

# The Resilience Model on Rescuers' Coping with Emergencies

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**Abstract**—Recently, given that emergencies are uncertain, complex and unpredictable, and, especially, sudden public crisis events have extremely destructive effects on our society, it has been becoming an important research project in the field of crisis management that government should construct a set of scientific coping mechanisms and enhance the resilience of rescuers. However, there are few studies on the resilience of rescuers. Focusing on emergency of public crisis, this study explored the structure and the mechanism of resilience of Chinese rescuers and rescue team of more than two thousand subjects in total through the Method of Document Analysis, Behavior Event Interview, Focus Group Interview, Expert Discussion, Questionnaire Survey, multi-statistical technique. The current study developed the Resilience Questionnaire of crisis rescuers and rescue team and verified the effectiveness of the following intervention mode methods based on the model of resilience: individualized consultation, experiential scenario, group counseling and cooperative group training, etc. This study provides an effective intervention mode for rescuers' coping with emergency events, aiming to improve the national crisis management platform, which has significant application values.

**Keywords**—*emergency; crisis rescuers; rescue team; resilience; intervention mode*

## I. INTRODUCTION

### A. The Necessity of Crisis Coping

At present, the whole world is developing more and more globally and digitally, which makes the already-complex social environment more dynamic and uncertain. Strictly, "crisis events" are highly uncertain, strikingly destructive, unpredictable, obviously complicated, and hard to handled with conventional management methods. Therefore, they are also called unconventional emergencies. Because they are unpredictable and happen in an abrupt fashion, crisis events often lead to secondary hazards and cause more widely-spread disasters, which are even more difficult to prevent and can throw the whole society into a panic. Without a set of scientific and effective coping mechanisms and management methods as well as a coping crew with firm beliefs and strong abilities, people will face more troubles in the future. Thus, it has become the most important and urgent project to improve crisis rescuers' resilience and set up a scientific and systematic crisis coping prevention mechanism.

### B. The Main Definitions of Crisis Coping

At present, crisis coping can be broken down to three

aspects: hazard identification, vulnerability analysis, and resilience evaluation (Fan, 2009). Hazard identification is the process of judgment, classification, and identification of all kinds of potential and existing crisis events through historical and statistical data collection, research, and analysis to find out the causes to the hazard and qualitatively analyze the outcomes. And because unconventional crisis events do not provide enough precursors and are too uncertain to predict the occurrence probability, it is not very effective to adopt the conventional risk evaluation model of "probability multiply with consequence." Among the affected by the crisis, people are the ones with subjective initiatives, so we also need to consider how to control mental vulnerability of both individual and group. Nevertheless, existing mental vulnerability analysis for people is based on how crisis affects its receiving objects, neglecting the fact that people can actively respond, and lack a clear understanding of the people's feedback mechanisms in the event chain of how people will react to crisis events and then how the events will act upon people again such as the phenomenon of "panic to chaos." Thereby, we need to explore the mental vulnerability of people with a space-time analysis of "physics-psychology coupling" and realize more systematic analysis of vulnerability of hazard's receiving objects in the situation of unconventional crisis. That is why it is one of the most important and urgent research projects to foster a confident, competent, and powerful coping team, improve crisis coping team members' resilience, and set up a scientific and systematic crisis coping and prevention mechanism.

### C. Rescuers' Resilience Model

Studies has showed that long after the earthquake, these rescuers kept having mental health problems, which impeded the process of post-earthquake society rebuilding. These rescuers who experienced disasters like this witnessed brutal and tragic scenes over a long period of time and were in close touch with the dead and injured repetitively, so they kept emphasizing with the sufferers and consumed tremendous strengths, which decreased mental immunity and led to haunting mental problems. This involves problems in physiology, psychology, and social function, which, if not treated and intervened on time, will very likely transform into serious mental problems under self depression. Psychological studies showed that either disaster sufferers or suffering witnesses could have post-traumatic stress disorder (PTSD), and if this condition keeps going on, these PTSD patients might also have severe depression, substance abuse, and sexual

dysfunction at the same time. That is why rescuers also need to be “rescued.” Presently, rescuers’ mental health and its improvement methods has become one of the major problems in disaster psychology and rescuer aid program at home and abroad (Shi, 2017).

## II. THE RESILIENCE MODEL STUDY DESIGN

### A. Research Perspective

In this series of studies, we pay our attention to how resilience affects employees’ work attitude, work behavior, and job performance, especially influence of self-adjustment methods, including emotional labor strategies, and dissociation, and the relationship between resilience, positive emotion, self-adjustment method, and job performance. This study also looks into how variables on the group level influence the individual and group’s resilience, how group resilience and group’s positive atmosphere influence individual’s resilience, and individual and group resilience’s influence on work outcomes. Finally, we explore how to train people for better resilience and see if resilience improvement can boost their positive emotions, adaptive behaviors, and coping abilities, which is more valued in reality. In all, we are going to combine empirical study and qualitative research to reveal how rescuers’ psychological reactions and behaviors work in unconventional crisis situation.

### B. Research Design

#### 1) Research aim

With cross-discipline knowledge of organizational behavior, clinical psychology, and human resources management, this study, under situation of coping with crisis events, uses qualitative analysis and empirical data to explore crisis rescuers and the rescue teams’ resilience structure model and internal working mechanism, develop corresponding measurement tools and effective intervention model, and verify the effectiveness of intervention models like individualized counseling, situation experience, group counselling, and collaborative group training based on the resilience model through field tests and comparison studies.

#### 2) Research outline

This study, focusing on crisis event situation, explores crisis rescuers and rescuer groups’ resilience structure model and their working mechanism and conduct field trials of intervention at where the subjects are used for the model. There are four studies, and their structure relationship is as follows. Firstly, what are the main components of crisis rescuers’ resilience model? Can these components accurately reflect the essence of crisis rescuers resilience when coping with crisis situation? Secondly, what are the main components of crisis rescuer teams’ resilience model under the specific crisis coping situation? And what are the comparison and contrast of crisis rescuers’ and crisis rescuer teams’ resilience model? Thirdly, we are going to explore resilience model’s mechanism from three routes: the first route is to investigate individual’s resilience’s influence on their coping method and mental health level from perspective of individual health; the second route is to investigate individual’s resilience’s influence on risk perception and crisis coping abilities from the point of view of crisis decision-making. The third is to see how group resilience

influences individual resilience and their mental health level. Last but not least, based on the findings of the three findings, we will conduct field trials of intervention study in representative organizations and firms. During the intervention study, we firstly need to verify that effectiveness of resilience questionnaire, and then we will design specific intervention mode, and, lastly, to verify the effectiveness of our intervention mode and transform our research findings into practice.

## III. EXPLORATION OF RESCUE MEMBERS RESILIENCE STRUCTURE

We interviewed 20 subjects about their experiences of crisis rescuing event from public security, armed police and military institutes. Combing the three groups interview results with focus interview data, we had two graduates to encode all these materials and form an initial construct. The subjects are from three institutes from Jinhua in Zhejiang province, Anyang, and Zhengzhou in Henan province. We gave out 600 questionnaires in total and 578 completed ones were returned. Through several explorations, 26 items left in the end and extracted a five-dimension structure of individual’s resilience. The naming for the new factor structure is as follows:

- 1) Factor one has six items, and its content includes: individuals can keep their emotion less influenced by outside world in face of crisis events so that they can analyze problems reasonably and objectively. Researchers named it as rational coping.
- 2) Factor two has five items, and its content includes: individual’s personality trait of strongness which makes him or her to be firmly faithful to protect people’s lives and properties and to be constantly responsible for his or her duties is called by the research as strong personality.
- 3) Factor three has four items and its content includes: one is good at controlling emotion, positively attributes the reasons for what happened, and is optimistic and hold positive expectations about future, which researchers called optimism.
- 4) Factor four has six items and its content includes: one has experiences of successful crisis coping, is confident in their own abilities, and believe that they can handle situations like this excellently, which researchers called self-efficacy.
- 5) Factor five has five items and its content includes: one can accept problems, endure through harsh situations peacefully, handle them with flexibility, become even stronger after crisis, and make constructive contributions, which researchers called flexible adaptation.

The already-verified five factor structure of resilience can describe mental characteristics of crisis rescuing members more accurately compared with the former qualitative study’s six factor structure, in which the items of the “hopefulness” dimension are compressed, deleted or moved to the “self-efficacy” or “optimism” dimension. Also, from the results of the explorative factor analysis we can know that the five factor structure’s cumulative explained variance difference is 67.53%, which proves the five factor structure to be reliable.

#### IV. EXPLORATION OF CRISIS RESCUING MEMBER TEAM'S RESILIENCE STRUCTURE

Combing the interview results with three groups focus interview (N =20) and questionnaire for crisis rescuing members' individual resilience (N =186), there were 16 left and a four factor structure of group resilience model was formed. The naming for the new factor structure is as follows:

(1) Factor one includes: the group has very successful rescuing experiences, believes that the group can set up effective working goals and plans, has the ability to obtain resources, tries as many ways as possible to overcome problems, and achieves working goals. These items reflect that the group agree with the collective goals and have faith in finishing the tasks, which the researchers called **collective efficacy**.

(2) Factor two includes: the group sees fighting for people's lives and properties as a holy mission and no matter what; they will not give up their positions and put the mission over their own sacrifice. These items embody the group's holding on to the same belief firmly, responsibilities for their own positions, and the determination in the group, which researchers called **common belief**.

(3) Factor three includes that the group can always see the bright side of the event and see hope in adversity. They are always optimistic about the future. These items reflect that the group is good at attributing things in a positive way and is positive and optimistic about the future. Also the group is full of support for each other, which researchers called **emotional support**.

(4) Factor four includes that the group is well prepared for long-term and harsh situations, can keep high spirits in face of sufferings, sees obstacles as steps to a better and stronger group. These items show the group's support, collaboration, flexibility, enduringness, peaceful acceptance, and constructive dealing style when problems come along, which researchers named **group flexibility**.

This study, based on Chinese crisis management background, designed the resilience questionnaire of the crisis rescuing group, which has good reliability and validity and can be used to assess the resilience level and coping ability of the crisis rescuing group. It can also be used to investigate the formation effect of the crisis rescuing group. This provides theoretical basis and measurement tools for the relevant empirical research and training development work of the crisis management team in the future.

#### V. EXPLORATION ON THE MECHANISM OF THE RESILIENCE MODEL BASED ON CRISIS COPING

This part is mainly to explore the internal mechanism of the resilience of crisis rescuers in the context of sudden crisis events. Firstly, we explored the relationship between the resilience of crisis rescuers' coping styles and mental health. Secondly, we explored the impact of crisis rescuers' resilience on risk perception and crisis decision-making. Finally, we explored how the resilience on the group level influences individual's resilience in the crisis events situation.

The subjects in this study were from three institutes (public

security and armed police) in Zhejiang and Henan province. A total of 500 questionnaires were distributed and 460 copies were returned. After excluding the invalid questionnaires that were filled out by subjects who did not participate in the collective or team rescue tasks, with too many blanks, with too biased reaction tendency, and with too many questions answered carelessly, there were 285 remaining valid questionnaires involving 42 teams. The number of people involved in a single team ranges from 3 to 10 people. The survey tools used in this study were: Individual Resilience Questionnaire, Group Resilience Questionnaire, and Mental Health Questionnaire. In this study, the  $\alpha$  coefficients of reliability of the three questionnaires were 0.94, 0.95, and 0.85 respectively. At the same time, AMOS was used to perform confirmatory factor analysis for each one. The results showed that the questionnaires were well structured. In order to explore whether individual resilience has mediating effect between group resilience and mental health, the researchers conducted an intermediary regression analysis on the relationship between the three and found that the group resilience has a positive impact on individual resilience. Group resilience further affects individual mental health by affecting the individual resilience. That is, individual resilience has a complete mediating effect between group resilience and individual mental health.

#### VI. INTERVENTION STUDY ON RESILIENCE MODEL BASED ON CRISIS COPING

In order to further verify the effectiveness of the resilience model of crisis rescuers and conduct in-depth intervention research, this study selects coal mine enterprises with frequent crisis events to conduct on-site research. Firstly, through behavioral event interviews, questionnaire surveys and high-level interviews, we will deeply understand the current crisis management status and mental health level of crisis rescuers in coal mines and verify the structural validity of the resilience questionnaire. Secondly, based on the actual background and development needs of coal mine enterprises, we are going to design targeted training intervention models, develop "Safety Mentality Training" tutorials that help rescuers to cope with crisis events and improve their resilience, and explore new training methods. Finally, we will verify the effectiveness of training models in improving crisis rescuers' resilience and mental health level through on-site experiments in order to connect with the national emergency-coping platform.

The results have shown that there was no significant difference between the experimental group and the control group in the positive response and the negative response before the training. After the training, the score of the experimental group on the positive response was significantly higher than that of the control group, and the score on the negative response was significantly lower than that of the control group; the tracking measurement (after two months) showed that the scores of the experimental group in both dimensions were still in that trend, but its level of significance decreased. In addition, the analysis results of repeated measured variance also showed that there were significant differences in the scores of the two dimensions of the experimental group. The results of the post-test showed that the scores of negative response from the tracking survey and the survey after training were significantly

lower than the pre-training data, while the positive response scores were significantly higher than the pre-training results, and there was no significant difference between the tracking results and the post-training results. All of the results above show that the effect of training is significant in the variable of coping style.

## VII. CONCLUSIONS

Firstly, the resilience of rescuers based on sudden crisis situations is a five-factor structure, including: rational coping, strong personality, optimism, self-efficacy, and flexible adaptation. The resilience of the crisis rescue group is a four-factor structure, including: collective efficacy, common beliefs, emotional support, and team flexibility.

Secondly, the resilience questionnaires of crisis rescuers and rescue group based on China's emergency-coping situation and cultural background have good reliability and validity, which not only lay a theoretical foundation for future research on crisis management, but also provide measurement tools for the recruiting and training of rescuers.

Thirdly, the coping style plays a mediating role between resilience and mental health. Among them, positive coping plays a full mediating effect between strong personality and mental stress. Negative coping plays a full mediating effect between strong personality and social function and between rational coping and social function. The institute with high level of group resilience have members with high level of resilience and mental health, and the individual resilience mediates between the group resilience and individual mental health.

Last but not least, the results of on-site experimental research show that the "Safety Mentality Training" course created based on the safety mentality model training method developed by China's coal mine enterprises is effective for improving the resilience and mental health of crisis rescuers.

## ACKNOWLEDGMENTS

This study is funded by the Major Project of National Social Science Foundation (13&ZD155) and National Natural Science Foundation of China (No. 90924007, No.9132404).

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