

Systematic Review

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A Concept Analysis on Disaster Resilience in Rescue Workers: The Psychological Perspective

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Abstract

Objective: The term *disaster resilience* has not been well defined. The purpose of this article is to scrutinize the concept of disaster resilience in rescue workers.

Methods: A systematic search was conducted of the PsychInfo, PubMed, ISI Web of Science, MEDLINE, CINAHL, Embase, and Scopus databases using the key terms. The framework from Walker and Avant was used to analyze the concept of disaster resilience.

Results: A total of 26 papers was included in this analysis. The attributes of disaster resilience have been identified from the literature as including personality, perceived control, self-efficacy, coping strategies, and social support. The antecedents of disaster resilience are disastrous events and preparedness for disaster. The consequences of disaster resilience are psychological well-being, posttraumatic growth, and enhanced work engagement.

Conclusion: This concept analysis presents a definition of the concept of disaster resilience that could contribute to the development of a standardized screening or assessment tool and tailored training programs to strengthen disaster resilience among those who are willing to be deployed to engage in disaster rescue work and those who have been involved in such work.

Background

Disasters due to human-made or natural hazards cause significant damage and affect millions of people every year. According to the Annual Disaster Statistical Review 2019, there were 396 natural disasters in 2019, affecting over 95 million people and causing economic losses of about US \$130 billion.¹ The devastation and deaths caused by disasters can also have long-term psychological effects on the survivors.

Apart from disaster survivors, rescue workers are also at risk of developing negative mental and physical health outcomes – in their case, from secondary trauma arising from their involvement in rescue activities at disaster sites.² Individuals respond in different ways to disastrous events. Those who are unable to absorb the impact of a disaster and bounce back to “normal life” can manifest negative mental health symptoms, including distress and psychological dysfunction.³ Those who have the ability to deal with stress, leading to better psychological adjustment, are said to have “resilience.”^{4,5}

Resilience has been viewed as an important buffer for individuals who are confronted with adverse events such as disasters, by serving to mitigate or prevent psychological distress.^{6,7} Those with the attributes of resilience would have the potential to bounce back to pre-deployment status after adverse incidents.

Resilience is not fixed or stable but is a dynamic process that can be facilitated and developed throughout a lifetime in varied context.⁸ Resilience has been reported to play an essential role in protecting against the development of posttraumatic stress disorder (PTSD) and is a mediation effect against depression.^{9,10} This is suggested that intervention or an enhancement program can be taken to promote resilience in individuals to prevent the depression and PTSD to some extent.

It has been found that the concept of resilience in different contexts, including children of divorced family, adolescents in school, students adjusting to university, and women facing violence, was proposed.^{11,12} However, the concept of disaster resilience has not been scrutinized. No studies analyzing the concept of disaster resilience specifically in connection with rescue workers have been identified. The aim of this study is to conduct such an analysis.

A better understanding of the concept of disaster resilience will not only inform organizations or agencies involved in disasters about the attributes of those suited for recruitment for disaster rescue activities, but also aid in the development of tailored interventions to better prepare rescue workers psychologically by enhancing their resilience. In this study, a comprehensive concept of disaster resilience specifically for rescue workers based on current literature

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would be identified, the definition of disaster resilience can be proposed following, and a theoretical framework of disaster resilience can also be derived, which will contribute to disaster risk reduction and resilience enhancement.

The aim of this concept analysis is to scrutinize the concept of disaster resilience in connection with rescue workers. This study has the following 3 objectives: (1) to explore the antecedents, attributes, and consequences of disaster resilience among rescue workers; (2) to define disaster resilience; and (3) to delineate a relevant preliminary conceptual framework. Ultimately, this study will provide a theoretical platform for developing a screening/assessment tool for selecting rescue workers, developing training programs to enhance disaster resilience among rescue workers, and conducting future research on disaster resilience.

Method

The Approach of This Concept Analysis

The concept was analyzed using Walker and Avant's approach to conducting a concept analysis, which emphasizes that concepts constantly evolve and change over time.¹³ This was the most appropriate approach to use in analyzing the concept of resilience, as resilience is regarded as a dynamic rather than a fixed characteristic, and one that can be developed over time through training and experience.^{14,15}

In Walker and Avant's approach, after a concept is identified for analysis, the aims or purpose of the analysis is determined. Six steps are then involved: identifying all uses of the concept; determining the defining attributes; identifying antecedents and consequences; identifying a model case; identifying a contrary case; and, finally, defining the empirical referents of the concept.¹³ These 6 steps were undertaken and are explained in detail below.

Sources of Information and Selection of Studies

A literature search was conducted of 7 electronic databases, namely, PsychInfo, PubMed, ISI Web of Science, MEDLINE, CINAHL, Embase, and Scopus, from their inception to March 27, 2019, using the following key terms: "resilien*" or "disaster resilien*" or "psychological resilience" AND "first responder*" or "emergency responder*" or "emergency personnel*" or "emergency workers" or "rescue worker" or "rescuer*" or "rescue personnel*" or "fire fighter*" or "police officer*" or "military" or "soldier*" or "health worker*" or "paramedics" or "nurse*" or "volunteer*" AND "disaster*" or "catastrophe."

Studies in English that explored resilience among rescue workers involved in disasters were considered eligible for inclusion. Editorials, reviews, and conference abstracts were excluded. The literature search yielded a total of 406 citations after the removal of duplications. Two additional records were identified through a hand search based on the reference lists of the included literature. The procedures for selecting the articles for this concept analysis are outlined in Figure 1. A total of 26 articles met the criteria for inclusion in this study.

Identifying Themes From the Selected Studies

The process of identifying themes from the included studies was conducted through inductive content analysis.¹⁶ After the articles were selected based on the criteria for inclusion and exclusion, the tasks of open coding, creating categories, and abstraction were carried out. The process of concept analysis comprises the identifications of antecedents, attributes, and consequences of disaster

resilience in rescue workers.¹³ In the process of analyzing the data, one of the researchers first compiled a standardized matrix table consisting of attributes, antecedents, consequences, and referents (Table 1). This table was then double-checked by another researcher. A third researcher was invited to take part in the discussion if a disagreement arose between the first 2 researchers.

Results

Identifying All Uses of the Concept

According to dictionary.com, the word *resilience* derives from the Latin word "resili" or "resilire," and carries the meaning of "to spring back and rebound."¹⁷ Resilience is a concept used in many fields. In the ecological sciences, resilience can be understood as the capacity of a system to recover from disturbances, which can lead to a reorganization of its structure and functions.^{18,19} In physics and engineering science, resilience refers to the ability of materials to absorb strain energy when they are deformed and to release that energy upon unloading without breaking.²⁰

In the psychological sciences, the term *resilience* was originally used in the early 1970s, to refer to children who thrived while living under difficult circumstances, such as in poverty or with parents with mental illness.^{21,22} In the 1990s, the concept of resilience began to be used in relation to adults.²³ From the perspective of psychology, resilience refers to the process of, capacity for, or outcome of successful adaptation, despite challenging or threatening circumstances.²⁴ It is an "individual's, group's, or organization's ability to continue its existence, to maintain normal levels of functioning, or to remain more or less stable, in the face of a surprise, either a deprivation of resources or a physical threat."²⁵ It is worth noting that resilience is dynamic and changeable over time in response to life experiences.^{14,26–28}

In the last 2 decades, the concept of resilience has been adopted for use in the field of disaster studies.²⁹ In the context of disaster, resilience often refers to "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management."³⁰

In the selected literature, the term *resilience* has mainly been used to describe a characteristic possessed by individuals (such as firefighters, police officers, military people, health care rescue workers, and volunteers involved in natural or man-made disastrous events during and/or after deployment) that protects them from developing psychological disorders such as psychological distress,^{7,31} depression, and PTSD.^{10,32–35}

The resilient behaviors of disaster rescue workers have most of all been characterized by adaptive coping^{35–39} and perceived/received social support.^{28,32,33,37–45} In the included studies, it was proposed that disaster resilience is not a fixed characteristic but can be developed through enhancing contributing factors²⁸ and through training.^{28,31,34,37,39,42,43,45–50}

In studies on disasters, disaster resilience has been defined in many reasonable and easy-to-understand ways. However, what has been lacking is a standardized and widely accepted definition of disaster resilience specific to disaster rescue workers. A concept analysis can be used to provide such a definition.

Defining the Attributes of Disaster Resilience

Attributes are characteristics of the concept that appear over and over again in the literature.¹³ The critical attributes of disaster

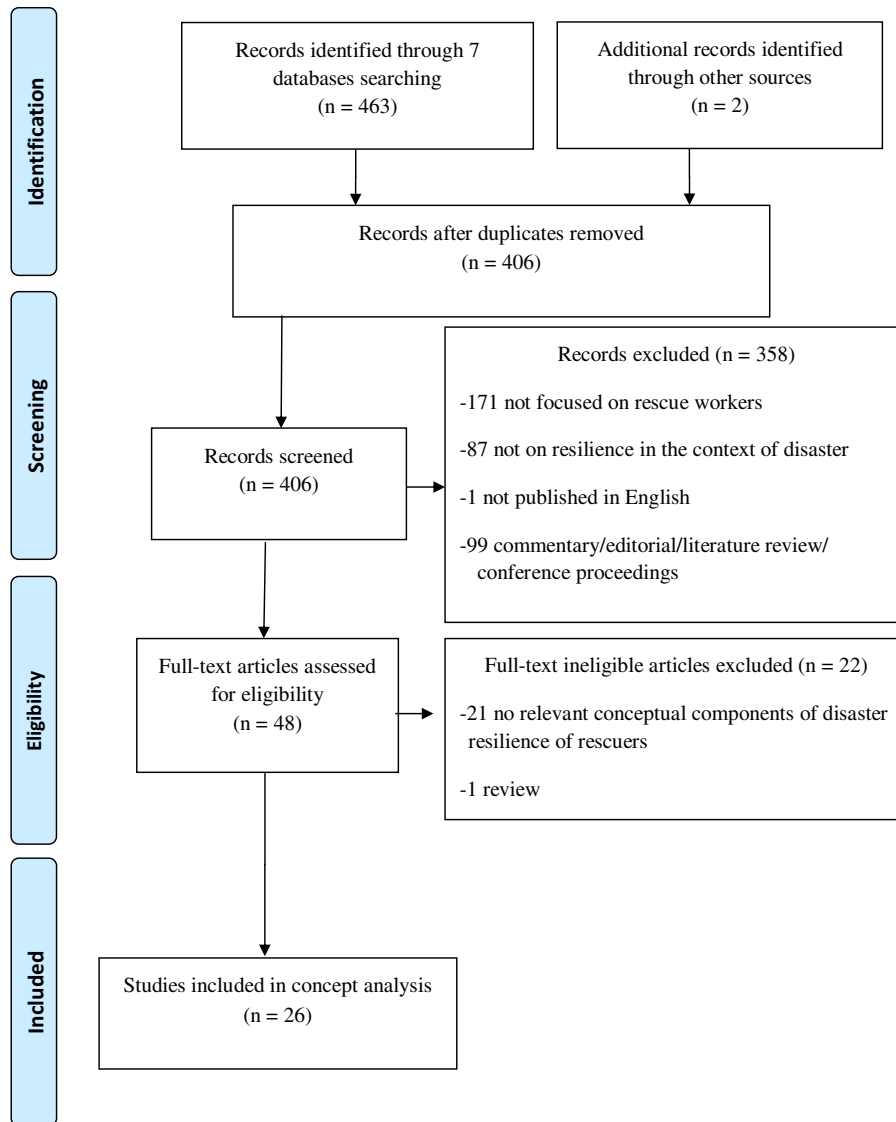


Figure 1. The process of literature search and study selection.

resilience that were identified from the included literature include personality, perceived control, self-efficacy, adaptive coping, and social support (see Table 1).

Personality

The review of the included literature identified various personality traits as contributing to disaster resilience in rescue workers, including hardiness, optimism, altruism, and a sense of humor.

Hardiness has been reported to be a significant psychosocial factor in individual resiliency.⁵¹ Hardiness is defined as a constellation of attitudes, beliefs, and behavioral tendencies consisting of commitment, control, and challenge.^{40,52} It is considered to be an important personality trait that influences the coping strategies of people when in stressful situations.⁵³ It has been reported that military rescuers, including Vietnam veterans, who possessed the trait of hardiness, showed no change in psychological well-being or had fewer symptoms of depression and PTSD in the aftermath of a rescue.^{36,42,49}

Optimism is another personality trait that plays a salient role in protecting rescue workers from developing psychological

disorders. Those who were optimistic were reported to have a lower prevalence of anxiety, depression, and stress after deployment to disaster sites than those who were not optimistic.⁷ Two qualitative studies have revealed that volunteers,⁴⁷ police officers,^{47,50} and health care rescuers³⁹ who were optimistic about life were able to return and engage in normal daily work immediately after deployment to a disaster rescue site, and had fewer symptoms of psychological distress than those without the characteristic of optimism.

Altruism is also a personality trait that leads to disaster resilience. Rescue workers are inspired to work in disaster areas through the sentiments of volunteerism and altruism. Altruism is a selflessness act of volunteering, donating, and informally helping individuals,⁵⁴ which protects one in the aftermath of adverse incidents and facilitates healing.⁵⁵ The first responders who served survivors of the devastation wrought by Hurricane Katrina believed that it was altruism that caused them to put themselves in the shoes of other people and that supported them in continuing their disaster rescue work when they were confronted with difficulties.⁴⁰ Volunteers who had a strong will to offer help to

Table 1. Attributes, antecedents, and consequences of disaster resilience in rescue workers

Items	References	
Attributes	Personality: Hardiness, optimism, altruism, sense of humor	Bartone et al. ⁴² ; Carlile et al. ⁴⁷ ; Cheng et al. ⁵⁴ ; Dolan et al. ⁴⁹ ; Freedman ³¹ ; Geiger ⁵⁰ ; Hystad et al. ⁵¹ ; Kobasa et al. ⁵³ ; King et al. ³⁶ ; Mao et al. ³⁹ ; McCanlies et al. ³³ ; Maddi et al. ⁵² ; Puvimanasinghe et al. ⁵⁵ ; Ren et al. ⁵⁶ ; Wyche et al. ⁴⁰ ; Yasien et al. ⁷
	Perceived control: Source of control, locus of control	Agarwal & Buzzanell ⁴⁴ ; McCanlies et al. ³³ ; Mitchell et al. ⁵⁹ ; McCanlies et al. ³⁸ ; Pietrzak et al. ³² ; Sattler et al. ⁵⁸
	Self-efficacy: Personal judgment on capability	Bandura ⁶¹ ; Carlile et al. ⁴⁷ ; Ozer et al. ⁶⁰ ; Pietrantonio et al. ⁶² ; Mao et al. ³⁹ ; McCanlies et al. ³⁸ ; Wyche et al. ⁴⁰
	Adaptive coping: Problem-focused coping, emotion-focused skills, disengaging coping, avoidance coping	Folkman et al. ⁶³ ; Freedman ³¹ ; Geiger ⁵⁰ ; Lazarus ⁶⁴ ; Mao et al. ³⁹ ; Marmar et al. ⁶⁵ ; Mitchell ⁵⁹ ; Sattler et al. ⁵⁸ ; Shepherd et al. ³⁵ ; Wyche et al. ⁴⁰
	Social support: Support perceived/received from workplace (co-workers, supervisors, and organizations) and/or friends, support perceived/received from family, support from community/religion	Ai et al. ⁶⁷ ; Agarwal & Buzzanell ⁴⁴ ; Alvarez & Hunt ⁴⁶ ; Bartone et al. ⁴² ; Carlile et al. ⁴⁷ ; Chang & Taormina ⁶⁶ ; Cohen ⁶⁸ ; Freedman ³¹ ; Geiger ⁵⁰ ; King et al. ³⁶ ; Lepore et al. ⁶⁹ ; Mao et al. ³⁹ ; Marmar et al. ⁶⁵ ; Mash et al. ⁴⁸ ; McCanlies et al. ³⁸ ; Pietrantonio et al. ⁶² ; Pietrzak et al. ³² ; Pietrzak et al. ¹⁰ ; Raveis et al. ⁴⁵ ; Sattler et al. ⁵⁸ ; Tseng et al. ⁴³ ; Wyche et al. ⁴⁰ ; Yasien et al. ⁷
Antecedents	Exposure to disastrous events	Ai et al. ⁶⁷ ; Agarwal & Buzzanell ⁴⁴ ; Alvarez & Hunt ⁴⁶ ; Bartone et al. ⁴² ; Carlile et al. ⁴⁷ ; Chang & Taormina ⁶⁶ ; Freedman ³¹ ; Ke et al. ³⁴ ; King et al. ³⁶ ; Mash et al. ⁴⁸ ; McCanlies et al. ³⁸ ; McCanlies et al. ³³ ; Mao et al. ³⁹ ; Raveis et al. ⁴⁵ ; Ren et al. ⁵⁶ ; Shepherd et al. ³⁵ ; Tseng et al. ⁴³
	Experience in engaging in rescue work	Adler et al. ⁷³ ; Boscarino et al. ⁷⁶ ; Ehring et al. ⁷⁵ ; Huffman et al. ⁷⁴ ; Perrin et al. ⁷² ; Pietrzak et al. ¹⁰ ; Sakuma et al. ⁷¹
	Preparedness for disaster	Alvarez & Hunt ⁴⁶ ; Bartone et al. ⁴² ; Carlile et al. ⁴⁷ ; Crowe et al. ³⁷ ; Dolan & Adler ⁴⁹ ; Mash et al. ⁴⁸ ; Mao et al. ³⁹ ; Paton ⁷⁷ ; Pietrzak et al. ¹⁰ ; Shepherd et al. ³⁵ ; Sudom et al. ²⁸
Consequences	Psychological well-being	Alvarez & Hunt ⁴⁶ ; Chang & Taormina ⁶⁶ ; Freedman ³¹ ; Geiger ⁵⁰ ; King et al. ³⁶ ; Marmar et al. ⁶⁵ ; McCanlies et al. ³³ ; Mitchell et al. ⁵⁹ ; Pietrantonio & Prati ⁶² ; Pietrzak et al. ³² ; Pietrzak et al. ¹⁰ ; Raveis et al. ⁴⁵ ; Sakuma et al. ⁷¹ ; Sattler et al. ⁵⁸ ; Shepherd et al. ³⁵ ; Tseng et al. ⁴³ ; Yasien et al. ⁷
	Posttraumatic growth	Agarwal & Buzzanell ⁴⁴ ; Ai et al. ⁶⁷ ; Carlile et al. ⁴⁷ ; Freedman ³¹ ; Geiger ⁵⁰ ; Mao et al. ³⁹ ; McCanlies et al. ³⁸ ; Pietrantonio & Prati ⁶² ; Tseng et al. ⁴³ ; Yasien et al. ⁷
	Work engagement	Carlile et al. ⁴⁷ ; Chang & Taormina ⁶⁶ ; Mash et al. ⁴⁸ ; Nishi et al. ⁷⁸ ; Pietrantonio & Prati ⁶² ; Wyche et al. ⁴⁰

others during the earthquake in Haiti in 2010 reported an increase in personal resilience.⁴⁷ Disaster health care rescuers were convinced that helping people in disasters was a responsibility in which they found true meaning in their work and in their own life.^{39,56}

A sense of humor also contributed to resilience in rescue workers after involvement in adverse incidents. Humor is a complex, vague, and elusive phenomenon.⁵⁶ However, it has been proposed as a coping mechanism in a variety of stressful situations, such as disastrous events. Humor can be viewed as an important resource to have a positive effect on health and well-being among individuals.⁵⁷ Police officers who responded to a bombing/terrorist attack said that, in work meetings, troop members would refer to adverse events indirectly, tensely, and with a great deal of black humor, to release anxieties and fears arising from their traumatic memories of the incidents.⁵⁰ Those police officers who demonstrated humor were less likely to suffer emotional distress when encountering traumatic experiences.

Perceived Control

Perceived control is another attribute of disaster resilience among rescue workers. Studies have reported that having some sense of control can help rescue workers to overcome unforeseen stressors and alleviate the level of their emotional distress and posttraumatic stress symptoms.^{33,38,58} It has been found that soldiers who perceived that they had control over their own lives scored highly in resilience after they returned from the Operation Enduring Freedom and Operation Iraqi Freedom wars on terrorism.³² Likewise, police officers with a strong locus of control were

reported to have fewer PTSD symptoms and greater posttraumatic growth after deployment to disaster rescue work.^{33,58} Disaster relief workers who had a sense of control could forge relationships of trust and foster support, mitigating the stress in their lives and work.⁴⁴ That those who lost control and felt fear and anxiety during disaster rescue work reported experiencing PTSD symptoms after deployment – some to the point of developing mental illness – offers evidence supporting the importance of having a sense of control.⁵⁹

Self-Efficacy

When confronting adverse incidents, those who possess self-efficacy are more likely to make an effort to achieve their goals.⁶⁰ Self-efficacy is a personal judgment that “one can successfully execute the behaviour required to produce the outcomes.”⁶¹

In the context of disaster, those with a strong sense of self-efficacy were reported to manifest less burnout, compassion fatigue, and symptoms of depression after being dispatched to a disaster site.^{38,62} The responders to the Hurricane Katrina and Wenchuan earthquake disasters took pride in being involved in the disaster response efforts and felt that they had become stronger after handling the challenges confronted in the rescue activities.^{39,40} Volunteers involved in the earthquake rescue effort in Haiti also experienced a sense of personal self-efficacy from the knowledge and skills that they acquired there, and reported having gained the ability to cope with the negative psychological sequelae and aftermath.⁴⁷

Adaptive Coping

Adaptive coping is an attribute of disaster resilience. Coping refers to the thoughts and behaviors that people use to manage distress and problems, and to maintain a sense of well-being.⁶³

In adaptive coping strategies, such as problem-focused coping, the emphasis is on the taking of direct actions to address the cause of the problem.⁶⁴ In the context of disaster, problem-focused coping strategies have been identified as protective factors that reduce the risk of damage or minimize the negative consequences of a hazard, contributing to resilience.^{40,58} Research has shown that problem-focused coping and emotion-focused coping can also promote posttraumatic growth.^{35,39,58} By contrast, maladaptive coping styles may put rescue workers at risk of developing psychological problems. For example, the adoption of disengaged coping through alcohol and substance abuse has been associated with increased posttraumatic stress symptoms such as PTSD^{35,58,59} and with low scores for resilience.³⁵

However, 2 qualitative studies have shown that rescue workers who adopted the coping strategy of psychological numbing did not necessarily experience a lower capacity to function and could continue to focus effectively on their jobs.^{31,50} A cross-sectional study also showed that rescue workers who made greater use of problem-focused coping strategies had more severe PTSD symptoms, but they were able to deal with their persistent symptoms through meaning-focused coping.⁶⁵ Although it cannot be concluded which coping strategies are more effective in the context of disaster, it is noticeable that coping plays an essential role in mitigating the effects of adverse events on rescue workers, contributing to resilience.

Social Support

The included studies highlighted the importance of receiving social support from one's workplace, including from co-workers, supervisors, and organizations, and/or from friends,^{10,31,32,36,38–40,42,44,46,48,50,58,65,66} family members,^{10,39,42,46,58,65} and from one's community or religion.^{7,31,44,47,50,62,67} Such support contributes to the development of resilience after a person has been deployed to a disaster area. Social support refers to "a social network's provision of psychological and material resources intended to benefit an individual's capacity to cope with stress."⁶⁸

Police officers and health care rescuers preferred to share feelings and memories about their rescue work with close friends and colleagues/co-workers, as mutual support from colleagues promoted a sense of trust within the rescue team, which helped them to deal with the rescue work.^{31,39} A study on resilience among firefighters demonstrated that support from colleagues and their work units positively correlated with posttraumatic growth.⁵⁸ Another study of police officers suggested social support from their work unit is associated with higher resilience and fewer symptoms of depression.³⁸ Members of their team "felt like family" and understand each other in the disaster site.^{43–46}

Social support from family or relatives has been confirmed to be a key determinant in mitigating the negative effects on trauma and enhancing resilience in health care rescue workers in the context of disaster relief operations.³⁹ Members of canine search and rescue teams, rescue nurses, and volunteers who perceived that they had social support experienced less psychological distress, as friends and family members help them to "pick up the slack" by providing outlets for them to express sad feelings and memories of their disaster rescue relief work. This benefited their physical and psychological health,⁶⁹ professional quality of life,⁴³ and resilience.⁴⁴ A negative association was found between family support and severe

and chronic PTSD symptoms in both police and non-traditional responders, while work support was reported to have a negative effect on delayed-onset PTSD among police responders.^{10,50}

Receiving/perceiving support from community/religion was viewed as a form of social support⁷⁰ that brought a feeling of belonging and emotional connectedness to a community.⁶⁶ A sense of community has been described as a protective factor that is negatively associated with psychological distress^{7,62} and physical burnout⁶² in rescue workers. Two qualitative studies revealed that rescuers who were resilient had a positive perception of their team and felt pride in their rescue work during the disaster response operation.^{40,44} Rescuers expressed the view that they were trained together and, when disasters happen, they work together, and that this was what made them successful in their rescue work.^{40,44} Another qualitative study involving in-depth interviews with first responders reported that the firefighters involved in the 9/11 terrorist attack incident felt that they were almost like a religious community in helping each other at the disaster scene.³¹

Four studies found that rescue workers who possessed strong religious/spiritual support experienced less psychological distress when they witnessed human suffering at disaster sites.^{7,44,47,67} Another study revealed that those first responders who were regarded as resilient after deployment held the belief that "God" is the one who regulates the course of events and decides when and what will happen, and saw their rescue activity as a mission to save lives in this world stemming from God's will.⁵⁰

In sum, disaster rescue workers who perceived or received support from friends, family members, colleagues, supervisors, and their community were characterized as resilient. They had high levels of psychological well-being and low levels of psychiatric symptoms and burnout after deployment.^{10,32,36,40,42,46,48,66} Social support protected these rescue workers from developing symptoms of PTSD.⁵⁰ and depression.⁴⁴

Antecedents and Consequences of Disaster Resilience

Antecedents of Disaster Resilience

Antecedents are events or situations that must happen prior to the occurrence of the concept.¹³ From the included literature, the antecedents of disaster resilience among disaster rescue workers can be identified as exposure to disastrous events, experience in engaging in rescue work, and preparedness for disaster.

Exposure to a disaster, such as an earthquake,^{34,35,39,47,56,66} hurricane,^{33,38,44,45,48,67} explosion,^{31,43,46} war,³⁶ and air crash,⁴² is an obvious antecedent of disaster resilience. The rescue workers in such disasters experienced stressful circumstances through their exposure to the disaster and demonstrated more resilience than those without deployment experience.²⁸ The degree and frequency of exposure to disastrous events were found to be related to psychological well-being.⁴² Professional rescue workers such as police and firefighters, who were more likely to have been exposed to disasters, were more likely to be prepared to deal with the stressors associated with their rescue duties in response to disastrous incidents. They were also less likely to develop psychological problems after deployment.^{10,71,72} While those deployed to a disaster for the first time were found to be particularly vulnerable to developing psychological problems,^{73,74} those with more years of service in disaster rescue work have been reported as being less likely to suffer from PTSD, anxiety, depression, and burnout.^{75,76} Thus, being exposed to and experienced in disaster work are antecedents for disaster resilience.

Preparedness for disaster has been found to be another antecedent of disaster resilience among rescue workers.⁷⁷ Rescue workers, including soldiers, search and rescue workers, firefighters and police officers, health care rescuers, and volunteers, benefit from their training, including in professional/disaster rescue skills and knowledge,^{37,39,42} seek counseling for themselves if needed,³⁷ engage in activities to build physical fitness,^{39,42,49} and receive training in leadership skills.^{48,49} All of these make them more likely to develop an internal locus of control and a sense of self-efficacy, and to be confident about their ability to handle difficulties at disaster sites.⁴⁶ Eventually, these activities help them to develop fewer psychological problems such as PTSD, anxiety, and depression.^{10,28,35,46} It has been suggested that volunteers could benefit from receiving training in rescue work, and in other skills such as communication and relaxation strategies.⁴⁷

Consequences of Disaster Resilience

The consequences of disaster resilience are the outcomes that occur as a result of exposure to disaster.¹³ The outcomes of the disaster resilience of rescue workers can be psychological well-being, post-traumatic growth, and work engagement.

Rescue workers who possess the characteristics of disaster resilience reported experiencing less peritraumatic distress,^{7,32,43,45,46,59,65,71} fewer symptoms of PTSD,^{10,31–33,35,36,50,58,59,65,71} lower levels of anxiety,^{10,46,59,71} less depression,^{32,38,46,71} no evidence of secondary trauma,^{10,45,50,66} less compassion fatigue,^{43,62} and were less likely to experience burnout^{43,62,66} after exposure to traumatic events than those without the characteristics of disaster resilience.

Those who experienced negative psychological problems were reported to be relying on avoidance coping, engaging in risky alcohol drinking,^{33,35,59} and lacking social support from colleagues and family.^{10,32,36,42,46,66}

Disaster rescue workers who were resilient also reported experiencing posttraumatic growth after exposure to disasters.^{7,31,38,39,43,44,47,50,62,67} However, the results regarding an association between posttraumatic growth and posttraumatic stress symptoms are inconsistent. A study found that posttraumatic growth was negatively associated with posttraumatic stress symptoms,⁵⁸ while 2 studies did not find any reduction in stress symptoms among those with posttraumatic growth,^{33,59} in that posttraumatic growth was not necessarily associated with lower levels of distress.³³

It was also found that rescue workers who demonstrated resilience were more satisfied with their rescue work, resulting in increased engagement in work after deployment to disasters.^{40,48,62,66,78} Congruent with the results of these studies, volunteers to disasters experienced an increase in interpersonal empowerment and social connectedness after they returned from disaster rescue work.⁴⁷ It can be concluded that those who were resilient were able to bounce back to resume their “normal life” after deployment, and to continue with their work.

Model Case

In accordance with Walker and Avant, a model case was created to serve as an example of the concept of disaster resilience and to demonstrate the defining attributes of that concept.¹³ Brackets were used to indicate the attributes of those who possess disaster resilience (Appendix 1).

Contrary Case

Again, following the suggestion of a model case,¹³ a contrary case was also created to serve as a clear example of what is “not the concept.” The brackets indicate the lack of attributes of disaster resilience (Appendix 2).

Empirical Referents

Determining the empirical referents for the attributes is the final step in a concept analysis. Empirical referents refer to the means by which one can recognize or measure the defining characteristics or attributes that demonstrate the presence of the concept.¹³

In the reviewed studies, there were no empirical referents that specifically measured the concept of disaster resilience. Instead, three instruments that had been developed to measure resilience, in general, were used to measure resilience in the disaster rescue workers featured in the included articles. These instruments are the Connor–Davidson Resilience Scale (CD-RISC-25, CD-RISC-10),^{32,33,35,38,43,79} the Young Adults Resilience Scale,⁷ and the Resilience Scale.⁶⁶

The CD-RISC was developed for use among the general population and outpatients with anxiety disorder and PTSD.⁸⁰ It is a self-rating scale for assessing an individual’s level of resilience. Both the original (25 items) and abbreviated (10 items) versions of the scale employ a 5-point Likert scale ranging from 0 (“not true at all”) to 4 (“true nearly all the time”) to assess the ability of the general population or those with anxiety disorder to cope or adapt to adverse situations. The higher the score, the higher the level of resilience. The scale was adopted for use among the police officers, firefighters, ambulance personnel, and veterans involved in disaster relief operations who were mentioned in the studies included in this paper.^{32,33,35,38,43,79}

The Young Adults Resilience Scale was developed by mixing qualitative and quantitative approaches from studies involving young adults who appeared to be “doing well” after having encountered significant adverse incidents.⁸¹ The scale contains 28 items that can be divided into 3 subscales – individual, caregiving, and contextual component factors – to assess resources related to individual capacities, relationships with others, and a sense of community and belongingness. A 5-point Likert scale was used, with 1 referring to “does not describe me at all” and 5 to “describes me a lot,” and with higher scores indicating higher levels of resilience. This instrument was adopted in a study of rescue workers who served in Pakistan.⁷

The Resilience Scale was developed for use in a qualitative study of community-dwelling older women who were considered to be adapting well after traumatic situations.⁸² This is a 25-item scale that employs a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). In one of the included studies, only 14 items were used to assess the ability of Chinese male soldiers to reestablish psychological equilibrium after having experienced significant difficulties.⁶⁶ This scale has demonstrated internal consistency and reliability, with Cronbach’s alpha coefficients ranging from 0.72 to 0.94.⁸³

The empirical referents as outcome measures included in the reviewed studies measured only the aspect of resilience and were generated based on qualitative and/or quantitative findings from other populations, such as patients with psychometric disorders and senior citizens other than rescue workers. As such, a comprehensive picture could not be obtained of the attributes of disaster resilience that were identified in this concept. There is an obvious

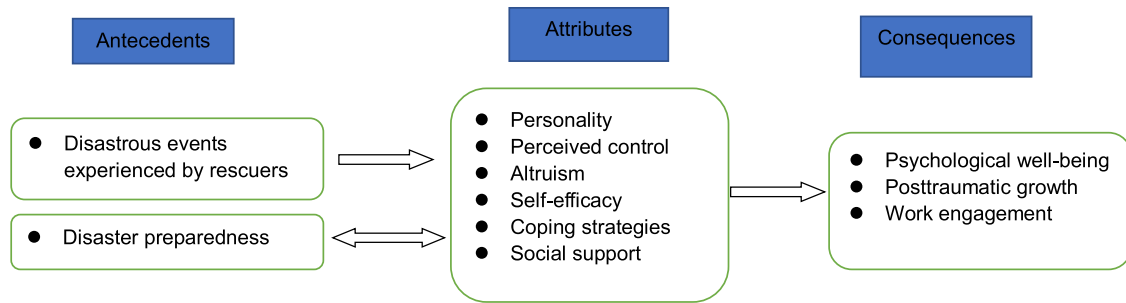


Figure 2. The antecedents, attributes, and consequences of the concept of “disaster resilience” in rescue workers.

need to develop a specific instrument to measure the concept of “disaster resilience” among rescue workers.

Definition of Disaster Resilience in Rescue Workers

In analyzing the concept of disaster resilience among rescue workers using the approach of Avant and Walker, the term *disaster resilience* can be defined as: “The personal ability and preparedness of rescue workers to respond to disastrous events in an effective manner, such that they are in a state of adaptation after deployment.” This ability is influenced by personality, perceived control, self-efficacy, effective coping, the social support of rescue workers, and preparedness for disasters; and manifested by positive outcomes in psychological well-being, posttraumatic growth, and work engagement after deployment.

Preliminary Conceptual Model of Disaster Resilience

The concept of disaster resilience among rescue workers was analyzed, and the key components in this phenomenon were described. In accordance with this concept analysis, a preliminary conceptual model was set up to depict disaster resilience among rescue workers (Figure 2).

The attributes, antecedents, and consequences of disaster resilience play a critical role in forming the key elements of this model. It is suggested that rescue workers who have a positive personality, a perception of control, and self-efficacy, who adopt coping strategies, have social support (attributes), are prepared for disastrous events (antecedents of disaster resilience), and who can maintain psychological well-being, will experience posttraumatic growth, and enhanced work engagement in the face of disaster (consequences of disaster resilience).

Discussion

Adopting Walker and Avant’s approach to concept analysis, the concept of “disaster resilience” among rescue workers was analyzed in this paper through an exploration of its attributes, antecedents, and consequences.¹³ The aim was to provide a better understanding of the concept and to clarify ambiguities in it. A definition and a preliminary conceptual model were described and depicted accordingly.

Five attributes, namely, personality, perceived control, self-efficacy, adaptive coping, and social support, were identified as essential for the development of disaster resilience among rescue workers. Although personality can be difficult to modify, the other attributes can be developed.⁸⁴ Disaster resilience in rescue workers is a dynamic characteristic that can be enhanced or nurtured

through training and interventions focusing on the identified attributes.

The coping strategies used by disaster workers to achieve disaster resilience differ from those used by other populations to develop resilience. Problem-focused coping has generally been viewed as an adaptive strategy for managing stress, while emotion-focused coping and avoidance coping have been regarded as maladaptive strategies resorted to by adolescents and the elderly.^{85,86} However, 1 study has found that emotion-focused coping was beneficial to the well-being and resilience of police officers.⁸⁷ A positive relationship between avoidance coping and posttraumatic growth has also been reported in rescue workers.⁸⁸ It is suggested that when working with disaster rescuers, different types of coping strategies suited to individual needs should be taken into consideration before and after the rescuers are dispatched to a disaster site.

This finding suggested that managers of rescue teams and organizations should provide their rescue workers the common signs of distress and depression, aware of their own reactions and coping strategies, and encourage them to express their feelings or talk about their experiences if necessary.⁸⁹ Relevant administrative departments should identify those who may be at risk of depression, and offer counseling or supportive services when needed.

In the included studies, social support was the most frequently reported attribute of disaster resilience in rescue workers. In the concept of disaster resilience, social support is not limited to support from the family members and friends of the rescue workers; rather, it is imperative that rescuers receive support from their peers/colleagues, from the organization/unit where they work, and from the community or their religion. It was essential for police officers and firefighters to have a sense of identity and belonging to a supportive group that provided them with a strong source of social support, especially during engagement in disaster-related work.³¹ Social support from a community and a professional had an impact on the psychological well-being of rescue workers and enhanced their disaster resilience.

The attributes of disaster resilience identified in this study can be categorized into individual qualities (personality, perceived control, self-efficacy, adaptive coping) and environmental resources (social support). The individual qualities can also be viewed as internal attributes, while social support as external attribute.¹¹ It is suggested that disaster resilience is an interacting process of individual qualities and the availability of environmental resources.¹¹ Further study should be conducted to gain a better understanding of the mechanism of the interaction of the attributes in enhancing disaster resilience.

Preparedness for disaster is an antecedent for disaster resilience in rescue workers. In disaster incidents, rescue workers face

challenges and stressors requiring quick decisions and actions.⁹⁰ Adequately preparing rescue workers in both rescue skills and psychological outlook could help equip them with the necessary competencies to maintain self-efficacy and a perception of control. Training and good preparation could enhance disaster resilience among rescue workers. Those who received training as certified rescuers were less likely to suffer from negative psychological symptoms after deployment and were considered to be resilient.⁴⁶ It is recommended that disaster rescue workers receive systematic training in psychological and physical preparedness before being dispatched to disaster sites.^{90,91} A certificate of qualification should be awarded to those who complete the training.

Rescue workers who possessed disaster resilience were not only able to respond effectively to disasters (response) and bounce back to living a normal life (recovery), but also experienced posttraumatic growth (adaptation). With the positive attributes of disaster resilience, disaster rescuers who are well prepared can experience psychological well-being, posttraumatic growth, and work engagement after deployment.

Disaster resilience is defined as a status and a process that a disaster rescuer, after deployment, is capable of adapting positively to adversity. This is comparable to the concept of sense of coherence (SOC). SOC is defined as a sense of control in the presence of life challenges, when an individual interprets the situation with comprehensibility, manageability, and meaningfulness,⁹² mediated by coping strategies and social support, leading to positive coping and outcomes. Evidence suggested that SOC, similar to disaster resilience, was negatively correlated with symptoms of PTSD among paramedics.⁹³ However, the relationship between disaster resilience and SOC has not been explored and may require further exploration.

The preliminary conceptual model of disaster resilience proposed here provides directions for future study. Tailored interventions for rescue workers to enhance their preparedness and disaster resilience could be developed accordingly. The interventions should also include effective coping strategies that fit the needs of individuals when confronted with difficulties. It would be of great value to develop an instrument that can measure disaster resilience, which can be used in the process of recruiting disaster rescuers and for evaluating the effectiveness of preparedness training interventions. Further research is needed to examine the relationship among antecedents, attributes, and consequences in the context of disaster resilience, and to establish the model depicted in this concept analysis. Further studies are also needed to explore the mechanism of disaster resilience development and to explore how rescue workers perceive and appraise the disastrous events.

Limitations

There are several limitations in this analysis of the concept of disaster resilience. The first is that the analysis is tentative, since the concept was based on the concept of resilience among other populations. In addition, this analysis was conducted from an examination of 20 articles, the majority of which were cross-sectional design studies; thus, causality could not be established. Only 3 qualitative studies were used in the analysis, so it is possible that this concept analysis did not capture all of the attributes related to disaster resilience. Finally, only articles published in English were included, while gray literature and articles published in other languages were excluded. Some other attributes of disaster resilience may not have been captured in the present analysis, since resilience is associated with culture.⁹⁴

Conclusions

This concept analysis of disaster resilience provides researchers who are interested in disaster research with a better understanding of the relationship among the antecedents, attributes, and consequences of the concept of disaster resilience. Administrators of both government and non-governmental organizations who are involved in recruiting, training, and preparing rescue workers for deployment to disaster sites will benefit from the clear definition of disaster resilience presented in this study. An instrument could be developed to measure the presence of disaster resilience for use in the process of selecting and training rescuers and to identify the prerequisites of disaster resilience (antecedents). Tailored interventions can be designed based on the characteristics of disaster resilience (attributes) to enhance the resilience of rescue workers so that they can maintain their psychological health, experience growth, and improve their work engagement (consequences) when they face adverse events in the course of performing their disaster-related work.

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/dmp.2021.157>

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