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The impact of educational intervention for providing disaster survival kit: Applying precaution adoption process model



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ABSTRACT

Natural disasters have caused many deaths and disabilities in human communities. One way to mitigate the impact of the disasters is the community based disaster preparedness programs against such incidents. The aim of this study is to encourage people to provide disaster survival kits. This randomized controlled study has evaluated the effectiveness of an eight-week Precaution Adoption Process Model-based disaster preparedness education program in 221 personnel in Ahwaz Carbon factory. The results have showed that after intervention, the training group showed significant positive progress in stages and seventeen subjects of the intervention group provided disaster survival kits. Our survey showed that the perceived benefits and barriers could predict the adaption stage. These results have supported the educational program based on the precaution adoption process model encouraging participants to provide disaster survival kits.

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1. Introduction

Disasters are threats to the population public health which could derail all aspects of human society requiring complex aid and recovery interventions [1]. In the last decade, more than 2.6 billion people have been affected by natural disasters such as earthquakes, tsunamis, landslides, cyclones, heat waves, floods, or severe cold weather. These disasters lead to mass casualty (e.g., blunt trauma, crush-related injuries, drowning) that can overwhelm local medical resources and prevent them from delivering comprehensive and definitive medical care [2]. Iran is one of the world's natural disaster-prone countries. In approximately 34 cases of natural disasters that occur, 90% of the population is exposed to the earthquakes and floods risks [3,4].

With the attention to statistical and historical evidences, Khuzestan province as a strategic and borderline province enjoys huge resources of oil and major dams. It had been experienced many natural disasters so far [5,6]. During recent decades, this province suffered from a lot of damages caused by natural disasters [6]. Available statistics indicated an increase in natural disasters and a lack of preparation to handle it [7].

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With the increasing frequency of such unforeseen events, community attention on the necessity of disaster preparedness has increased [8]. Such events can be mitigated or avoided through effective preparedness. For instance, the catastrophic loss of the Indian Ocean Tsunami of December 2004 was largely due to the lack of preparedness among the populations at risk [9]. On the contrary, in Japan's Tohoku earthquake on 11 March 2011, the effectiveness of disaster preparedness among Japanese citizens saved many lives. These examples demonstrate that personal disaster preparedness is critical to mitigate disaster impacts [10].

Preparedness for a major disaster is the most effective way to minimize the damage suffered by the affected population [11]. Emergency management officials and disaster planners recognize that for the first 72 h of an earthquake or other disaster strikes, individuals and families should be prepared for self-sufficiency because services and supplies can be disrupted and emergency aid might not be immediately reachable [12,13]. Having a comprehensive preparedness plan in the country and encouraging people to provide a family disaster survival kit can be a major factor in reducing the effects of disasters. The implementation of the interventions to provide and encourage the use of the kit in many developed countries have been welcomed with the general acceptance of the population [14]. The kit can be provided with a small expenditure and may contain a list of the items necessary such as canned foods, drinking water, flashlight, radio and batteries, first aid kit and so on [15]. In a national survey conducted in the United States in 2009, showed that 57% of the households had prepared disaster survival kits [16]. Fung and Loke studies also in Hong Kong showed that the contents of the kit of the affected people were 56.6% drinking water, 74.7% flashlight, 69.2% blankets and 52.5% radio [17].

Although such studies in this field have not been found in Iran as of yet, it seems that the formation of such behavior in the Iranian household has not been desirable. In a pilot study conducted by us in the Iran's Red Crescent aid workers we found out that just 12.5% of them had a disaster supply kit. According to our observations, lack of such a behavior in groups who have experienced disasters and who are knowledgeable experts in disaster management, then we can assume failure to develop such behavior in the community is not far-fetched.

Developing knowledge and behavior readiness so as to enhance the potential of individuals to cope with disasters is just possible through training [18].

But to reach to effective results, training must be implemented on the basis of principles and tested theories. Theories and models present a systematic view of events and present an educational process plan as a guideline for educational recognition and plannings [19].

With regards to the necessity of preliminary studies in Iran and to reach a favorable perception for researchers and those who are involved in the planning and implementation of interventions aimed at mitigating natural disaster effects. Also for providing the field to implement such a study on theoretical basis, the study is to encourage people to provide disaster survival kits on the precaution adoption process model basis.

2. Material and methods

By this randomized controlled experimental study conducted by personnel of Ahwaz Carbon factory in 2013, out of the 221 participants enrolled in this study, data was collected from 105 participants in the intervention group and 111 in the control group. Demographic characteristics of the participants were measured by a demographic questionnaire. Questions assessing the stages of PAPM were adapted from the study of Weinstein on Radon with some modifications [28]. The stages are classified into: unaware of Disaster Survival Kit (stage 1), have heard about the Disaster Survival Kit but unengaged (stage 2), undecided to prepare it (stage3), decided not to prepare it (stage 4), decided to prepare it (stage 5) and have a Disaster Survival Kit (stage 6).

Knowledge measurement designed is based on the guidelines of Red Cross [29]. This scale scores range is from zero to 10 and included question with open single answers about the contents of the disaster survival kit (Appendix A). Perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy questionnaires were directly measured by 5 items for each construct based on 5-point Likert scale (Appendix B). The face and content validity of the researcher-made instruments were confirmed by a panel of experts (comprising 8 experts in health education, psychology, disaster management and environmental health) in two different sessions. Test retest with a two-week interval was used to confirm the reliability of the instruments in 60 persons. The Cronbach's alpha of 83–94% confirmed the reliability of the instruments.

2.1. Theoretical background

Precaution Adoption Process Model (PAPM) is one of the stage theories used to explain how persons adopt certain behaviors to protect themselves. It consists of seven cognitive and behavioral stages ranging from unaware of the problem to action and maintenance stage [20].

Factors are probably to determine the progress between stages that Weinstein suggested are media messages about hazards and precaution (stages 1–2), raising knowledge, personal experience with hazard and communication from significant others (stages 2–3), perceived threat, perceived social norms, beliefs of precaution effectiveness and difficulty (stages 3–4 or stage 5), self-efficacy, mitigating perceived barriers and improvement perceived benefits (stages 5–6) [51].

PAPM has received increasing support for its usefulness in predicting health related actions [27]. The theory has been applied to many research topics in health education, including home radon testing [21], osteoporosis [22], meat consumption [23], child safety [24], and cancer screening [25]. Also Glik et al. [26] and Gielen et al. [27] conducted studies about disaster preparedness by applying PAPM and showed the efficiency of this model by reaching considerable educational results. In spite of the applications of the PAPM of many protective behaviors, we consulted with Dr. Neil Weinstein about the application of PAPM for our educational program and providing disaster survival kits and he emphasized that it is suitable for our program. It seems encouraging to provide disaster survival kit based on PAPM is the first study applied in Iran.

2.2. Intervention

2.2.1. Educational program

Training needs assessment was based on constructs measure of precaution adoption process model. The learning objectives were based on pretest results, as well as basic learning needs set in the context of natural disasters, affects and coping with strategies based on international standards [29,15]. The training materials, including video clips, pamphlets, posters, and slides designed and produced according to the training program objectives and the appropriate stage of readiness. All training materials tested before implementation of the training programs were corrected before applying them in the program. Intervention groups were divided into 6 subgroups and each subgroup included 18 participants. The training program was performed in a continuous period of 4 sessions in 8 weeks and each session was 45 min in duration. In order to monitor the training program, in the fourth week of the program, the stage change questionnaire was completed by participants of the case and control groups. After determining their recent changes, behavioral stage appropriate educational strategies were fulfilled. Lectures were presented with a slide show and three films with different lengths were shown as pre-organizers at the beginning of training sessions (1 video clip) and the last sessions (two video clips) in order to stimulate group discussions. Group discussions were performed to engage learners in learning and correct and improve their beliefs about the severity of the natural disaster risk and urgent need of personal action.

Training sections were conducted in 3 phases. In the first phase included 39 s video clips, lectures and questions and answers were conducted. The aim of this phase was to face participants with the main problem, encouraging them for the following training issues and also increasing their initial knowledge of the problem. This phase was performed in one session and it was trying to transition participants from stage 1 to stage 2 of PAPM. Second phase of the training program was aimed at improving knowledge, perceived susceptibility, perceived severity, perceived benefits and self-efficacy and decreasing perceived barriers. In this section we used 6 min video clips, lecture, poster, pamphlet and 18 person discussion groups. This phase conducted in 2 sessions and it was used to transition participants from stage 2 to stages 3 or 5 and 6. The last phase conducted to transition persons from stages 3, 4 and 5 to stage 6 with the aim of increasing perceived susceptibility, perceived severity, self-efficacy and decreasing perceived barriers. The video clips were 2 min and 6 s, lectures and discussion group were used and were performed in one session.

The questionnaires were completed before and after the intervention, and the stage of change was assessed at baseline and at weeks 8 and 16 of the program for all participants.

2.3. Data analysis

The data was analyzed by SPSS 16.0 software, and descriptive statistics and analytical statistics including Chi square (to determine the frequencies observed in the range of expected frequencies), Mann–Whitney test and independent t-test for comparison of the means of two independent groups and paired t-test for comparison of one group's mean average in two intervals. Correlation and ordered logit regression for stage change and variables were also used. The significance level was set at $P < .05$.

3. Results

The mean age of the participants was 35.70 ± 7.93 and 89.6% of them were males and 10.4% were women. 76.5% of the participants had high school education and more than it and a 23.5% of the participants had less than high school education. 59.3% were worker and 40.7% were clerks. Monthly income of intervention group was 60.2% less than 300\$, and 39.8% was more than 300\$. There was no significant difference between income and participants who are in stages 6 and 5. There was no significant difference between the experimental group and the control group in terms of the variables such as educational level, place of residence and marital status.

Results showed 16.2% of intervention group in two months after intervention provide disaster survival kits. Progression in stage of change was used as one of the criteria of intervention success. A highly significant difference at the end of the training program ($P < .001$) was found between the training and control groups. Individuals in the training group had a positive, significant progression through the program, whereas limited progression occurred in the control group. After 4 weeks of the education program, the training group had a larger percentage of participants (81.3%) in the Unengaged and

Table 1
Participants' stage of change before, during and after the instruction.

	Unaware, n(%)	Unengaged, n(%)	Undecided, n(%)	Decide not to act, n(%)	Decide to act, n(%)	Action, n(%)	PV
Baseline							
Trained	83(76.9)	25(23.1)	0(0)	0(0)	0(0)	0(0)	<i>P</i> = .023
Control	74(65.5)	26(23)	13(11.5)	0(0)	0(0)	0(0)	
After 4 weeks							
Trained	0(0)	48(44.9)	39(36.4)	0(0)	20(18.7)	0(0)	<i>P</i> < .000
Control	71(63.4)	25(22.3)	13(11.6)	0(0)	3(2.7)	0(0)	
After 8 weeks							
Trained	0(0)	0(0)	11(10.5)	15(14.3)	79(75.2)	0(0)	<i>P</i> < .000
Control	62(55.9)	23(20.7)	9(8.1)	0(0)	17(15.3)	0(0)	
2 months after intervention (16th week)							
Trained	0(0)	0(0)	0(0)	23(21.9)	65(61.9)	17(16.2)	<i>P</i> < .000
Control	57(51.4)	21(18.9)	13(11.7)	6(5.4)	14(12.6)	0(0)	

Table 2
Summary statistics on constructs of model in both groups before and after intervention

Variables	Experimental		Paired <i>t</i> -test	Control		Paired <i>t</i> -test	Effect Size	Independent <i>t</i> -test
	Before intervention	After intervention		Before intervention	After intervention			
Knowledge	1.75 ± 2.259	8.96 ± 1.467	<i>P</i> = .000	1.94 ± 2.548	2.95 ± 2.919	<i>P</i> = .000	6.2	<i>P</i> = .000
<i>P</i> susceptibility	20.73 ± 2.883	22.23 ± 2.158	<i>P</i> = .000	21.03 ± 2.609	21.37 ± 2.453	<i>P</i> = .034	1.16	<i>P</i> = .000
<i>P</i> severity	19.49 ± 3.175	21.92 ± 2.405	<i>P</i> = .000	19.96 ± 3.033	20.86 ± 2.396	<i>P</i> = .000	1.53	<i>P</i> = .000
<i>P</i> benefits	17.45 ± 2.329	21.30 ± 2.210	<i>P</i> = .000	18.14 ± 2.544	18.75 ± 2.962	<i>P</i> = .042	3.24	<i>P</i> = .000
<i>P</i> barriers	15.18 ± 3.576	11.49 ± 4.268	<i>P</i> = .000	14.50 ± 3.590	14.62 ± 3.749	<i>P</i> = .662	−3.81	<i>P</i> = .000
Self-efficacy	15.70 ± 3.915	20.70 ± 2.697	<i>P</i> = .000	16.32 ± 4.156	16.89 ± 3.985	<i>P</i> = .019	4.43	<i>P</i> = .000

Table 3
Correlation matrix.

	Stage change model	Perceived susceptibility	Perceived severity	Perceived benefits	Perceived barriers	Self-efficacy
Stage change model	1					
Perceived susceptibility	.236*	1				
Perceived severity	.237*	.592*	1			
Perceived benefits	.492*	.235*	.386*	1		
Perceived barriers	−.481*	−.231*	−.220*	−.410*	1	
Self-efficacy	.546*	.369*	.298*	.513*	−.481*	1

* Significant at the .01 level (2-tailed).

Table 4
Predictors of changes in stages for providing disaster survival kit (*n* = 216).

	Estimate	Std. error	Wald	df	Sig.
Perceived susceptibility	−.005	.073	.005	1	.945
Perceived severity	.047	.072	.427	1	.513
Perceived benefits	.125	.059	4.533	1	.033
Perceived barriers	−.114	.038	9.171	1	.002
Self-efficacy	.054	.047	1.357	1	.244

Undecided stages than the control group and a larger percentage of control group participants (63.4%) in unaware stage. Percentages of participants in each stage are summarized in [Table 1](#).

[Table 2](#) shows that the mean scores of knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy in the experimental group after intervention significantly changed as compared with that before the intervention ($P < .001$).

There is no significant between perceived barriers in control group after intervention compared with that before the intervention. But there were significant differences in the other constructs mentioned in the control group compared with that before the intervention ($P < .05$).

Also independent *t*-test for comparing two groups showed that there were significant differences in all constructs mentioned above compared with that before the training program ($P < .001$).

There was significant correlation among stage change and perceived susceptibility, perceived severity, perceived benefits and self-efficacy. Also there was an inverse significant correlation between stage change and perceived barriers ([Table 3](#)).

Regression logistic shows that perceived benefits and perceived barriers were significant. But there were no significant relationship among stage change and perceived susceptibility, perceived severity and self-efficacy ([Table 4](#)).

4. Discussion

The precaution adoption process model was used to guide the evaluation of the intervention designed to encourage people to provide disaster survival kits. Also, this study showed improvement in all constructs in the intervention groups at the end of the training program. Based on the results of the staging algorithm, at the baseline, there were very large percentages of participants (intervention 76.9%, control 65.5%) in the unaware stage. The intervention group showed a progression in stage compared with the control group. The increased number of participants in the stages 1, 3 and 5 at 4 weeks of the education program a part of the experimental training program may be attributed to the used educational strategies. At the end of the training program (8 weeks) a large number of participants in intervention group progress decide to act (stage 5) and it may be attributed to a successful educational program; so two months after the evaluation of participants at 8th week, 17 individuals provided disaster survival kits (progress to stage 6). The cause that majority have not provided the kit might have been to their low income.

So it seems this kit was not a pressing need for them. With regards to these findings it seemed that intervention had positive impact for providing the kit. Several studies showed the impact of educational interventions on the progress of the process model and our findings are consistent with other's researchers [[28,30–32](#)].

After the educational program, knowledge of individuals in the intervention group compared with the control group showed a remarkable improvement and it indicated that our training program was successful and these findings are consistent with other studies that conducted by Wang et al. [[33](#)], Tanaka [[34](#)], Bayati et al. [[35](#)] and Shakerinejad et al. [[36](#)]. Perceived susceptibility of the experimental group compared with the control group had significant change and it indicated that our intervention was effective; our findings are consistent with other studies [[37–40](#)]. Also perceived severity in the intervention group had significant changes after training program in comparison with the control group and showed the implementation of the training program successful. Findings reported by Morowatisharifabad et al. [[41](#)], Tavasoli et al. [[42](#)] and Hazavehei et al. [[37](#)] showed the positive effects of perceived severity on improvement of behavior and our findings are consistent with them. This research indicated that perceived benefits had improvement in the experimental group and it demonstrated that our intervention was effective on this variable. The findings of several studies were in the direction of our results [[37,40,42](#)]. The impact of training program on perceived barriers in the intervention group of this study, reported by different studies as well [[37,42,43](#)]. Improvement of self-efficacy in experimental group displayed the impact of an educational program on this variable. Self-efficacy could enhance the feeling of success in individuals which may lead to improve behavior [[44,45](#)]. Our findings are consistent with findings that reported by Baljani et al. [[46](#)], Unsal et al. [[47](#)] and Atak et al. [[48](#)].

We observed relative improvements in scores of knowledge, perceived susceptibility, perceived severity, perceived benefits and self-efficacy after the training program in the control group. Also we observed progression in stage 5 in control group after 4 weeks, 8 weeks and 16 weeks (2 months after end of training program) and it is possibly related to the reading of the items of questionnaires in pretest by individuals of control group and they may follow the topics and gaining information from others like their co-workers in training group. Vakili et al., Mardani Hamuleh et al. and Moeini et al. reported such occurrences in their studies [[49,52,53](#)]. Such events could be occurred through restricted samples under educational program and might be justifiably interesting training topics for individuals. Also a lot of researchers have reported such findings [[49,50](#)].

Stage change, perceived susceptibility, perceived severity, perceived benefits, perceived barriers and self-efficacy showed strong correlations.

This study showed perceived benefits and perceived barriers predicted adoption stage and for every unit increase in perceived benefits we expect an improvement in the admission process to the extent of .125 and also for every unit decrease in perceived barriers we expect a progression in adaptation stage to .11 extent.

5. Conclusions

This study which showed the educational intervention based on precaution adoption process model had a positive impact on personnel of the Ahwaz Carbon factory for encouraging them to provide disaster survival kits. To enhance preparedness of societies against natural disasters it is suggested that educational intervention based PAMM becomes applicable.

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Appendix A. Supplementary material

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.ijdr.2014.10.012>.

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