Effects on readiness to change of an educational intervention on depressive disorders for general physicians in primary care based on a modified Prochaska model—a randomized controlled study

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Background. The Prochaska model of readiness to change has been proposed to be used in educational interventions to improve medical care.

Objective. To evaluate the impact on readiness to change of an educational intervention on management of depressive disorders based on a modified version of the Prochaska model in comparison with a standard programme of continuing medical education (CME).

Methods. This is a randomized controlled trial within primary care practices in southern Tehran, Iran. The participants included 192 general physicians working in primary care (GPs) were recruited after random selection and randomized to intervention (96) and control (96). Intervention consisted of interactive, learner-centred educational methods in large and small group settings depending on the GPs' stages of readiness to change. Change in stage of readiness to change measured by the modified version of the Prochaska questionnaire was the main outcome measure.

Results. The final number of participants was 78 (81%) in the intervention arm and 81 (84%) in the control arm. Significantly (P < 0.01), more GPs (57/96 = 59% versus 12/96 = 12%) in the intervention group changed to higher stages of readiness to change. The intervention effect was 46% points (P < 0.001) and 50% points (P < 0.001) in the large and small group setting, respectively.

Conclusions. Educational formats that suit different stages of learning can support primary care doctors to reach higher stages of behavioural change in the topic of depressive disorders. Our findings have practical implications for conducting CME programmes in Iran and are possibly also applicable in other parts of the world.

Keywords. Depressive disorders, educational intervention, primary care, randomized controlled trial.

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Introduction

Conventional continuing medical education (CME) has largely failed to improve professional practice and health outcomes.^{1–5} CME has been compulsory for all doctors in Iran since 1990, but there is now an identified need⁶ to develop a new framework based on theories of learning and behavioural change. We have tested the 'readiness to change' or so-called Prochaska model⁷ in a CME programme on depressive disorders for general physicians working in primary care (GPs) in Iran. Depressive disorders are common and frequently unrecognized in GPs' practice both in Iran and worldwide,^{8,9} and a majority of patients do not receive adequate treatment.¹⁰ So far there have been no formal CME courses on depressive disorders for GPs in Iran. Therefore, there is a need to increase the knowledge and skills of general physicians working in primary care (GPs) regarding the diagnosis and treatment of depression.⁸⁻¹⁰

The Prochaska model describes five stages of change: pre-contemplation, contemplation, preparation for action, recent change and maintenance.⁷ The model postulates that individuals are at different stages of readiness to change and that effective interventions should adjust to the stages and assist moves to higher stages, thus promoting behavioural change. The model has most commonly been applied in health behaviour contexts, such as treatment of addictive behaviour, and health promotion.^{11,12} More recently, the model has been suggested to provide a deeper understanding of participants' response to knowledge translation within the CME context and how educational methods can be customized.^{11–15} Studies on the effects of tailored interventions based on the Prochaska model have been suggested in the literature.^{11,14,16}

A modified Prochaska model has been used as an evaluation tool to assess the participants' stages of readiness to change in a research transfer training programme.¹⁵ The original five stages were collapsed into three stages—attitude, intention and action—in the 'Modified Prochaska Questionnaire' (MPQ). In the 'attitude' stage, there is awareness of a problem but no commitment to take action. In the 'intention' stage, the individual has prepared for behaviour change, while in the 'action' stage, such change has already taken place.

This study aimed at evaluating the impact on GPs' readiness to change after an educational intervention based on the modified Prochaska model as a needs assessment to identify interactive learner-centred methods fostering behaviour change,^{17–19} in comparison with GPs participating in concurrently available CME programmes, with standard didactic learning, within the same medical field. Our primary hypothesis was that participants in the intervention group would move to higher stages of readiness to change at least 20%

points more often than in the control group. Our secondary hypothesis was that the same would be true regardless whether the learning took place in educational settings with large or small groups.

Methods

The methods and findings of this study have been reported in agreement with the Consolidated Standards of Reporting Trials requirements.²⁰

Study area

Eligible for inclusion were all about 1600 GPs working in private clinics in the southern part of Tehran and registered⁶ with Tehran University of Medical Sciences (TUMS), which is responsible for their CME. Most of them (80%) worked in a private clinic, while 20% were employed at public clinics and hospitals. A majority were men (74%) and the mean age was 38 years (SD = 9.3). The mean level of experience was 7 years (SD = 8.3).⁶

Protocol

This is a randomized controlled trial with a calculated sample size of 164, based on an estimated improvement of 20% points in the intervention group and assuming 80% power at a 5% significant level. Considering about 20% attrition, the desired sample size was increased to 200. An extra 50% was added in order to allow for up to 33% initial attrition.

Participants

Initially, 300 GPs, who had private clinics in the southern Tehran region, were randomly selected and invited to a meeting, which 200 GPs attended. Eight of them were not eligible as they worked outside of the target area. The remaining 192 were informed about the objectives of the study and methods used and that participation would exempt them from having to pay the usual participation fee. After signing an informed consent, all of them filled in the MPQ.

Assignment

The 192 GPs were first grouped according to their stages of readiness to change and stratified based on sex, age (three levels) and length of work experience (three levels). Second, they were randomly allocated within each subgroup to the intervention (n = 96) or the control arm (n = 96). There were no significant differences in demographic characteristics (Table 1) or in their baseline stages of readiness to change (Table 2) between the GPs in the two study arms.

Participant flow and follow-up

Intervention arm. All GPs in the attitude stage (n = 74) were allocated to large group education, where

 TABLE 1
 Demographic characteristics of 96 participants in the intervention arm and 96 participants in the control arm

Demographic characteristics	Intervention	Control	P-value
Age, mean (SD)	40.2 (6.1)	40.5 (8.8)	0.81
Men (%)	72 (75)	68 (71)	0.52
Work experience in years, mean (SD)	11.7 (6.2)	12.1 (8.3)	0.77

 TABLE 2 Distribution of participants among the three stages of readiness to change according to their responses to the MPQ in pre- and post-test in both groups (post-test only for those participating in the intervention)

Stage of readiness to change	Pre-test		Post-test	
	п	%	п	%
Intervention				
Attitude	74	77	15	19
Intention	22	23	49	63
Action	0	0	14	18
Total	96	100	78	100
Control				
Attitude	73	76	53	65
Intention	23	24	25	31
Action	0	0	3	4
Total	96	100	81	100

the 'diagnosis' of depressive disorders was emphasized (Fig. 1). Interactive educational methods relevant for a large group were used, such as programmed lectures, modified buzz groups and lectures followed by videos and discussion. All GPs in the intention stage (n = 22) were allocated to a small group in a workshop setting, mainly using case illustrations presented through standardized patients, role playing, jigsaw, buzz groups and snowball techniques (Box 1: available as supplementary material online), all emphasizing novel 'treatments' of depressive disorders and 'differential diagnosis'. The total education time in both groups was 12 hours. Eighteen doctors (13 in the large group and 5 in the small group) did not show up at the education and were not reached for follow-up.

Control arm. The number of doctors in both the large and small group tallied with the intervention groups, but both diagnosis and treatment of depressive disorders were emphasized in both groups. The reasons for introducing a small group in the control arm was to reduce the potential bias of better effect if the learning takes place in a small group setting. All GPs in the intention stage (n = 23) were therefore allocated to the large group, which took part in a current CME programme on depressive disorders using conventional teacher-centred educational methods, such as lectures. A corresponding number of the 52 GPs in

the attitude stage was randomly assigned to the small group, participating in a workshop, where current CME methods for small groups were applied, such as mini-lectures followed by questions and answers. The total education time in both groups was 8 hours. Fifteen doctors (11 in the large group and 4 in the small group) did not show up at the education and were not reached for follow-up (Box 2 and 3: available as supplementary data online).

Content of the educational intervention

Eight CME teachers from the Department of Psychiatry were trained at a 1-day workshop on the application of interactive educational methods. After training, they conducted 2-day courses for the GPs in both the intervention and control groups. The courses were given in July 2006 and took place in the localities used for CME at TUMS.

The same educational background material was used in both groups: a book with comprehensive guidelines for GPs for the diagnosis and treatment of depressive disorders, which had been compiled by members of the research group, based on World Health Organization documents²¹ and the WPA Bulletin of depressive disorders.²² The background material was also used to prepare case scenarios and for instructing standardized patients.

Measures

The MPQ¹² was taken as a model, translated into Farsi and further modified in order to be adapted to depressive disorders and to the different cultural context (Appendix 1). The validity and reliability have been documented in a previous study.²³ The final MPQ has 11 statements to be answered by 'yes' or 'no'. The first three questions correspond to the attitude stage, the next four questions to the intention stage and the last four questions to the action stage. GPs who gave positive answers to less than six questions (the first three questions plus two questions from the intention part) were allocated to the attitude stage. If they gave positive answers to six to nine questions (including at least all the attitude and three of the intention stage questions), they were allocated to the intention stage. If they gave 10 or more positive answers, they were allocated to the action stage. A post-intervention assessment was performed after 1 month by sending the MPQ to all participants by trained carriers, who were instructed to collect the test 20 minutes after delivery.

Analysis

The data were entered by the use of SPSS software version 13. The Pearson's chi-square test for independence was used to compare the intervention and control groups regarding proportions of doctors reaching a higher stage of readiness to change after the

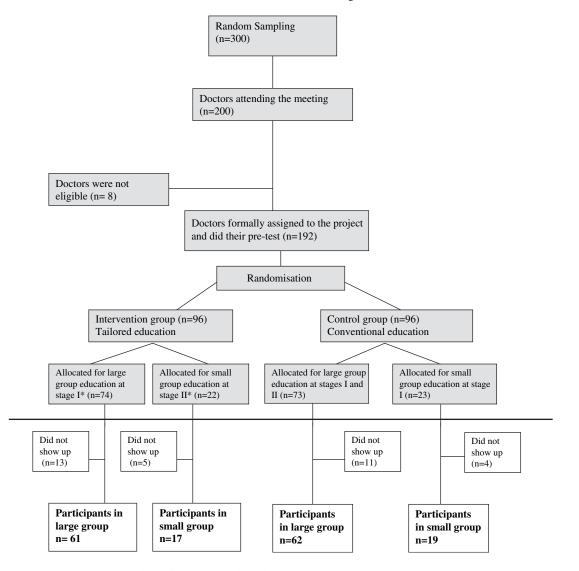


FIGURE 1 Flow of GPs through trial; Stage I = attitude and Stage II = intention.

intervention. Corresponding subgroup analyses for different initial stages and educational methods were done. All analyses were performed with an intentionto-treat approach.

Results

The process of change to higher stages showed significant differences between the intervention and control groups for all comparisons (Table 3). Both our primary and secondary hypotheses were strongly confirmed. In total, 57 GPs of 96 (59%) moved to a higher stage in the intervention arm compared with 12 of 96 (13%) in the control arm (P < 0.01), an intervention effect of 47% points. In the large group setting, 46 of 74 GPs in the intervention arm moved to a higher stage compared with 12 of 73 GPs in the control arm (P < 0.01), an intervention effect of 46% points. The corresponding figures in the small group setting were 11 of 22 GPs in the intervention arm and none of 23 in the control arm (P < 0.01), an intervention effect of 50% points.

GPs in Stage I in the intervention arm moved to higher stages of change in significantly more cases than GPs in the control arm (46/74 = 62% versus 9/73 = 12%; $P \le 0.001$). The same was true for GPs initially in Stage II (11/22 = 50% versus 3/23 = 13%; P = 0.001).

It should be noted that all analyses have been done according to the intention-to-treat model. If changes were to be considered only for those, who actually participated, the differences would be even more dramatic.

Discussion

This is the first study of its kind, according to the international literature. We found a highly significant impact on doctors' readiness to change in the field of

	Pre-test		Post-test		
	Stage I ^a	Stage II ^a	Stage I	Stage II	Stage III ^a
Intervention arm $(n = 96)$	74 (77%)	22 (23%)	28 (nr: 13) (29%)	54 (nr: 5) (56%)	14 (15%)
Large group—Stage I $(n = 74)$	74 (100%)	0	28 (nr: 13) (38%)	43 (58%)	3 (4%)
Small group—Stage II $(n = 22)$	0	22 (100%)	0	11 (nr: 5) (50%)	11 (50%)
Control arm $(n = 96)$	73 (76%)	23 (24%)	66 (nr: 13) (69%)	27 (nr: 2) (28%)	3 (3%)
Large group—Stage I $(n = 50)$	50 (100%)	0	41 (nr: 9) (82%)	9 (18%)	0
Large group—Stage II $(n = 23)$	0	23 (100%)	2 (9%)	18 (nr: 2) (78%)	3 (13%)
Small group—Stage I $(n = 23)$	23 (100%)	0	23 (nr: 4) (100%)	0	0

 TABLE 3 GPs' stages of change before and after the educational intervention and by participation in type of educational group, including non-respondents (nr)

Non-respondents are assigned to their original stage in the post-test. All differences between the intervention and control arm are significant ($P \le 0.001$).

^aStage I, attitude; Stage II, intention and Stage III, action.

management of depressive disorders after participating in a tailored CME activity based on a needs assessment using a modified Prochaska model. Caution was taken to avoid bias related to different educational formats. There was a clearly demonstrable impact regardless of stage of readiness to change at the start or whether the learning took place in a large or small group setting. Our findings confirm the value of matching each participant to the learning format most suited for that participant's stage of change, i.e. based on the participants' learning needs.^{13,24}

Based on the model, the desired outcomes for GPs in the attitude stage was an improved understanding related to general diagnosis. Therefore, the educational strategy in the intervention large group was interactive education, such as programmed lectures.¹⁷ The outcome for the GPs in the intention stage was a practical understanding of novel aspects on treatment and differential diagnosis. Therefore, we used a workshop setting with two or multi-faceted communications in the intervention small group.^{1,17,18} It has been theorized that professional change in behaviour depends on a deeper level of learning, which is facilitated by interactive workshops.^{18,19}

Half of the GPs in the intervention small group shifted to the higher action stage in contrast with the control small group where nobody moved to the next stage. In the large group in the intervention arm, close to 2 of 3 GPs shifted to the intention stage, a few of them even to the action stage, while only 1 of 10 changed to the next stage in the control arm. However, three of the GPs in the second stage in the control large group shifted to the highest stage. The reason could be that the training was partly focusing on treatment aspects and our assumption was that persons in the intention stage would be more sensitive to such teaching. This does not invalidate our finding that the small and large group formats (without considering the participants' stages of change) seem to have no impact on the participants' stages of change.

The findings support our assumption that the tailored intervention helped the GPs to not only become aware of problems regarding diagnosis and management of depression but also motivated them to learn more on the subject by participating in CME activities, cooperating in research, doing more counselling with depressed patients and more often consulting their psychiatric colleagues. In other intervention studies outside the field of medical education, shifts to higher stages have been shown in some,^{15,25,26} but not in all.²⁷

Limitations of the study include that the GPs in the intervention arm received 12 hours of training compared with 8 hours in the control arm. However, teacher involvement was the same in all groups in both arms, as the methods in the intervention arm helped the participants to learn from peers and by themselves during their group work. A second limitation was the attrition in both study arms from randomization to start of the intervention, although it was similar in the two arms. Notably, the final sample size of 159 GPs corresponds well with the originally calculated necessary sample size of 164. Potential bias related to different learning formats was partially controlled for by introducing small group teaching also in the control group. Full control could not be reached, however, as the educational methods were different. Although the participants were randomly selected among all GPs working in southern Tehran, the external validity is partially reduced by the fact that one-third of the initially selected GPs did not respond to the invitation. However, the participating GPs matched reasonably well with the total population of GPs regarding age, gender and length of work experience. Although the teachers were the same in both groups, their conduct was mainly following the intentions for each type of learning situation, according to the observations made by the first author. Therefore, we believe that the teachers' performance did not favour any of the study arms, thus not having a confounding effect on the participants' stages of change.

Contrarily, there is an advantage of using teachers with the same level of experience and academic grade for both groups in order to eliminate any bias related to different competence among the teachers.

Strengths of the study include the design and that the measuring instrument had previously been adapted and validated in Iran. The final sample size is also the largest such study found in the literature.

We have demonstrated that a theoretical model of medical learning and behavioural change can be used to devise learning formats that suit different stages of learning and that participation in such tailored education can help primary care doctors to move to higher stages of readiness to behavioural change regarding management of depressive disorders.

The model can be effectively used in future CME programmes in Iran and is also possibly applicable in other parts of the world. The expected intermediate outcome is that participants improve their management of depressive disorders in relation to their readiness to change, thus enhancing the potential for improved outcomes for the patients. The cost for this new model is higher in comparison with the current CME programme as it is more time consuming for both teachers and participants, but our assumption is that this would be outweighed by more effective performance. However, a final assessment regarding cost-effectiveness can only be made after further studies regarding outcomes for patients and society.

Supplementary Data

Supplementary Boxes 1–3 are available at *Family Practice* online (http://fampra.oupjournlas.org/).

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Declaration

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Ethical approval: The study protocol was approved by the Ethics committee at Tehran University of Medical Science.

Conflict of interest: None.

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Appendix 1. MPQ

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Stages of readiness to change	English translation of MPQ	Yes	No
Attitude	1. I believe that depression is an important disorder in the professional of all GPs.		
	2. I am consulted by depressed patients about once a week.		
	3. I believe that my knowledge regarding depressive disorders is not adequate.		
Intention	4. I have planned to spend some time studying depressive disorders on a regular basis in the near future.		
	5. Treating depressive patients has become a pre-occupation of mine.		
	6. I have planned to regularly attend CME meetings regarding depressive disorders.		
	7. I have decided to do research in the field of depressive disorders on a regular basis.		
Action	8. I regularly consult my psychiatrist colleagues regarding diagnosis and treatment of depressive disorders and ask for their recommendations.		
	9. In the last 6 months, I have attended CME programmes regarding depressive disorders.		
	10. In the last 6 months, I have studied six articles from scientific sources, journals		
	and books regarding the diagnosis and treatment of depressive disorders and I		
	have compared my own diagnosis and treatment methods with the novel and up to date methods.		
	 During the last week, I have counselled more than five patients with depressive disorders. 		