

Research Article**Increasing family readiness in natural disasters:****A theory-based instruction intervention****Kambiz Karimzadeh Shirazi^{1*} and Khalil Jassempour²**

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ABSTRACT

Purpose: This paper aimed to encourage the general public to raise their readiness in case of natural disasters.

Methods and tools: The present randomized controlled study was designed to evaluate the effectiveness of a two-month training intervention based on a staging model for the personnel of Ahwaz Carbon Factory, Iran (case group=108 and control group=113).

Results: The results indicated that when the intervention was implemented, 16.2% of the training group provided disaster survival kits. Moreover, results revealed that a significant difference was observed regarding the variables of self-judgment of the magnitude of risk and preparing the disaster survival kit.

Conclusion: Results supported the positive effect of a theory-based education intervention to increase individual preparedness in natural disasters.

Keywords: Natural Disasters; Disaster Survival Kit; Precaution Adoption Process Model

INTRODUCTION

Natural disasters may have various negative effects on the health and life of individuals. Accidents from natural disasters may lead directly to high death tolls and damages, or indirectly contribute to the breakout of contagious diseases(1). In fact, natural disasters cause severe phenomena rapidly along with deep effects. These phenomena include earthquakes, floods, hurricanes, etc(2). According to the reports of the World Health Organization, five million people die from social disaster accidents annually and ten times more become physically disabled(3). In Iran, one of the countries most affected by natural disasters,(4) almost 31 types of natural disasters occur. Iran is ranked among one of the top 10 countries in terms of natural disasters and 90 percent of its population is exposed to the risks from floods and earthquakes(4). Consistent with historical and statistical evidences,

Khuzestan province as a border city and possessor of huge oil resources and colossal dams has faced many natural disasters. According to the available evidence and statistics, the most significant natural disasters which often occur in Khuzestan are ranked in order of importance as: floods, earthquakes, droughts, hurricanes, and landslides. This province has been largely damaged by natural disasters during the last decades (5). The available statistics indicate an increase of natural disasters and also lack of readiness for dealing with them (6). The high incidence of accidents affecting the individuals and the societies have lead to more attention paid by people to prepared for natural disasters (7). One of the most effective means for responding to the needs of people trapped in a natural disaster is preparation (7). Efficient, fast, and timely response in the time of accidents and

unpredicted casualties is the responsibility of government organizations and agencies(8). However, people who are usually caught in such disasters may become deprived from their basic needs for some time after the accident, since the water supply systems, energy, sewage, telephone lines, etc. may be cut off for days(9). Regarding the background of relief and rescue operations, it is seen that there are limitations in rescuing, supplying and distributing what people need in the damaged areas(8). Hence, people's preparation before any natural disaster is very crucial for public participation decreases the complications and difficulties which exist after the accidents, especially during the first week after the disaster has hit the area(10).

Having a comprehensive preparation plan for encountering accidents in a country as well as motivating the public to have a Family Disaster Relief Supply Kit can have an important role in decreasing the consequences of such disasters. Conducting motivational interventions to equip and also using this kit has been highly accepted in the U.S, Turkey, Japan, etc(9). This kit can be offered in a low price and its items include a list of basic necessities such as canned food, mineral water, bread, first aids box, etc(10). In a national survey in the U.S in 2009, it was revealed that 57 percent of individuals have the survival kit in their homes and 45 percent at their workplace (11). Fung and Loke found that in Hong Kong the emergency packages of damaged people contained 56.6 percent drinking water, 74.7 percent flashlight, 69.2 percent blanket, and 52.5 percent radio(12). Although similar research in Iran have shown that this kit was not been welcomed in the Iranian setting which reveals that that this view is not very well shaped inside Iranian families. In a primary investigation of the Red Crescent Society of Ahwaz conducted by the present researchers, it was found that only 12.5 percent of the population had the family disaster survival kit. Regarding that this behavioral deficiency was observed among such a group of people who were aware of risks, dangers and disasters and were experts of disaster management, it would

be assumed that the same attitude is not expected from the general public.

The main factors for increasing the potential preparation of the public in case of natural disasters through instruction are increasing the awareness and establishing the behavioral foundations for it(13). However, to obtain useful efficient results, the instruction must be done systematically and based on verified theories. These theories and models provide a systematic view from the facts and events. They also provide the necessary guidelines for proper identifying, programming, and evaluation of interventions(13). The Precaution Adoption Process Model is a stage theory suggested by Neil Weinstein in 1992 and has been applied effectively in different interventions(14). This model shows how individuals are transferred through seven stages to adopt healthy manners. These stages include: "unaware of the issue," "aware of the issue but unengaged," "Undecided," "Decided not to act," "Decided to act," "Action," and "Maintenance" (in order), every stage presents distinct patterns of behavior, beliefs and experiences(14). For transition of individuals from the first, second and third stages factors of awareness and risky personal experience, and for fourth, fifth and sixth stages other factors such as eliminating the obstacles, abilities, subjective norms, perceived danger and self-efficacy are important(14). Gielen et al. apply this model and other necessary measures at the time of emergency situation and confirm the efficiency of it and find considerable educational findings(15). Regarding the necessity of conducting primary research in Iran in order to provide a better understanding for researchers and executive officials, designing and conducting interventions which reduce the outcomes of natural disasters among the damaged groups, and also the existence of a suitable research ground using an appropriate model fitted to this content, the present research aims at implementing a theory based education of family for preparing Family Disaster Relief Supply Kit based on Precaution adoption process model.

METHODS

The present study was a controlled semi-experimental intervention which was conducted on the personnel of the Ahwaz Carbon Factory. The studied population included all personnel of this company, 221 people participated in the study by consensus. The selected sample was randomly divided into an experiment and control groups. To reduce the potential contact and transfer of data among the two groups, the educational program was done during the break time between shifting of the personnel. The data collection instrument was a questionnaire. The data were collected in pre-experiment and post-experiment phases. The demographic characteristics of samples were determined using a demographic questionnaire. To evaluate the transformation of stages, the Neil Weinstein scale based on Precaution adoption process model was applied(14). This scale included 6 questions which demonstrated the position of the studied people in seven stages of the model. Knowledge measurement was conducted by a scale ranging from zero to ten, which included open answer questions about the kit and its contents. It should be pointed that the content of knowledge in the present study was based on the essential educative criteria of the international Red Cross organizations, Red Crescent and the US Federal Emergency Management Agency(8). Self-efficacy and subjective norms questionnaires were directly measured by 5 items for each construct based on a 5-point Likert scale. The self-judgment of risk questionnaire was designed by the researchers in visual form and included two parts. The first part measured the magnitude of risk, and the second part measured risk severity for every natural disaster (flood, earthquake, hurricane, lightning, drought, sand storm, rock falls, and landslides), scored from 0 to 80. The measurement scale of enabling factor of individuals to provide the contents of kit also included a 30-item list, each item scores from 1 to 5. The face and content validity of the researcher-made questionnaires were confirmed by a panel of 8 scholars in diverse fields, including health education, environment health, crisis management, and psychology in two

separate sessions. For evaluating the reliability of the questionnaires the test-retest method was applied with a 14 day interval on 60 people. The reliability of instruments was also calculated using Coefficient of Internal Consistency which indicated a good reliability as 90-95. The present study was confirmed and welcomed by the moral committee and financial support of Yasuj Medical University (YUMS).

EDUCATIONAL PROGRAM

After obtaining the written consent of the participants, the questionnaires were filled out before and after the instruction intervention. Training needs assessment was done based on measuring the Precaution adoption process model constructs and educational goals were derived from pre-test findings, the content of natural disasters, their impacts and the means of encountering the personnel. Next, training materials such as films, pamphlets, slideshows, and PowerPoint slides were prepared based on the goals of study and tailored based on the stages of behavior preparation. The instruction was conducted in a continuous eight week period in the form of four 45-minutes sessions. Lectures were presented using slide shows. At the beginning (one film) and at the end of the sessions (two films), three films with different lengths were shown as pre-organizers to stimulate group discussions. Group discussions were administered to involve the learners in their own education process and also to develop their attitudes toward the degree of risks and the necessity of taking immediate personal actions in the time of natural disaster's occurrence. Finally, trainings were completed at three sections. The first section was aimed at improving the knowledge of participants and moving them from stage 1 to stage 2. In the beginning of the first session, a short film of about 40 seconds was shown as an advanced organizer, aiming at getting their attention to the cognitive objectives using the educational lectures and slideshows. At the end of the session, Q & A method (questions and answers) lead to better involvement of learners in the process of learning. The Second section aimed at the transition of individuals from stage 2 to

stages 3, 5, and 6. The theoretical foundation of education in this period was based on goals such as increasing self-efficacy which were administered during two sessions by using lecture, slideshow and showing an educational film about 6 minutes. It should be pointed that educational sessions were always completed by group discussions including 18 participants in each group. Mounting posters designed by the research team in the class and distributing pamphlets (with related oral explanations) were among the complementary educational activities. In the third section or the final one, using lectures and slideshows and also a short films about 3 minutes of length, covered the cognitive educational goals. Discussion groups focused on the experiences and ideas of the participants about forming a desirable activities and followed the objective of facilitating the decision making process in the participants. In fact, the final part was designed for the transition of people from stage 3 to stages 4, 5, and 6 of behavioral preparation, following the goals such as the perceived risk, increasing self-efficacy and enhancing decision making. Three days after the instruction was completed (week 8), the research instruments were given to the intervention and experiment groups. To

Table 1. Demographic characteristics of samples

| Variable | | Intervention group n(%) | Control Group n(%) | Total n(%) | PV* |
|-----------------------------|-----------------------------|----------------------------|-----------------------|---------------|-------|
| Age | 23-29 | 28(25.9) | 31(27.4) | 59(26.7) | 0.005 |
| | 30-36 | 27(25) | 41(36.3) | 68(30.8) | |
| | 37-43 | 24(22.2) | 29(25.7) | 53(24) | |
| | 44-50 | 19(17.6) | 12(10.6) | 31(14) | |
| | 51-57 | 10(9.3) | 0(0) | 10(4.5) | |
| Gender | Male | 90(83.3) | 108(95.6) | 198(89.6) | 0.003 |
| | Female | 18(16.7) | 5(4.4) | 23(10.4) | |
| Marital Statues | Single | 25(23.1) | 31(27.4) | 56(25.3) | 0.464 |
| | Married | 83(76.9) | 82(72.6) | 165(74.7) | |
| Education | Less than High School | 25(23.14) | 27(23.9) | 52(23.5) | 0.118 |
| | High School or HS Graduated | 40(37.03) | 55(47.7) | 95(43) | |
| | Collage Degree | 43(39.83) | 31(27.4) | 74(33.5) | |
| Occupational Classification | Laborer | 64(59.3) | 78(69) | 142(64.3) | 0.130 |
| | Clerk | 44(40.7) | 25(31) | 79(35.7) | |
| Income (monthly) | Less than 300\$ | 65(60.2) | 87(77) | 127(68.8) | 0.022 |
| | 300\$ and more | 43(39.8) | 26(23) | 69(31.2) | |

*Chi-square Test

Results indicated that afore the intervention, 76.9 percent of the experiment group were in the "Unaware" stage, and none of the control and intervention groups were "action stage" (preparing the kit); however, after the intervention, 16.2 percent (17 people) of the experiment group progressed to the action stage, while none of the control group were observed at the acting stage. Also, Chi-square test showed significant difference between the two groups regarding development in the stages of model during the three days after the eighth week and two months after the intervention (table 2).

investigate the effect of time on the main result of intervention, a reevaluation of the transition stages was conducted.

STATISTICAL ANALYSIS

Data were analyzed using the SPSS 16 software. The central descriptive statistical indices and scattering were used for description of data. Paired t-tests, independent t-test and chi-squares were run for testing the hypotheses. Comparison of changed stages (as a variable) in the two groups were done using Man-Whitney test. To control the effect of background variables, ANCOVA was used.

RESULTS

Among the 221 participants of the control and intervention groups who declared their interest to enter the experiment, 216 people (105 in intervention group and 111 in the control group) completely carried out the stages of research. The demographic features of the studied groups are summarized in table 1. Chi-square test showed that between the intervention and control group there was a significant difference in terms of gender, age, and the level of income (p<0.05). Other demographic features showed no significant difference among the two groups.

Table2. 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) | P=0.023 |
| Control | 74(65.5) | 26(23) | 13(11.5) | 0(0) | 0(0) | 0(0) | |
| After 8 weeks | | | | | | | |
| Trained | 0(0) | 0(0) | 11(10.5) | 15(14.3) | 79(75.2) | 0(0) | P<0.000 |
| Control | 62(55.9) | 23(20.7) | 9(8.1) | 0(0) | 17(15.3) | 0(0) | |
| 2months after intervention | | | | | | | |
| Trained | 0(0) | 0(0) | 0(0) | 23(21.9) | 65(61.9) | 17(16.2) | P<0.000 |
| Control | 57(51.4) | 21(18.9) | 13(11.7) | 6(5.4) | 14(12.6) | 0(0) | |

* Man-Whitney Test

The chi-square test regarding direct encounter to disasters, presence in the affected areas (for rescue operations) and observing the pictures of natural disasters showed that there was no significant difference between the control and intervention groups. After the intervention, findings revealed that among 105 participants of the intervention group, among those who prepared a relief supply kit, only 7.7 percent were directly exposed to disasters, and 3.1 percent were present at the affected areas and 16.1 percent watched the pictures of disasters. Chi-square test showed that a significant relationship existed among having presence in the affected areas and preparing a kit (P=0.01), however other kinds of encounters were not significantly related to preparing a kit. Moreover, regarding the statistical indices of the structures of precaution adoption model, the results indicated that a significant difference was perceived regarding the variables of self –judgment of the magnitude of risk and preparing a kit (P<0.05) but this difference was not observed regarding the self-judgment of the risk severity, enabling factor and subjective norms related to preparing a kit (table3).

Table3. Comparison of constructs of PAPM between the participants who are provide kit and those not provide kit

| Variable | Providing Kit | | Don't Providing Kit | | PV* |
|---------------------------------|---------------|-------|---------------------|-------|-------|
| | Mean | SD | Mean | SD | |
| Subjective Norms | 19.76 | 3.84 | 19.70 | 2.42 | 0.951 |
| Self-judgment of magnitude risk | 50.53 | 9.25 | 56.20 | 13.16 | 0.040 |
| Self-judgment of risk severity | 53.29 | 10.78 | 55.82 | 13.63 | 0.407 |
| Enabling Factor | 125.53 | 5.64 | 126.02 | 20.62 | 0.936 |

*Independent T-Test

Comparing the knowledge, self-efficacy, and subjective norms prior to and after the interventions in the experiment group with paired t-test showed a significant statistical difference (P<0.000). Paired t-test indicated that a significant difference existed in the control group regarding knowledge and self-efficacy prior to and after the intervention; however such a difference was not observed in terms of subjective norms. Independent t-test also indicated lack of significant difference between the two groups in terms of knowledge, self-efficacy, and subjective norms prior to the intervention. Nonetheless, these differences became significant for these variables after the intervention (P<0.05) (table4). By eliminating the background variables, ANCOVA results showed a significant difference regarding knowledge and self-efficacy between the two groups after the intervention but regarding the subjective norms, no significant difference was found (table4).

Table4. Summary statistics on constructs of model in both groups before and after intervention

| Variables | Experimental | | paired t-test | Control | | paired t-test | Effect Size | Independent t-test | PV* |
|------------------|---------------------|--------------------|---------------|---------------------|--------------------|---------------|-------------|--------------------|-------|
| | Before intervention | After intervention | | Before intervention | After intervention | | | | |
| Knowledge | 1.75 ±2.26 | 8.96±1.47 | P=0.000 | 1.94±2.55 | 2.95±2.92 | P=0.000 | 6.2 | P=0.000 | 0.000 |
| Subjective Norms | 17.65±2.69 | 19.71±2.68 | P=0.000 | 18.09±2.96 | 18.20±2.87 | P=0.538 | 1.95 | P=0.000 | 0.328 |
| self-efficacy | 15.70±3.91 | 20.70±2.69 | P=0.000 | 16.32±4.15 | 16.89±3.98 | P=0.019 | 4.43 | P=0.000 | 0.006 |

*ANCOVA (Adjusted for background variables) improvement of acting to prepare family disaster relief supply kit. The results of the present study revealed the effectiveness of education on

DISCUSSION

The present study was based on precaution adoption process model, designed for the

progressing the stages of changes and improvement of the expected behavior (preparing the kit) among the participants. It was perceived that after conducting the educational program, the experiment group exhibited a progress in their stages compared to the control group. Also, at the completion of the intervention, a large number of individuals in the experiment group decided to act in the acting stages i.e. preparing a relief supply kit. The finding indicated the positive effects of instructive interventions on the progress of the individuals in a stage-based model. The stage of change instrument was based on the assumption that the instruction was able to provide the grounds for developing people's attitudes(14). The findings of Glik et al. regarding the progress of the individuals to move on to the acting stage in order to prepare the disaster survival kit against natural disasters (16) the findings of the study conducted by Azmahami et al. regarding the effect of instruction on progress of transition stages were consistent with the findings of the present study(17).

Considerable improvement of knowledge in the intervention group was supported by studies done by Poorreza et al., and Gielen et al. regarding the effect of education on the knowledge of how individuals act in emergency situations(15,18). During the intervention, since no similar education were given to the participants at their workplace or by media, the improved knowledge of control group was probably due to the sense of curiosity and sensitivity of this group to the subject and obtaining information from their colleagues who were in the intervention group. This problem may be justified by the limited population of the study, or the attractiveness or importance of the subject; such problem was also reported by Hazavehei et al. and Vakili et al.(19,20). The effect of education on the improvement of self-efficacy was also reported by AsadiZandi et al. and Yani Lai who have found similar results and declare that instruction positively effects the improvement of self-efficacy(21,22).

Improvement of subjective norms in the experiment group after the intervention meant that the change of the construct in the experiment group was probably due to the effect

of participants on each other and also the transfer of information about the subject of study to their families. Research findings confirm the report(19,23). Also, the study showed that subjective norms were not in line with preparing the kit. A study done by Peak et al. showed that subjective norms had a positive relationship on preparing the relief supply kit(24). However, Kakaiee et al. showed that there was no relationship between subjective norms and using individual protection equipment which was consistent with the findings of the present study(25). However, various studies have shown that subjective norms variable was a strong predictor of adopting preventive behaviors(25,26).

The present study indicated that the history of encountering the disasters was in line with preparing family disaster relief supply kit and other studies supports the findings(27,28). Hence, direct experience of disasters lead individuals to decide upon adopting a precautionary behavior. Our findings also indicated that self-judgment of magnitude of risk was related to preparation of relief supply kit. Self-judgment of magnitude of risk was equivalent of perceived risk(29). Some studies were consistent with these findings(28,30), hence it could be concluded that the numbers of disaster occurrence increase the sensitivity of people for having precautionary behaviors(31). The present research showed that self-judgment of risk severity was not related to the preparation of relief supply kit. This construct measures individuals' mental perceptions from the risk and its damages on the human society, which was equivalent to the perceived severity of risk(29). In Karimi et al. it was shown that the perceived severity was effective on adopting precautionary behavior;(32) which does not reject the present findings but explains that adopting such behaviors can be due to the role of other factors such as perceived barriers (costs, time, etc.), resources and guidelines(14). This study reported lack of relationship between the enabling factors (availability) and preparing family emergency kit. The existence of a positive relationship between the enabling factor of individual protection tools and adopting preventive behaviors was reported by other

researchers;(33,34) it seemed that our findings revealed the lack of relationship between this construct and preparing the kit was related to the obstacles of preparing this emergency kit. Limitations of this study included determining the intervention and control group at one particular place (Carbon Co. Ahwaz) and also not following up the maintenance stage (stage 7 of the model).

CONCLUSION

The findings of present research adequately indicated the positive effects of instruction intervention based on precaution adoption process model on promoting the knowledge, self-efficacy, and subjective norms for preparing the family disaster relief supply kit. Also the present researchers observed a 100 percent improvement in the decision making and acting processes for preparing this kit. Hence, instructive interventions based on precaution adoption measures might be suggested for increasing the readiness of society groups in dealing with natural disasters.

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