models have not been applied to AT training so far, Yardley et al. study showed people do not stick to Alexander guideline and direction, and because AT lessons take a long time to be learned and are not cost-effective in developing countries, this study was conducted to assess education based on AT lessons coupled with IM among female teachers with CLBP in southern Tehran, Iran three months after the intervention.

2. Methods

2.1. Participants

This quasi-experimental study was conducted on elementary female teachers in two governmental, educational districts in southern Tehran from January to December 2014. Firstly, two districts of southern Tehran were selected randomly and then assigned to the intervention group and the control group by simple randomization. The eligible teachers were selected by purposive sampling using a specialist who prepared checklists and visiting elementary schools, then by referring them to the specialist for confirmation.

Inclusion criteria included having non-specific CLBP most hours a day, which lasted more than 90 day get sick from low back pain or recurrent LBP, agreement to participate in the study, and being female. Exclusion criteria involved malignancy history, vertebral column infection or fractures, spinal surgery and congenital abnormality, severe postural deformity, confirmed spondylolysis, rheumatoid arthritis, osteoporosis, and pregnancy, referring pain to leg inability to walk more than 100 m, numbness or pins-and-needles feelings in the feet or toes, morning stiffness lasting more than 30 minutes, difficulty in walking on the toes and heel, positive straight leg rising (SLR) test in 70 angles, no pain reduction after resting, and pregnancy. Initially, 86 patients were recruited. Nine patients about 10 percent drop up, one from the intervention group and eight from the control group. Subsequently, 42 and 35 patients were assigned to the intervention and control groups, respectively.

2.1.1. Sample Size

According to the below formula and considering α = 5%, 90% statistical power, d = 0.6 (moderate effect size), using the following formula, and 15% sample drop out; the sample size was calculated 35 patients for each group.

$$n = \frac{\left(Z_{\frac{\alpha}{2}} + Z_{\beta}\right)^2}{d^2} = \frac{10.49}{0.36} = 29.13 \sim 30$$

2.2. Study Instruments

An elicitation study by interviewing 15 eligible teachers from the target group was conducted to design the IM construct questionnaires. Themes were labeled according to the IM constructs, and self-report AT questionnaire were prepared based on them. Following the assessment of 11 experts in health education and promotion, occupational medicine specialist and research specialist, the score of 0.87 was calculated for content validity ratio (CVR) by appling the Lawshe table, 0.96 for content validity index (CVI), and 0.84 for internal consistency Cronbach's α. The opinions of 25 eligible teachers about the clarity of the items were applied for evaluating face validity.

The 108-item AT questionnaire included demographic information and 15 IM constructs such as knowledge, perceived risk, and so on. Likert scale rated on a 1 to 7 was applied for inquiries, except for knowledge items, which

offered true-false or "do not know" responses and behavior items, which offered 5 = always to 1 = never. Skill assessment checklist included a total of 18 items considering the two fundamental AT lessons: getting up from the chair and picking up light objects, which were evaluated observationally. The Farsi version of the Roland-Morris disability questionnaire (19), which has a 24 list of daily activities, The hand to floor test (Rozenstock L 2005) (20), and visual analog scale were also employed (21).

2.3. Educational Plan

A 90-page booklet and a CD about inhibition and directions rehearsals were provided for both groups. Table 1 shows the educational plan. The lessons were based on the IM constructs and intervention mapping instructions in the intervention group (22, 23). The technique used to improve IM constructs have been previously reported (24), and the others are available in Table 1.

2.4. Ethical Considerations

The Ethics Committee of Shahid Sadoughi University of Medical Sciences, Yazd, Iran, approved the study (Letter Number: P/17/1/187844 in December 21, 2013). Verbal consent was obtained. The visits to schools and holding of AT sessions were authorized by the educational authorities of Tehran Province.

2.5. Statistical Analysis

All statistical analyses were carried out by SPSS V. 16. For statistical analysis, Independent and Paired Sample *t*-test, Mann-Whitney, chi-square, Wilcoxon, and covariance were used.

3. Results

In two groups, 77 teachers were assessed. Table of demographic characteristics of the participants and the comparison of them, as well as table of other variables such as age, work experience, education, marital status, Roland-Morris and pain score, duration of LBP, and IM constructs have been reported (24, 25). Regarding these constructs and variables, no baseline differences were observed between the groups by the *t*-test and Mann-Whitney U test (All P values > 0.05). The mean scores of the seven IM constructs before the intervention are shown in Tables 2 and 3.

Three months after the intervention, the changes in all IM constructs in both intervention and control groups were significant ($P < 0.05$), except for perceived environmental constraints, which was not improved in both groups ($P = 0.869$). However, in the intervention group, covariance test results revealed more significant improvements on all IM constructs, except for the constructs of knowledge ($P = 0.210$), direct normative belief ($P = 0.279$), environmental constraint ($P = 0.869$) and intention ($P = 0.080$) in which both groups were improved similarly.

The improvement in "pain score" and "frequency of pain" in both groups was strongly significant. However, Roland-Morris score ($P = 0.006$) and hand to floor test ($P < 0.001$) were improved only in the intervention group (Table 4). Covariance test revealed more significant improvement in all of the above-mentioned outcomes in the intervention group, except for pain score ($P = 0.086$), which showed a similar improvement in this outcome in both groups.

4. Discussion

This study investigated the education of teachers with CLBP based on AT lessons coupled with IM three months after the intervention. The results showed that teacher educational plan in the intervention group facilitated the adoption of AT behaviors and fostered skills and abilities, direct and indirect perceived behavioral control, indirect subjective norms, direct and indirect attitude, and perceived risk in comparison to the control group. Consistent with this result, it was established that merely providing knowledge and messages alone "As in AT training, so far has been common" is not enough to change behavior (11).

Also, the frequency of pain and disability decreased in the intervention group compared with the control group, which was objectively confirmed by hand to floor test. These results indicated that the IM strengthened the AT training. The environmental constraint was the only construct that did not change in both groups. Fishbein stated changing environmental factors can include community engineering or training for people to avoid environmental barriers (16). Consistent with these findings, Cardoso study showed a high prevalence of LBP in teachers and recommended advocacy for the improvement of the environmental condition (26). Adequate and standardized furniture are considered to improve upright posture in AT training (27).

Knowledge, direct subjective norms, and intention constructs were improved in both groups. The control group improvement could be attributed to receiving three sessions of AT training. Yardley et al. study showed participants in 6-session AT training classes did not show changes in perceived behavioral control, but participants in 24-session training classes made progression in attitude and

Table 1. The Intervention Plan in Both Intervention and Control Groups[a, b]

Group	Education for Control Group	Education for Intervention Group
Session number	Three sessions (just AT lessons)	5 sessions in 1.5 hours for intervention group performed. (AT lessons coupled with IM)
Trainers	A health education specialist, a physical medicine and rehabilitation specialist, and a physiotherapist	A health education specialist, a physical medicine and rehabilitation specialist, and a physiotherapist
Educational package	One DVD and a 90-page booklet about AT lessons	One DVD and a 90-page booklet about AT lessons, A checklist of self-assessment, a checklist of posture assessment, a page of early commitment, Two poster reminders for installation on the wall of the house, three poster reminders for installation on the walls of the training place (classroom) and its corridors
Common educational methods and equipment	Lectures, demonstrations, questions and answers (Q&A). Equipment: photos, video projector, chair, desk, mirror, pillow, bed, and model of the spine	Similar to control group
Content of sessions	Definition of LBP and its etiology, the origin of the AT, principals of AT, how to do exercise, self-assessment, work with chair, monkey position, daily activity, rehearsal of back muscles relaxation	Technique and methods such as enhance perceived risk, knowledge, shape and change attitude, improve perception of environmental constraints and change environment, change habitual behavior, skills and abilities, self-efficacy and overcoming barriers, and also techniques used to change perception of subjective norms. Discussion and role-playing sessions in addition to all interventions in control group were also used.
Following	Four notifications of SMS	Fifteen persuasive SMS every week, 4 notifications of SMS, Telephone call after one and half month to follow

[a] Techniques used to increase skills and abilities, self-efficacy and overcoming barriers in intervention group: Teaching methods: lecture, Q&A, role-playing. Equipment: photos, video projector. Early commitment, self-monitoring or personal supervision, dividing behavior in to smaller behaviors, verbal encouragement, attribution, role-playing, remove and overcoming barriers, modeling, guided practice, setting short-term and long-term goals.
[b] Techniques to change perception of subjective norms in intervention group: Information about the other agreements (specialist, health director of district, giving OJT certification), social comparison, training them in 10-individual groups.

Table 2. Comparison of IM Constructs (Knowledge, Perceived Risk, Attitude, Subjective Norm) Before and After the Intervention Between the Two Groups

Evaluated IM Constructs, Group	Before Intervention	After Intervention	P Value[a]	P Value[b] (Between the Two Groups)
Knowledge				0.210
Intervention	1.320 ± 0.260	8.394 ± 0.321	< 0.001	
Control	0.850 ± 0.213	8.062 ± 0.327	< 0.001	
P value[c]	0.31	0.472[d]		
Perceived risk				0.032
Intervention	29.134 ± 1.198	34.952 ± 1.352	< 0.001	
Control	28.500 ± 1.450	32.628 ± 1.179	0.024	
P value[c]	0.92[d]	0.032		
Direct attitude				0.001
Intervention	34.371 ± 1.105	53.190 ± 0.623	< 0.001	
Control	32.771 ± 0.547	48.628 ± 1.080	< 0.001	
P value[c]	0.20	0.001		
Behavioral belief χ (outcome evaluation)				0.029
Intervention	54.809 ± 5.142	104.928 ± 0.633	< 0.001	
Control	44.451 ± 4.341	89.54 ± 1.080	< 0.001	
P value[c]	0.137[d]	0.021[d]		
Directive subjective norm				0.279
Intervention	17.023 ± 3.072	20.928 ± 3.405	< 0.001	
Control	16.400 ± 1.718	19.942 ± 5.628	< 0.001	
P value[c]	0.266	0.278[d]		
Normative belief χ (motivation to comply)				0.025
Intervention	16.047 ± 4.549	20.928 ± 0.503	< 0.001	
Control	5.857 ± 3.084	19.942 ± 0.625	< 0.001	
P value[c]	0.068	0.013[d]		

[a] Paired *t*-test and Wilcoxon.
[b] Covariance.
[c] *t*-test and Mann-Whitney.
[d] Using parametric tests.

Table 3. Comparison of IM Constructs (Behavioral Control, Skills and Ability, Environmental Constraint, Intention, Behavior) Before and After the Intervention Between the Two Groups

Evaluated IM Constructs, Group	Before Intervention	After Intervention	P Value[a]	P Value[b] (Between the Two Groups)
Directive perceived behavioral control				0.010
Intervention	16.357 ± 0.317	22.595 ± 4.472	< 0.001	
Control	16.371 ± 1.416	19.857 ± 4.653	< 0.001	
P value[c]	0.892	0.010[d]		
Control belief χ their perceived power to influence behavior				0.001
Intervention	7.357 ± 4.372	56.023 ± 6.362	< 0.001	
Control	4.521 ± 2.559	27.171 ± 4.474	< 0.001	
P value[c]	0.208	< 0.001		
Environmental constraint				0.869
Intervention	26.166 ± 0.911	26.523 ± 0.917	0.767[d]	
Control	26.000 ± 1.004	26.257 ± 1.117	0.846[d]	
P value[c]	0.902[d]	0.853[d]		
Skills and abilities				< 0.001
Intervention	1.345 ± 0.206	7.214 ± 0.450	< 0.001	
Control	1.471 ± 0.224	2.257 ± 0.240	0.003	
P value[c]	0.561	< 0.001		
Intention				0.080
Intervention	17.666 ± 0.587	25.976 ± 0.530	< 0.001	
Control	16.857 ± 0.487	24.542 ± 0.533	< 0.001	
P value[c]	0.112	0.008		
Behavior				< 0.001
Intervention	30.357 ± 0.800	57.595 ± 1.569	< 0.001	
Control	32.714 ± 0.879	50.914 ± 1.271	< 0.001	
P value[c]	0.051	0.002		

[a] Paired *t*-test and Wilcoxon.
[b] Covariance.
[c] *t*-test and Mann-Whitney.
[d] Using parametric tests.

Table 4. Comparison of Pain Outcome Before and After the Intervention Between the Two Groups

Evaluated Outcome, Group	Before Intervention	After Intervention	P Value[a]	P-Value[b] (Between the Two Groups)
Pain score				0.086
Intervention	5.178 ± 0.227	3.190 ± 0.243	< 0.001	
Control	5.235 ± 0.267	3.971 ± 0.305	0.002	
P value[c]	0.85	0.061		
Frequency of occurrence of pain in the last three months				0.022
Intervention	11.571 ± 2.708	1.738 ± 0.259	0.001	
Control	14.730 ± 2.372	5.142 ± 0.939	0.001	
P value[c]	0.70	< 0.001		
Roland-Morris score				0.001
Intervention	4.714 ± 0.621	3.881 ± 0.452	0.006	
Control	7.235 ± 0.758	6.714 ± 0.621	0.598	
P value[c]	0.126	< 0.001		
Hand to floor test				0.023
Intervention	8.095 ± 1.509	2.428 ± 0.628	0.001	
Control	7.942 ± 1.511	5.457 ± 1.312	0.271	
P value[c]	0.85	0.036		

[a] Paired *t*-test and Wilcoxon.
[b] Covariance.
[c] *t*-test and Mann-Whitney.
[d] Using parametric tests.

perceived behavioral control after three months, while both groups did not show progress in the intention (13).

Some IM constructs in the intervention group progressed compared to the control group. This improvement in constructs facilitated behavior adoption better than the control group, which declines LBP and can be attributed to applying IM based training by using different methods to enhance IM constructs. Fishbein, and Bartholomew and Mullen stated that in IM and other models, there is no discussion on how to change constructs (16, 28). Consistent with our study, Woodman et al. reported patients that participated in AT class indicated significant improvements in most self-efficacy/self-care measures compared with usual care alone (29). Bleakly et al. indicated attitude as the most important predictor of the behavior and mentioned skills, abilities, and environmental constraints are not mostly measured in IM-used studies (30).

Pain score significantly decreased in both groups, but the frequency of the pain occurrence was less in the intervention group. It means that the intervention group experienced less LBP frequency of occurrence than the control group; regardless of showing the same pain severity as control group each time. Reddy in his study reported more skill, decrease in pain, and better posture after six AT training sessions (31). Little et al. revealed that AT courses are more effective than massage and exercise and have long-term benefits for LBP (32). Consistent with the current study, in a study, 60% of participants indicated significant improvement in pain condition by employing AT in a longer follow-up period (32). LBP disability and hands to floor test decreased significantly just in the intervention group. Studies declared that hand to floor test can be used as a sensitive and objective index (33)

These results explicit the use of IM to promote adherence to AT and also cost-effectiveness and feasibility of employing AT in developing countries. In Hue et al. study in 2015, it was stated that AT training coupled by exercise, created more cost-effectiveness (34). However, it is necessary to maintain motivation by providing personal support and texting persuasive SMSs or reminder classes. The limitations of the study can be considered self-reported of behavior and small-sample size, teaching AT by a teacher without a certificate, more comprehensive research must be planned to evaluate the outcome of incorporating IM into AT training.

4.1. Conclusions

Because of fewer adverse reactions in complementary treatments, AT application is highly recommended in developing or developed countries by using the methods described in the present study.

Acknowledgments

The authors wish to thank the authorities of Yazd University of Medical Sciences who supported this project financially. We are also thankful to Dr. David Staurt Moore, Dr. Ebrahimi the director of Iran Physical Therapy Association, Dr. Mohammad Kamali, Dr. Tavafian, the authorities of education ministry, teachers and managers of districts 15 and 19 of Tehran, and those who helped us during conducting this research.

Footnotes

Authors' Contribution: Study design: Tahereh Kamalikhah, Leila Sabzmakan, Hassan Okati-Aliabad, Fatemeh Rahmati-Najarkolaei, and Nooshin Rouhani-Tonekaboni; acquisition of data, analysis, and interpretation of data: Tahereh Kamalikhah; drafting the article or revising: Tahereh Kamalikhah, Fatemeh Rahmati-Najarkolaei, and Nooshin Rouhani-Tonekaboni. All of the authors corroborate final approval of the version to be submitted.

Conflict of Interests: None of the authors declared any conflicts of interest.

Ethical Approval: The Ethics Committee of Shahid Sadoughi University of Medical Sciences, Yazd, Iran, approved the study (letter number: P/17/1/187844 in December 21, 2013). Verbal consent was obtained before starting the classes. The visits to schools and holding of AT sessions were authorized by the educational authorities of Tehran province.

Funding/Support: Yazd University of Medical Sciences supported this project financially.

Patient Consent: Verbal consent was obtained before starting the classes. The visits to schools and holding of AT sessions were authorized by the educational authorities of Tehran province.

References

1. Maher C, Underwood M, Buchbinder R. Non-specific low back pain. *The Lancet*. 2017;**389**(10070):736–47. doi: 10.1016/s0140-6736(16)30970-9.
2. Miyamoto GC, Moura KF, Franco YR, Oliveira NT, Amaral DD, Branco AN, et al. Effectiveness and cost-effectiveness of different weekly frequencies of pilates for chronic low back pain: Randomized controlled trial. *Phys Ther*. 2016;**96**(3):382–9. doi: 10.2522/ptj.20150404. [PubMed: 26294680].
3. Ardakani EM, Leboeuf-Yde C, Walker BF. Failure to define low back pain as a disease or an episode renders research on causality unsuitable: Results of a systematic review. *Chiropr Man Therap*. 2018;**26**:1. doi: 10.1186/s12998-017-0172-9. [PubMed: 29321845]. [PubMed Central: PMC5759306].

4. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;**392**(10159):1789–858. doi: 10.1016/S0140-6736(18)32279-7. [PubMed: 30496104]. [PubMed Central: PMC6227754].
5. Ghaffari M, Alipour A, Farshad AA, Yensen I, Vingard E. Incidence and recurrence of disabling low back pain and neck-shoulder pain. *Spine (Phila Pa 1976)*. 2006;**31**(21):2500–6. doi: 10.1097/01.brs.0000239133.29037.d0. [PubMed: 17023861].
6. Erick PN, Smith DR. A systematic review of musculoskeletal disorders among school teachers. *BMC Musculoskelet Disord*. 2011;**12**:260. doi: 10.1186/1471-2474-12-260. [PubMed: 22087739]. [PubMed Central: PMC3250950].
7. Qaseem A, Wilt TJ, McLean RM, Forciea MA; Clinical Guidelines Committee of the American College of Physicians. Noninvasive treatments for acute, subacute, and chronic low back pain: A clinical practice guideline from the American College of Physicians. *Ann Intern Med*. 2017;**166**(7):514–30. doi: 10.7326/M16-2367. [PubMed: 28192789].
8. Horng YS, Hsieh SF, Wu HC, Feng CT, Lin MC. Work-related musculoskeletal disorders of the workers in a child care institution. *Tw J Phys Med Rehabil*. 2008;**36**(1):15–21. doi: 10.6315/2008.36(1)02.
9. Woodman JP, Moore NR. Evidence for the effectiveness of Alexander Technique lessons in medical and health-related conditions: A systematic review. *Int J Clin Pract*. 2012;**66**(1):98–112. doi: 10.1111/j.1742-1241.2011.02817.x. [PubMed: 22171910].
10. Cacciatore TW, Horak FB, Henry SM. Improvement in automatic postural coordination following alexander technique lessons in a person with low back pain. *Phys Ther*. 2005;**85**(6):565–78. [PubMed: 15921477]. [PubMed Central: PMC1351283].
11. Ajzen I. Behavioral interventions based on the theory of planned behavior. *Interventions with the TBP*. 2006.
12. Foster NE, Thomas E, Bishop A, Dunn KM, Main CJ. Distinctiveness of psychological obstacles to recovery in low back pain patients in primary care. *Pain*. 2010;**148**(3):398–406. doi: 10.1016/j.pain.2009.11.002. [PubMed: 20022697]. [PubMed Central: PMC2831173].
13. Yardley L, Dennison L, Coker R, Webley F, Middleton K, Barnett J, et al. Patients' views of receiving lessons in the Alexander technique and an exercise prescription for managing back pain in the ATEAM trial. *Fam Pract*. 2010;**27**(2):198–204. doi: 10.1093/fampra/cmp093. [PubMed: 20032168].
14. Uhrig JD, Davis KC, Rupert D, Frazeb J. Behavioural precursors and HIV testing behaviour among African American women. *Health Educ J*. 2010;**71**(1):102–14. doi: 10.1177/0017896910386528.
15. World Health Organization. *Regional Office for the Eastern Mediterranean, Health education: Theoretical concepts, effective strategies and core competencies, A foundation document to guide capacity development of health educators*. WHO; 2012.
16. Fishbein M. A reasoned action approach to health promotion. *Med Decis Making*. 2008;**28**(6):834–44. doi: 10.1177/0272989X08326092. [PubMed: 19015289]. [PubMed Central: PMC2603050].
17. Givaudan M, Van de Vijver JR, Poortinga YH. Identifying precursors of safer-sex practices in Mexican adolescents with and without sexual experience: an exploratory model 1. *J Appl Soc Psychol*. 2005;**35**(5):1089–109. doi: 10.1111/j.1559-1816.2005.tb02161.x.
18. Bleakley A, Hennessy M, Fishbein M, Jordan A. How sources of sexual information relate to adolescents' beliefs about sex. *Am J Health Behav*. 2009;**33**(1):37–48. [PubMed: 18844519]. [PubMed Central: PMC2860278].
19. Mousavi SJ, Parnianpour M, Mehdian H, Montazeri A, Mobini B. The Oswestry Disability Index, the Roland-Morris Disability Questionnaire, and the Quebec Back Pain Disability Scale: Translation and validation studies of the Iranian versions. *Spine (Phila Pa 1976)*. 2006;**31**(14):E454–9. doi: 10.1097/01.brs.0000222141.61424.f7. [PubMed: 16778675].
20. Rosenstock L. *Text book of clinical occupational and environmental medicine*. USA: Elsevier saunders; 2004. 529 p.
21. Ceylan A, Ozgencil GE, Erken B, Asik I. Effectiveness of percutaneous intradiscal decompression therapy in thoracic disc herniation. *Balkan Med J*. 2019;**36**(2):134–8. doi: 10.4274/balkanmedj.galenos.2018.2018.0188. [PubMed: 30299261]. [PubMed Central: PMC6409959].
22. Bartholomew LK, Parcel GS, Kok G, Gottlieb NH. *Planning health promotion program an intervention mapping approach*. Sanfrancisco CA: Jossey Bass; 2006.
23. Milne S, Orbell S, Sheeran P. Combining motivational and volitional interventions to promote exercise participation: Protection motivation theory and implementation intentions. *Br J Health Psychol*. 2002;**7**(Pt 2):163–84. doi: 10.1348/135910702169420. [PubMed: 14596707].
24. Rogers RE. *Theory of planned behavior and adherence to a multidisciplinary treatment program for chronic pain [dissertation]*. University of North Texas; 2006.
25. Johnson SE, Hall A. The prediction of safe lifting behavior: An application of the theory of planned behavior. *J Safety Res*. 2005;**36**(1):63–73. doi: 10.1016/j.jsr.2004.12.004. [PubMed: 15752484].
26. Kamalikhah T, Morowatisharifabad MA, Rezaei-Moghaddam F, Ghasemi M, Gholami-Fesharaki M, Goklani S. Alexander technique training coupled with an integrative model of behavioral prediction in teachers with low back pain. *Iran Red Crescent Med J*. 2016;**18**(9). e31218. doi: 10.5812/ircmj.31218. [PubMed: 28144457]. [PubMed Central: PMC5253206].
27. Kamalikhah T, Rahmaty Najarkolaei F, Sabzmakan L, Rouhani Tonekaboni N. Kirkpatrick evaluation of theory-based educational program for low back pain management in teachers. *Trauma Mon*. 2016;**22**(5). e35976. doi: 10.5812/traumamon.35976.
28. Bartholomew LK, Mullen PD. Five roles for using theory and evidence in the design and testing of behavior change interventions. *J Publ Health Dent*. 2011;**71**:S20–33. doi: 10.1111/j.1752-7325.2011.00223.x.
29. Woodman J, Ballard K, Hewitt C, MacPherson H. Self-efficacy and self-care-related outcomes following Alexander Technique lessons for people with chronic neck pain in the ATLAS randomised, controlled trial. *Eur J Integr Med*. 2018;**17**:64–71. doi: 10.1016/j.eujim.2017.11.006. [PubMed: 29527245]. [PubMed Central: PMC5842361].
30. Bleakley A, Hennessy M, Fishbein M, Jordan A. Using the Integrative Model to explain how exposure to sexual media content influences adolescent sexual behavior. *Health Educ Behav*. 2011;**38**(5):530–40. doi: 10.1177/1090198110385775. [PubMed: 21606378]. [PubMed Central: PMC5444939].
31. Reddy PP, Reddy TP, Roig-Francoli J, Cone L, Sivan B, DeFoor WR, et al. The impact of the alexander technique on improving posture and surgical ergonomics during minimally invasive surgery: Pilot study. *J Urol*. 2011;**186**(4 Suppl):1658–62. doi: 10.1016/j.juro.2011.04.013. [PubMed: 21855928].
32. Little P, Lewith G, Webley F, Evans M, Beattie A, Middleton K, et al. Randomised controlled trial of Alexander technique lessons, exercise, and massage (ATEAM) for chronic and recurrent back pain. *BMJ*. 2008;**337**. a884. doi: 10.1136/bmj.a884. [PubMed: 18713809]. [PubMed Central: PMC3272681].
33. Cabitza P, Randelli P. Efficacy and safety of eperisone in patients with low back pain: A double blind randomized study. *Eur Rev Med Pharmacol Sci*. 2008;**12**(4):229–35. [PubMed: 18727454].
34. Hu XY, Chen NN, Chai QY, Yang GY, Trevelyan E, Lorenc A, et al. Integrative treatment for low back pain: An exploratory systematic review and meta-analysis of randomized controlled trials. *Chin J Integr Med*. 2015:1–13. doi: 10.1007/s11655-015-2125-2.