
Stress and Stress Management in European Crisis Managers – A multi-method approach

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Abstract

The EU-funded research project PsyCris aims at improving psychosocial support in crisis management with the development of stress management trainings for the understudied group of crisis managers (i.e., executives and supervisors of organizations involved in disaster response) being one of its objectives. As research concerning specific stressors, burden, and stress management in this occupational subgroup is scarce, the two studies of this dissertation examined perceived stress in (European) crisis managers, stressors related to their psychosocial work environment, and applied stress management/coping strategies. Study 1, applying a qualitative approach, set an additional focus on the requirements regarding stress management in the context of disaster operations, which were assessed by means of semi-structured interviews with 31 crisis managers. Within study 2, stress, individual factors, and mental and somatic health symptoms were examined by means of a set of well-established questionnaires, in order to identify potential risk factors for mental health in crisis managers. During the interviews of study 1, which were analyzed with the qualitative text analysis method GABEK, the crisis managers reported experiencing event-specific, potentially traumatic stressors (e.g., confrontation with victims), but also organizational and occupational stressors related to their leadership positions (e.g., making far-reaching decisions under time pressure or dealing with press and media). While possibilities for control were perceived as limited during disaster operations, organizational and peer support played an important role to mitigate mission-related stress. Furthermore, functional and adaptable stress management/coping strategies were reported as crucial for being able to effectively manage a crisis. Within study 2, the sample of 86 European crisis managers showed less mental and somatic health symptoms than a control group comprising 91 managers from the public sector. Compared to the general population, they showed average levels of depression and anxiety symptoms, but elevated levels of somatic and posttraumatic stress symptoms. Dysfunctional coping appeared to be the most influential risk factor for mental and somatic health in crisis managers, while stress reactivity was shown to moderate the relationship between perceived stress and mental health. The results of the two studies point to a special need to mitigate the high levels of stressful demands experienced by crisis managers and to prevent the use of dysfunctional coping strategies. From the results, recommendations were derived which are taken into account within the development of the stress management training for crisis managers, realized within the PsyCris project.

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List of Abbreviations

ACTH	Adrenocorticotrophic hormone
AD	Adjustment Disorder
ANOVA	Analysis Of Variance
APA	American Psychological Association
ASD	Acute Stress Disorder
BBK	Bundesamt für Bevölkerungsschutz und Katastrophenhilfe
BCa	Bias-corrected and accelerated
CG	Control group
CI	Confidence interval
C-LEAD Scale	Crisis Leader Efficacy in Assessing and Deciding Scale
CM	Crisis manager
CRH	Corticotropic releasing hormone
D-C-S model	Demand-control-support model
DIN	Deutsches Institut für Normung
DOW	Description of work
DSM-5	Diagnostic and statistical manual of mental disorders 5 th edition
EMT	Emergency medical technician
GABEK®	Ganzheitliche Bewältigung von Komplexität
GAD-7	Generalized Anxiety Disorder 7-item scale
GAS	General adaption syndrome
HPA-axis	Hypothalamus-pituitary-adrenocortical axis
IES-R	Impact of Event Scale-Revised
ISO	International Organisation for Standardization
JCQ	Job Content Questionnaire
LCU	Life change Unit
LMU	Ludwig-Maximilians-University Munich
PE fit model	Person-environment fit model
PHQ	Patient Health Questionnaire
PSAB	PsyCris Stress Assessment Battery
PSQ	Perceived Stress Questionnaire
PSRS	Perceived Stress Reactivity Scale
PSS	Psychosocial support
PsyCris	PSYcho-social Support in CRISis Management

PsyCris PPP Platform	PsyCris Preparedness-Planning-Prevention Platform
PTSD	Posttraumatic Stress Disorder
SRRS	Social Readjustment Rating Scale
SRS	Stress-Reaktivitäts-Skala
TADMUS	Tactical Decision Making Under Stress
TICS	Trier Inventory for the Assessment of Chronic Stress
UGR	University of Granada
VIF	Variance inflation factor
WHO	World Health Organization
WinRelan®	Winword Relation Analysis
WP	Work package

1 Introduction

Since several decades, the human and financial costs of occupational stress are well examined and documented and have been shown to relate to inefficiency, increased sick leave and accident rates, mental and somatic health symptoms, early retirement, and even premature death (e.g., Cox & Rial-González, 2002; EU-OSHA, 2014; Kaluza, 2015; Karasek & Theorell, 1990). The adverse consequences of (work-related) stress on health are particularly relevant for high-risk occupational groups such as crisis and emergency management personnel, i.e., personnel who respond to emergencies and large-scale public health and safety crises such as firefighters, emergency (medical) services personnel, and policemen (e.g., Johnson et al., 2005; Kirkcaldy, Brown, & Cooper, 1998; Regehr & Bober, 2005). Crisis and emergency management personnel were repeatedly shown to suffer from stress and stress-related health consequences, for example physical complaints, post-traumatic stress disorder, depression, anxiety, burnout and substance abuse (e.g., Alexander & Klein, 2001; Bennett, Williams, Page, Hood, & Woollard, 2004; Corneil, Beaton, Murphy, Johnson, & Pike, 1999; LaFauci Schutt & Marotta, 2011). The examination of stress related to the work-environment of this occupational group is seen as important, also in order to develop preventive and supportive measures. In this context, the researchers Beaton, Murphy, Pike, and Jarrett (1995, p. 231) describe the danger of not attending to the stress symptomatology of crisis and emergency management personnel by pointing out the anticipated potential costs: “suboptimal task performance and potential compromising of public safety, as well as burnout and foreshortened careers, unnecessary disablement, and elevated morbidity and mortality.”

A particularly understudied group of crisis management personnel are leaders and supervisors in crisis management: Existing research mostly addressed specific stressors and health consequences of first responders such as firefighters and rescue workers (see LaFauci Schutt & Marotta, 2011; Monroe, 2009). Only few studies focused (additionally) on the specific demands and related burden of crisis management leaders, in the following referred to as *crisis managers* (Brown & Campbell, 1990; Kirkcaldy et al., 1998; LaFauci Schutt & Marotta, 2011; Regehr & Bober, 2005). The positions of crisis managers in the context of public health and safety crises or disasters bear high levels of responsibility; their leadership performance and decisions can have far-reaching impacts for the affected population and crisis management personnel in non-leading positions (Hadley, Pittinsky, Sommer, & Zhu, 2011).

Against this background, it seems crucial to support the occupational subgroup of crisis managers in dealing with the challenging demands and specific stressors related to their positions in disaster operations. Considering the scarce research on the specific work-related stress of crisis managers, it is important to learn more about their actual stressors, stress management/coping strategies and corresponding requirements, in order to tailor stress management trainings and other preventive measures to their needs.

This dissertation, which was conducted within the scope of the EU-funded research project *PsyCris*, aimed at closing this gap in research. It employed a multi-method approach and comprised two studies, an exploratory qualitative study and a quantitative study based on an online survey. The qualitative study (study 1) examined the psychosocial work environment of crisis managers, their stressors, and applied stress management/coping strategies by means of semi-structured interviews. It set a special focus on crisis managers' requirements regarding stress management in the context of disaster operations. The quantitative study (study 2) assessed perceived stress, work-related stressors and resources, individual factors such as coping styles and stress reactivity, as well as mental health in crisis managers by means of a battery of well-established and validated questionnaires. It compared this occupational subgroup to managers from a different occupational field and sought to identify work-related and individual risk factors for mental health. Based on the results, recommendations for the development of a cognitive-behavioral stress management training for crisis managers, which is realized as part of the *PsyCris* project, were derived.

In this manuscript, at first the research background of the two studies (i.e., the *PsyCris* project) is described in more detail. Subsequently, the theoretical background concerning the constructs *stress*, *stress management/coping*, and *health consequences* is elaborated on, before addressing the current state of research on stress in crisis management. Thereafter, the objectives and research questions of the dissertation are addressed, followed by detailed descriptions of the two studies, beginning with the exploratory, qualitative study. In this context the respective methods of data collection and analysis are described, results are reported and discussed, and derived recommendations regarding the envisioned stress management training for crisis managers are outlined. In the end, the results and derived recommendations of both studies are tied together in an overall summary and conclusion.

Figure 1 depicts the structure of this manuscript.

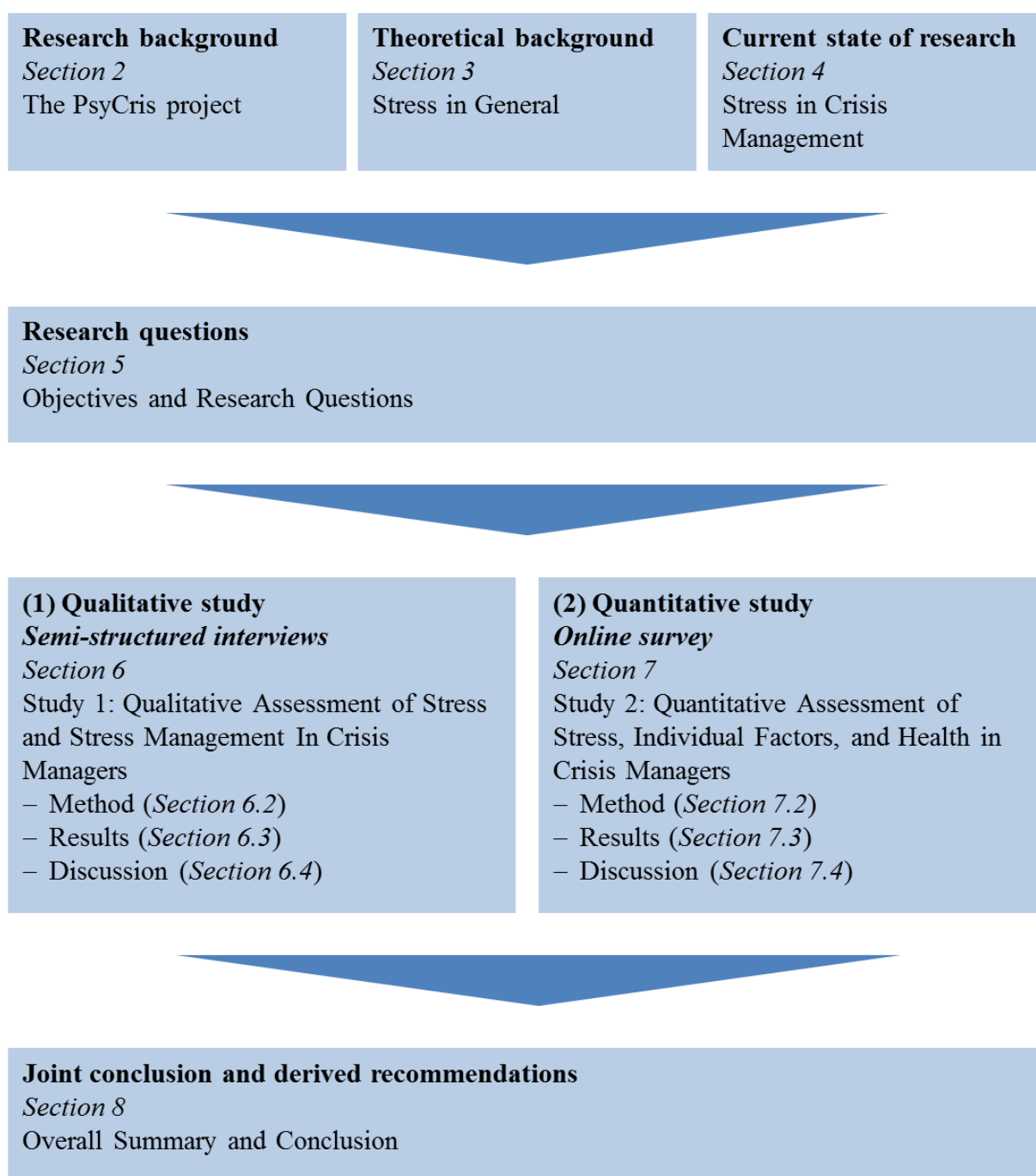


Figure 1. Structure of the dissertation

2 The PsyCris Project – Research Background

2.1 Overview and objectives

This dissertation was conducted within the scope of the research project *PsyCris* (PSYcho-social Support in CRISis Management). PsyCris is an international, multi-disciplinary research project with a duration of 36 month (start in July 2013), which is funded by the European Union within the Seventh Framework Programme¹. Within PsyCris, ten partner institutions and companies (universities and research centers, small and medium-sized enterprises, limited liability companies, and stakeholder organizations) collaborate under the coordination of the Ludwig-Maximilians-University Munich (LMU) to reach the projects main aim: the improvement of psychosocial support in crisis management (for affected persons/victims, professional helpers and volunteers).

The project aims at meeting the following objectives according to its description of work (DOW; Adler, 2011):²

- Analysis of the status quo of medical and psychosocial support in the context of large-scale crises in European countries
- Analysis of the long-term psychosocial, societal and cultural consequences of crises
- Contingency planning for psychological and medical needs in the context of large-scale crises
- Provision of efficient self-help strategies for affected communities, populations, groups and countries
- Development of interventions for crisis management personnel to enhance coping with stress related to disaster/crisis work and to prevent stress-related disorders

PsyCris aims at reaching these objectives by applying research methods from the fields of psychology, education and learning sciences, informatics, sociology, and health sciences.

The project gained ethical approval for the planned and conducted studies and the applied research methods by the Ethics Commission of the Faculty of Psychology and Education

¹ This project has received funding from the European Union's Seventh Framework Programme for research, technological development, and demonstration under grant agreement no 312395.

² See also the project's web-site www.psycris.eu

sciences of the LMU, which acts as the project's main ethics commission, and by ethics commissions in the partnering countries (Austria, Israel, Lithuania, Luxembourg, and Spain).

The developed interventions, guidelines, and research findings relevant for improving psychosocial support in crisis management are integrated into an internet-based learning environment for crisis management personnel which focuses on competence development including peer-like exchanges and self-directed learning. This internet-based learning environment, which has been termed *PsyCris PPP (Preparedness-Planning-Prevention) Platform*, constitutes the main product of the PsyCris project. It considers and values the crisis management personnel's experiences and strives to build a "community of practice" (i.e., an expert network; Adler, Sauter, Meyer, Hagl, & Raich, 2015)

2.2 Work package *Stress Assessment and Stress Management*

The PsyCris project comprises different work packages which examine different aspects relevant for improving psychosocial support in crisis management. Within work package 4 (WP4), the focus is on stress assessment and stress management in crisis management personnel. The main aim of WP4 is to develop interventions which help crisis managers (definition see section 2.3) to better cope with the stress related to disaster operations. For this purpose, two kinds of stress management interventions are developed: a biofeedback-based training procedure for the self-regulation of physiological stress responses and a cognitive-behavioral stress management training (DOW; Adler, 2011). For the purpose of tailoring these trainings to the needs and requirements of the target group of crisis managers, potential end-users are involved in the conceptualization and development. In this context, information regarding stressors related to the work environment and positions of crisis managers, their requirements concerning stress management (strategies), as well as work-related and individual risk factors for mental health have to be assessed.

This dissertation served exactly this purpose: It comprises two studies which examine perceived stress of crisis managers, stressors related to their work environment, and applied stress management/coping strategies that were conducted as part of WP4³. While study 1 employed an exploratory, qualitative approach, using semi-structured interviews for data collection, study 2 was based on an online survey, comprising a set of well-established and

³ Related to that, parts of this dissertation were included in deliverables (D4.1 and D4.2; describing the research conducted in WP4), which were submitted to the European Commission.

validated questionnaires. The main aim and purpose of these two studies, as mentioned above, was to identify starting points for the development of the cognitive-behavioral stress management training and to derive corresponding recommendations. Furthermore, the target group's learning requirements regarding stress management and psychosocial support in crisis management, assessed by means of interviews within the scope of study 1, are considered in the development of the whole PPP-Platform.

2.3 Target group: Crisis managers

As addressed above, the PsyCris project aims at improving psychosocial support in crisis management. Psychosocial support (or psychosocial prevention and aftercare) comprises all prevention measures and short-, medium- and long-term aftercare strategies during and after a major crisis or a major crisis mission, respectively. It aims at an effective prevention, early recognition, and, if necessary, treatment of stress-related consequences and disorders for all affected groups (population, professional helpers, and volunteers; Bundesamt für Bevölkerungsschutz und Katastrophenhilfe⁴ (BBK), 2012).

It is important to distinguish between psychosocial support that is provided by crisis management personnel (for victims/affected persons or their relatives and families) and psychosocial support the crisis management personnel are provided with (e.g., by their organization or designated psychosocial support institutions).

Crisis management personnel⁵ comprise all kinds of personnel/(first) responders involved in the management of large-scale crises or disasters, respectively (such as fire fighters, police men, rescue or emergency (medical) services personnel/paramedics, and military personnel). Most of the research regarding stress and related (health) consequences in the context of crisis management or disaster response as well as most of the available occupational prevention and support programs focus on first responders (such as firefighters, policemen, emergency services personnel, etc.; see LaFauci Schutt & Marotta, 2011; Monroe, 2009). An

⁴ Federal Office of Civil Protection and Disaster Assistance (in Germany)

⁵ One might also use the terms *crisis response personnel* or just *crisis personnel*. In fact, there are many different terms describing the same or slightly different occupational groups in this context which makes it difficult to navigate through existing research (or to identify target groups of existing support/prevention programs). Within this manuscript, the term *crisis management personnel* is used whenever first responders and crisis management leaders are referred to. The terms *crisis managers* comprises exclusively crisis management personnel in leading positions. The term *crisis and emergency management personnel* additionally includes personnel involved in the management/response of emergencies.

understudied occupational subgroup involved in disaster response is the group of crisis management leaders and supervisors. The PsyCris consortium elaborated the following definition of this subgroup of crisis management personnel, termed *crisis managers*:

Crisis (or disaster) managers are strategic, tactical, and operational managers and supervisors⁶ in organizations involved in national or local disaster response and civil protection (like Red Cross, fire brigades, public authorities, agencies for technical relief, and the military) in the context of major crises and disasters. Crisis managers may be permanent heads or members of a disaster management unit or incident commanders. Alternatively, they can be nominated or appointed, respectively. They belong to the middle and higher management and have staff and decision-making responsibilities.

As a more specified group of crisis management professionals, *crisis managers for psychosocial prevention and aftercare* are defined as middle and higher managers of institutions providing psychosocial support for the affected population and crisis management personnel in the context of disasters and large-scale crises. They work generally in crisis interventions teams or pastoral care teams and have staff and decision making responsibilities within their positions. Many of them work on a voluntary basis.

The PsyCris project considers it essential to support crisis managers (in light of WP4 particularly concerning their stress management/coping abilities), to prevent a physical and mental harm of this occupational group and, related to that, their subordinated staff as well as to facilitate an effective crisis management. Considering the high responsibility and the far-reaching impact related to their positions in the management of large-scale crises/disasters, crisis managers are the main target group of the PsyCris project (Adler et al., 2015).

⁶ In the UK, the terms *golden*, *silver*, and *bronze commanders* are commonly used.

3 Stress in General – Theoretical Background

This chapter addresses the concept of stress in general. For this purpose, the most important stress definitions, models, theories, and approaches for research and practice are introduced, also in light of the perspective of this dissertation project. Furthermore, the construct *stress management* (i.e., *coping*) is elaborated on and somatic and mental (short- and long-term) health consequences of stress are addressed.

3.1 Stress – Definition, terminology, and origins

Research and practice on the topic *stress* is based on numerous different definitions and conceptual models which are not homogenous as they focus on different aspects of the construct. For this reason, when conducting and reporting research about stress, it is important to give an overview about the different approaches to examine and explain stress, as all of them contain important contributions to a comprehensive understanding of the construct.

Stress is approached from the perspective of different sciences, i.e., biology and medicine, psychology, sociology, as well as work and business sciences. As mentioned above, when examining the causes and consequences of stress, these sciences concentrate on different aspects of the construct. Most of the sociological stress theories and models focus on the eliciting conditions/stimuli, termed stressors, and are therefore classified as stimulus-based stress models (e.g., Holmes & Rahe, 1967). Biological/physiological and medical stress models, on the other hand, are response-based models which focus on the persons' physiological reaction to a stress stimulus (e.g., Selye, 1981). Stress models and definitions that concentrate on the interaction (or more precisely transaction) of the environmental conditions (stressors/stimuli) and the individual person (its reaction, perception and coping behavior) stem from the field of (cognitive) psychology and are classified as relational or transactional stress models (e.g., Lazarus & Launier, 1981; for classifications see Bodenmann & Gmelch, 2009; Busse, Plaumann, & Walter, 2006; Lazarus, 2006; Nitsch, 1981). From the perspective of the relational stress models, stress is neither exclusively represented by an environmental stressor, nor by a pattern of emotional, cognitive, behavioral, and physiological reactions of a person. Instead it is conceptualized as a transactional process between environment and person in which the person's perception and cognitive appraisal of the environmental stimulus plays a crucial role (see section 3.2.3).

Another category of stress theories is termed *resource-oriented* and models falling into this category focus on the person's (intrapersonal and extrapersonal/environmental) resources and

their influence on the stress perception and reaction. Resource-oriented stress models differ notably in the way they concentrate on these resources or the kind of role they assume resources to play in the emergence of stress. For example, the salutogenetic stress model by Antonovsky (1987) rather focuses on the identification of protective factors (sense of coherence as central component) whereas the stress model of Hobfoll (1998) defines stress as an imminent or experienced loss of resources (see Busse et al., 2006)⁷.

However, as the dissertation sets a special focus on the stress related to the work environment of crisis management personnel, it is further important to introduce work-related stress models (e.g., Karasek & Theorell, 1990), a more specified category of stress models. They stem from the fields of work and occupational (health) psychology and examine the influence of the conditions (i.e., stressors but also resources) of different work environments with regard to the development of stress.

Table 1 gives an overview of the different kinds of stress models addressed in this manuscript. According to the different stress models and theories, the term *stress* is often used ambiguously, describing either stressful conditions/stressors (e.g., work-overload, social conflicts) or the individual's stress reaction and its concomitant effects (e.g., nervousness, irritability, hypertension). However, relational or transactional, process-oriented stress definitions provide a more holistic perspective on stress, and are more frequently applied in contemporary stress research and practice (Bodenmann & Gmelch, 2009).

Regardless of the focus of the different definitions, it still can be stated that stress always involves eliciting stimuli, processes of internal perception by the respective person and bodily, cognitive, emotional, and behavioral reactions (Lazarus, 1993).

Considering all of the above, the relational, process-oriented definition of Salas, Driskell & Hughes (1996, p. 6) is assumed to address all relevant aspects and was therefore chosen as the basis of this dissertation project⁸:

⁷ The resource-oriented stress models were shortly addressed for the sake of completeness, but are not further described in the following sections due to reasons of relevance regarding the focus of this dissertation.

⁸ This dissertation is based on the relational/transactional stress perspective and, as a consequence, applies a process-oriented, relational definition of stress. However, as stress is also examined from the angle of an occupational psychological model, the demand-control-support-model (Karasek & Theorell, 1990, see section 3.2.4.1), the term stress is also used to describe stressful work-related environmental conditions.

“We define stress as a process by which certain environmental demands [...] evoke an appraisal process in which perceived demand exceeds resources and results in undesirable physiological, psychological, behavioral, or social outcomes.”

In the following sections, the approaches of stimulus- and response-based stress models are described in more detail against the background of their conceptual foci: stressors and stress reactions. Beyond that, the relational stress model of Richard Lazarus (Lazarus & Launier, 1981) is described with a special focus on appraisal and coping processes. Furthermore, the work-related stress model of Karasek and Theorell (1990) is illustrated in more detail.

Table 1

Different conceptual models of stress (adapted from Busse et al., 2006, p. 64)

Models	Important representatives	Focus	Understanding of stress/ research question
Biological stress models	Cannon (1929) Selye (1956)	Response-based approaches, physical reactions	The unspecific stress reaction is the body's response to any kind of stressor.
Sociological stress models	Holmes & Rahe (1967) Anderson (1991)	Stimulus-based approaches, stressors (noise, poverty), critical life events, daily hassles	Every stressor elicits a specific stress response.
Psychological stress models	Lazarus & Folkman (1984)	Transactional model, individual perception, interpretations and coping behavior	Stress comprises the environmental conditions, the perception of these, the stress reaction and coping behaviors.
Stress models related to working environment	Karasek & Theorell (1990)	Demand, control and support	High demands combined with few possibilities for control and low levels of social support at work lead to mental and somatic strain.
	Siegrist (1996)	Compensation (gratification) Effort-reward-imbalance	High effort combined with low reward leads to strain, especially in overcommitted employees.

3.1.1 Origins

The term *stress* originates from the engineering sciences and was first used in the late 17th century. It was applied in the sense of *pressure, force, load*, describing the entirety of external forces impacting on a material. The term *strain* was used to refer to the consequences such as changes or wear/deformation of the material. The two constructs were conceptualized in the form of a cause and effect relationship and, insofar, correspond to the stimulus-response terminology of behaviorist psychology. The stress-strain-concept was later transferred and enlarged to human work, not only considering physical stress stimuli but also psychosocial stress and its short- and long-term physical and mental consequences on the working person (see section 3.2.4; Lazarus, 2006; Rutenfranz, 1981; Sonntag, Frieling, & Stegmeier, 2012; Udris, 1981).

With the biochemist and medical scientist (endocrinologist), Hans Selye, the term stress was first introduced in medical sciences in the 1940s and thereby, received more and more scientific interest (Kaluza, 2015; Lazarus, 2006). When examining a potentially undetected sexual hormone in rats, Selye discovered an unspecific somatic response of the organism to any kind of harm/demand, which forms the core of his definition of stress (Selye, 1957; 1979). This paradigm of unspecificity (i.e., all sorts of demands cause the same bodily reactions in all individuals) was criticized by numerous researchers (Lazarus & Launier, 1981), as it neglects the differences in consequences caused by different kinds of stressors (cf. stimulus-based stress models; section 3.2.1). Furthermore, it does not comprehensively consider the impact that individual components may have on the consequences of different stressors (cf. relational stress models; section 3.2.3). By now, stress, its causes and consequences have been researched by many different sciences from various angles, leading to numerous stress conceptualizations and models (see Table 1).

3.1.2 Forms of stress

Stress can occur in different forms dependent on different characteristics which concern stressors, the affected individual persons, and/or stress reactions. Bodenmann & Gmelch (2009) address four criteria which specify the different forms of stress: First of all, the *quality* of stress, referring to the affected person's connotation and perception. A person can perceive stress either in the form of aversive distress (associated with negative emotions like anger) or in the form of positive, activating eustress (see the different perceptions of a situation as threat or challenge; section 3.2.3.1). This distinction was at first introduced by Selye (1974) considering that a timewise limited stress reaction can also cause a functional and

performance-enhancing activation. With regard to terminology, it has to be noted that the general term *stress* is usually used in the sense of distress (whenever perceived demands exceed perceived resources); whenever eustress is addressed, explicitly this term is used.

The second criterion influencing the form, in which stress is experienced, is the *intensity*, on the one hand of the stressor and related to that, in most cases also of the stressor's impact (i.e., stress reaction and long-term consequences) on the individual. Examples for stressors with different intensities are critical life events (macro stressors) versus daily hassles (micro stressors; see section 3.2.1). Beyond that, also with regard to the distinction between traumatic stress and everyday work-related stress, *intensity* is the determinant criterion.

The *time period* during which stress occurs is the third criterion, leading to the distinction between chronic (i.e., long-lasting stress exposure and responses) and acute stress.

Last but not least, when observing the *extent of influence* (fourth criterion), one can distinguish between stress that affects an individual (e.g., caused by a serious disease) and stress that is experienced by a collective (e.g., caused by a natural disaster or increased by media coverage).

3.2 Stress theories, models, and research approaches

3.2.1 Stressors: Stimulus-based approach

Stressors can be defined as all environmental demands which are followed by the onset of a stress reaction. Whenever situations or demands require an adaptation and the affected person perceives meeting the respective demand as subjectively important but uncertain, these demands/situations are defined as stressors (e.g., Kaluza, 2015). Concerning the question, which characteristics of stressors have an impact on the occurrence and intensity of stress responses, it is postulated that unknown, ambiguous, unpredictable and uncontrollable situations are very likely to lead to stress reactions (Busse et al., 2006; Kaluza, 2015).

Based on the context, stressors can be categorized as physical stressors (noise, lightning), social stressors (conflicts with friends, relatives), ecological/environmental stressors (long way to work, scarcity of housing), economic stressors (financial worries), occupational/work-related stressors (work overload), and monotony (monotonous work, stimulus satiation) (Bodenmann & Gmelch, 2009).

The health psychologist and stress researcher, Gert Kaluza (2015) states that, by now, the most influential stressors are performance-related stressors (e.g., time pressure on top of the

ranking of stressors) and social stressors, which are assumed to have complex, contemporary socio-cultural backgrounds (such as the change of the work environment in western countries, the disappearance of (family) traditions, etc.).

As mentioned above, for situations/demands becoming stressors and for the following stress reaction, the person's perception is highly important. Nevertheless, stimulus-based stress concepts focus more on the stressor itself, assuming that a certain stressor will lead to a specific stress response, without considering individual differences⁹ (see Lazarus & Launier, 1981). One of the most well-known stimulus-based stress theories that focus on the occurrence of so-called major or critical life events is the life event theory by Holmes and Rahe (1967). Within the scope of a study with 400 participants, who rated 43 life events according to their life-changing effects and related required adaptations (measured in so-called Life change Units, LCUs), Holmes and Rahe developed a weighting scale for critical life events, the Social Readjustment Rating Scale (SRRS). With the help of the SRRS and its weighting of the stress-eliciting extent of critical life-events, one can identify the individual stress level by adding the LCUs. Holmes and Rahe conceptualized 300 LCUs as critical limit, which exceeds every possibility for adaptation and leads to illness.

Besides major life events (also called macro stressors) or chronic stressors (such as diseases or housing situations), another important category of external stress stimuli are micro stressors or *daily hassles*. Daily hassles are day-to-day difficulties and adversities (i.e., everyday stressors) that, if cumulated or long-lasting, can lead to somatic and mental health symptoms. By now, diverse research studies could show that these everyday stressors are even more influential with regard to mental and somatic health than major life events (see Kaluza, 2015). However, it is important to note in this context, that major life events can also manifest themselves in daily hassles and thus are not clearly separately observable (Davison & Neale, 1998; Filip, 1995).

Criticism regarding stimulus-based stress models is based on the repeatedly empirically corroborated assumption that specific stress situations have different impacts on different individual persons: Research has indicated that stressful life events might not account for too much variability (9-10 % according to Holahan, Moos, & Schaefer, 1996; Somerfield & McCrae, 2000) in physical and psychological consequences to stress exposure. In this context

⁹ Which are not neglected completely but do not play a role in the corresponding research approaches.

it is deemed necessary that individual differences, characteristics, abilities, and resources are considered to a greater extent in the emergence of stress, also in light of enhancing resistance to stress.

3.2.2 Stress response: Physiological response-based approach

Although Hans Selye is seen as the “founder” of empirical stress research (see section 3.1), Walter Cannon was the first (1930s) to explicitly examine how humans and animals physically react to danger. He elaborated the concept of homeostasis, assuming that a stress stimulus elicits a deviation of the homeostasis (i.e., bodily steadiness), whereas the physiological stress reaction aims at restoring the initial steady state. Within the scope of his research, he discovered that a sequence of endocrine and neuronal reactions was initiated in dangerous/noxious situations, which enable the body to defend itself or to flight. Accordingly, Cannon termed this stress reaction fight-or-flight response (Lazarus, 1993; 2006; Schandry, 2006; Zimbardo & Gerrig, 2004).

As mentioned in the introductory section 3.1, Selye (1957) discovered in laboratory experiments with rats that living bodies react to different noxious agents or, in other words, stress stimuli (e.g., heat, hunger but also psychological and social stressors) with similar physiological reactions (which are unspecific with regard to the eliciting stimuli) (see also Schandry, 2006). In all cases, he observed (1) an enlargement of the adrenal cortex (2) a strong shrinkage of the thymus, the central control organ of the immune system and (3) serious gastric and intestinal ulcers. On this basis, he postulated a syndrome of the body’s response to every kind of harm and defined this syndrome of stress-related bodily changes as *general adaption syndrome* (GAS). The GAS consists of three stages, *alarm reaction*, *resistance*, and *exhaustion*.

The alarm reaction

When confronted with a new situation, the incoming sensory information converges in the thalamus, the brain’s first corridor, where a first vague picture of the situation is formed. The information is further processed to the cerebral cortex, where it is compared to previous situations/memories and rated regarding its threatening character. If a threat is perceived, the

amygdala¹⁰ is activated, eliciting emotions such as anger and anxiety and initiating the physiological stress reaction (Kaluza, 2015).

The hypothalamus, which is involved in numerous emotional responses, plays a central role during the stress reaction (therefore also called “stress center”): First, it controls and regulates the autonomic nervous system and secondly, it activates the pituitary gland.

The bodily processes during the alarm reaction take place via the combined actions of the sympathetic nervous system and the endocrine system on two physiological stress axes (Kaluza, 2015; Lazarus, 2006; Schandry, 2006; Selye 1957; 1979; 1981; Zimbardo & Gerrig, 2004):

1. Sympathetic nervous system: Sympathomedullary pathway

The hypothalamus activates the adrenal medulla via the autonomic nervous system or more precisely via the sympathetic nervous system¹¹. In the adrenal medulla, the two hormones adrenaline and noradrenaline are released into the bloodstream. Adrenaline and noradrenaline enhance the functioning of various inner organs. Thereby, for example, the heart rate and the blood flow in the muscles are increased as well as energy is provided to effectively fight the stressor. Further related bodily changes are illustrated in Figure 2.

2. Endocrine system: Hypothalamus-pituitary-adrenocortical (HPA-)axis

The hypothalamus-pituitary-adrenocortical axis serves particularly the purpose of releasing glucocorticoids which are important for providing energy (see below). For this purpose, the hypothalamus releases the corticotropic releasing hormone (CRH) to activate the pituitary, which in turn releases the adrenocorticotrophic hormone (ACTH). ACTH plays an important role within the physiological stress reaction as it stimulates the adrenal cortex to secrete corticosteroids (more precisely glucocorticoids) such as cortisol. As mentioned before, the glucocorticoids are crucial for the provision of energy (which is important to deal with the stressor). They initiate, for example, the release of glucose from the liver. Beyond that, glucocorticoids have an immunosuppressive effect (after a short, 30-60

¹⁰ If a sign of danger is identified already in the thalamus, the stress reaction can be initiated directly via the amygdala without the contribution (i.e., precise checking) of the cerebral cortex, resulting in a knee-jerk stress reaction.

¹¹ The second branch of the autonomic nervous system, the parasympathetic nervous system, is the antagonist the sympathetic one: it regulates regenerative processes and plays an important role after the acute stress reaction/alarm reaction.

minutes increase of the immune response) and can influence the emotional state as well as cognitive processes (learning and memory) via brain receptors. Apart from initiating the release of glucocorticoids, ACTH also stimulates different organs to release approx. 30 other hormones, which contribute essentially to the alarm reaction and thereby to the adaption of the organism.

In the scope of the alarm reaction, the described release of different hormones (via the two stress axes) serves different purposes: As already mentioned, the blood flow in the muscles and the brain is increased by redirecting it from other parts of the body. Beyond that, glucose and fatty acids are mobilized and released into the bloodstream to provide energy. Sensory processes like vision and hearing are sharpened and alertness is increased. Finally, immune reactions are temporarily suppressed and restorative processes as well as routine maintenance functioning (e.g., digestion) are reduced (Cooper & Quick, 2003).

Figure 2 gives an overview of the bodily changes related to the stress reaction that are caused by the described processes on the two stress axes.

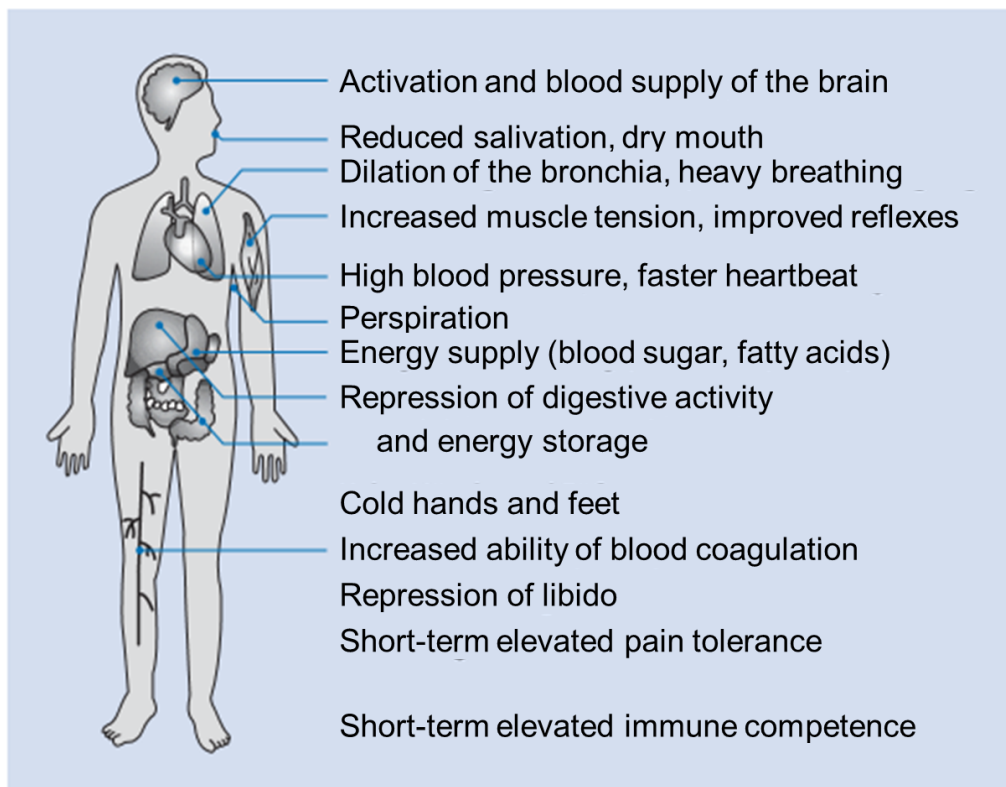


Figure 2. Bodily changes related to the stress reaction (adapted from Kalzua, 2015, p. 19)

The stage of resistance

Usually, a stressor and the related alarm reaction are followed (after effective coping/adaption or disappearance of the stressor) by a phase of recreation, in which the physical changes regress again. This phase of recreation is normally initiated by hormonal feedback loops, assessing the concentration of cortisol in the bloodstream and accordingly inhibiting the release of CRH. However, whenever a stressor persists, the alarm reaction is followed by a stage of resistance with the purpose to further stand up to the perceived stressor. While the alarm reaction represents a stage of increased activation and energy to effectively fight the stressor (and to preserve physical integrity), the stage of resistance is characterized by a state of moderate activation/arousal (Busse et al., 2006, Zimbardo & Gerrig, 2004). In this stage, the ability to resist the specific, current stressor is particularly high but the ability to stand up against other kinds of stressors decreases.

While the hormones (CRH, ACTH, noradrenaline, adrenaline and cortisol), which are released in the course of the alarm reaction are effective to temporarily fight the stressor, they can have harming effects and “pose a risk to health if they are sustained over a prolonged period, or elicited frequently or at a high intensity.” (Cooper & Quick, 2003, p. 7). On the long run, ACTH, for example, damages the ability of natural killer cells to fight cancer cells and infection, whereas increased amounts of glucocorticoids can lead to hypertension, damages in muscular and hippocampal tissues, infertility, growth inhibition, weakening of the immune system, and diabetes. Dysregulations in the CRH-system are assumed to contribute to the development of cognitive and emotional dysfunctions. (Schandry, 2006; Zimbardo & Gerrig, 2004). The short-, medium-, and long term consequences of stress on the body or somatic health, respectively, are further addressed in section 3.3, in combination with cognitive, emotional, and behavioral consequences.

If the stage of resistance persists for a longer period of time, the organism can lose its ability for self-regulation. This means it is not capable to return to the initial level of relaxation - even if the stressful conditions are not existent anymore - but remains in a state of elevated arousal/activation (with elevated hormonal levels) that can have serious health consequences (Kaluza, 2015). These aspects are particularly important considering that numerous people live in states of chronic, long-lasting stress (Zimbardo & Gerrig, 2004).

The stage of exhaustion

If a stressor continues impacting a person who is in the stage of resistance over a long period of time and an effective adaption is not possible, the stage of exhaustion is entered. In this

stage, the energy for adaption is exhausted and decreases below the base level. Serious organic diseases such as heart attacks or intestinal ulcers may be the consequences. At worst, the state of exhaustion can lead to death.

Even if Selye's work has aroused the scientific interest in the construct stress and has given impulses to further empirical stress research, the strong focus of his stress model on the bodily stress reaction and the related paradigm of unspecificity of the GAS have also been repeatedly criticized: "Selye's work has been criticized as simplistic, because it has taken a general view of stress reactions, limited itself to physical stressors and underplayed psychological considerations, particularly the role of intervening psychological states." (Thompson, 1992, p. 148). The biggest issue of criticism was Selye's neglect of the emotional meaning of the noxious agents, which elicit the stress response, and the neglect of any kind of cognitive mediation between stressor and (bodily, emotional and behavioral) stress reactions. Particularly relevant for this discussion were findings from Mason et al. (1976), who observed that, when animals and humans were exposed to physical stressors without perceiving threat or harm, the physiological stress reaction was very low to non-existent. The presumably mediating cognitive processes between stress stimuli and the perception of and reaction to stress were emphasized as the main focal point within transactional stress models, which are described in the following.

3.2.3 Stress as transaction between person and environment: Relational approach

The fact that different persons react differently to certain stressors suggests that there are individual processes and structures that make a potential stressor become an active stressor for the respective person. The importance of these individual factors for the intensity of the stress reaction and an effective adaption is emphasized in psychological (cognitive) stress research. This research approach presumes that the occurrence of a stress reaction and its intensity depends on the combination of stimulus/environmental conditions and person, i.e., the interaction of persons and their external environment (Lazarus & Folkman, 1984). Accordingly, the cognitive theory of stress can be described as relational and process-oriented (Folkman, 1984). According to the relational or more precisely transactional stress model of Richard Lazarus, by now the most scientifically acknowledged relational stress model (Aldwin, 2007), a person perceives stress if he/she assesses the challenges or demands arising in a situation higher than his/her own resources for adaption. The term

transactional/transaction describes the reciprocal interaction of person and environment within the emergence of stress, which means that, on the one hand, conditions of the external environment influence the cognitions, emotions, and behavior of a person and, on the other hand, the behavior of a person influences its environment (Aldwin, 2007; Kaluza, 2015). The model contains two major factors that decisively influence stress:

- 1 Cognitive appraisal: Assessment of the demands/challenges of a situation in relation to one's own coping abilities.
- 2 Coping: Attempts of the person to overcome the situation and to meet the demands/challenges that are being faced.

3.2.3.1 Appraisal processes in the transactional stress model

A person's cognitive appraisal of a situation, of the demands during that situation, and of the individual resources/possibilities for adaption decides if a situation or a stimulus becomes a stressor for a person or not. Lazarus (e.g., Lazarus, 1993; 2006; Lazarus & Launier, 1981) distinguishes between three categories of appraisal processes: primary appraisal, secondary appraisal, and reappraisal.

Primary appraisal

Primary appraisal comprises the relevance of an event or a situation for a person's well-being. The actual event or situation may be assessed as irrelevant, benign-positive or stressful (Folkman, 1984; Lazarus & Launier, 1981). A person will assess an event as irrelevant, or neutral, if the event does not have any significance for the person's well-being. An event is assessed as positive or desirable if a person feels secure and confident in dealing with the respective situation, no adaptations are required and only positive consequences are signaled.

Situations are appraised as stressful if they involve *harm/loss*, *threat*, or *challenges*, whereas in all three forms, the current or future well-being is perceived as negative (Lazarus, 2006; Lazarus & Folkman, 1984; Lazarus & Launier, 1981):

- 1 Harm/loss: This stressful appraisal is related to an event that has already occurred, such as a bodily injury or bereavement.
- 2 Threat: A potentially harmful event or a loss is expected in the future. This appraisal may often overlap with harm/loss, for example if a current harmful event such as an accident with severe injuries leads to lengthy and potentially painful treatment in the future.
- 3 Challenge: A situation and corresponding future demands are associated with endeavor and efforts, and an opportunity for gain, mastery, and/or growth is anticipated.

To summarize, a situation is appraised as stressful if a person perceives it as being relevant for his/her well-being, whilst it is either appraised as harm/loss experienced in the past, a threat of well-being in the future, or a future situation that might provide gain or growth.

Secondary appraisal

According to Lazarus and Launier (1981), the main difference between primary and secondary appraisal refers to the subject of the appraisal process with secondary appraisal referring to the coping resources and options. Secondary appraisal does not necessarily need to chronologically follow primary appraisal as it is possible to assess coping abilities required to deal with a situation even if this situation has not occurred (yet) or is not anticipated. Mostly, however, the appraisal of a person's individual coping possibilities takes place once an event or a situation has been assessed as stressful.

In the context of secondary appraisal an individual person thus assesses which possibilities and resources are available to cope with the occurred or expected event. These resources may either be of psychological (e.g., self-esteem), physical (e.g., fitness), social (e.g., emotional and informational support) and/or material (e.g., money) nature (Folkman, 1984).

Moreover, secondary appraisal is important for the development of primary appraisal processes (Lazarus & Launier, 1981). For example, the primary appraisal of a situation or an event as threat may be mitigated by the appraisal that sufficient coping possibilities are available.

Reappraisal

As interactions and relations between persons and environment constantly change, it is required to consider new information within the appraisal processes so that a person's behavior remains adaptable (Lazarus & Folkman, 1984; Lazarus & Launier, 1981). These continuous repetitions of the cognitive processes of primary and secondary appraisal are referred to as reappraisal.

Defensive reappraisal, a specific form of reappraisal, may be applied if a person appraises an event as a threat and coping possibilities are assessed as insufficient to deal with the expected demands. In the context of reappraisal, the person may, for example, deny the threat and appraise the event as desirable or irrelevant. Hence, reappraisal may contribute to sustaining the adaptability of a person's behavior when new information is taken into consideration, but it may also prevent that a person actively and purposefully deals with occurring situations (Hering & Beerlage, 2004).

3.2.3.2 Coping processes in the transactional stress model

In addition to the above described appraisal processes, coping processes are the second core component of the transactional stress model of Lazarus. Lazarus and Launier attach great significance to these in the context of current and future perceptions of stress: “There are intuitive and empirical reasons for the assumption that the respective form of how people cope with stress is more important for one’s morality of life, social adaptability, and health/illness than the frequency and severity of episodes of stress themselves.” (translated according to Lazarus & Launier, 1981, p. 241).

In this context, coping is defined as the entirety of behavioral and intrapsychic efforts undertaken by a person to deal with demands from the environment, one’s own demands, and the conflicts between these types of demands that strain or exceed a person’s resources. Thereby, coping is conceptualized independently by its effect or outcome, respectively, meaning that coping does not necessarily imply managing or succeeding (Folkman, 1984; Lazarus & Launier, 1981). Beyond that, coping is defined as a contextual state, meaning that the respective applied coping style depends on the nature of the stressful situation. More precisely, coping is seen as a dynamic process that continuously changes dependent on changing demands and changing appraisals of the situation (Holahan, et al., 1996; Lazarus 1993, 2006).

In contrast, dispositional approaches of coping postulate a trait definition in the form of habitual coping styles that are stable over times and situations (e.g., Miller 1987).

Integrative approaches, which are accepted by the majority of researchers in the field, assume applied coping styles to be the combination of both, personal preferences and situational factors (see Aldwin, 2007; Holahan et al., 1996).

Coping efforts may start off at the external environment, the individual person, or at both aspects jointly. Depending on their *function*, they may aim at either changing the person-environment-relationship (problem-focused or instrumental coping) or at regulating the emotions of the individual person (emotion-focused or palliative coping; Lazarus & Launier, 1981).

Problem-focused coping directly addresses the stress-inducing event and aims to change it. A person may either achieve this by changing the environmental conditions (e.g., seeking instrumental support of friends or colleagues) or by changing own habits (e.g., changing the sleep cycle to be more motivated and capable in the morning).

In contrast, emotion-focused coping addresses the emotions of an individual person that arise in response to a stress-inducing event. Lazarus and Launier (1981) describe stress emotions such as fear, guilt, anger, sadness/depression, envy, and jealousy as painful and agonizing. The coping efforts of a person on this level aim at mitigating or dissolving such aversive emotions. This may be achieved by active relaxation, seeking emotional support, acceptance, or similar. Like problem-focused coping, emotion-focused coping may unfold its impact at the person itself (for example in case of acceptance) or the external environment (for example cultivating friendships).

Figure 3 shows the cognitive processes according to the transactional stress model by Richard Lazarus.

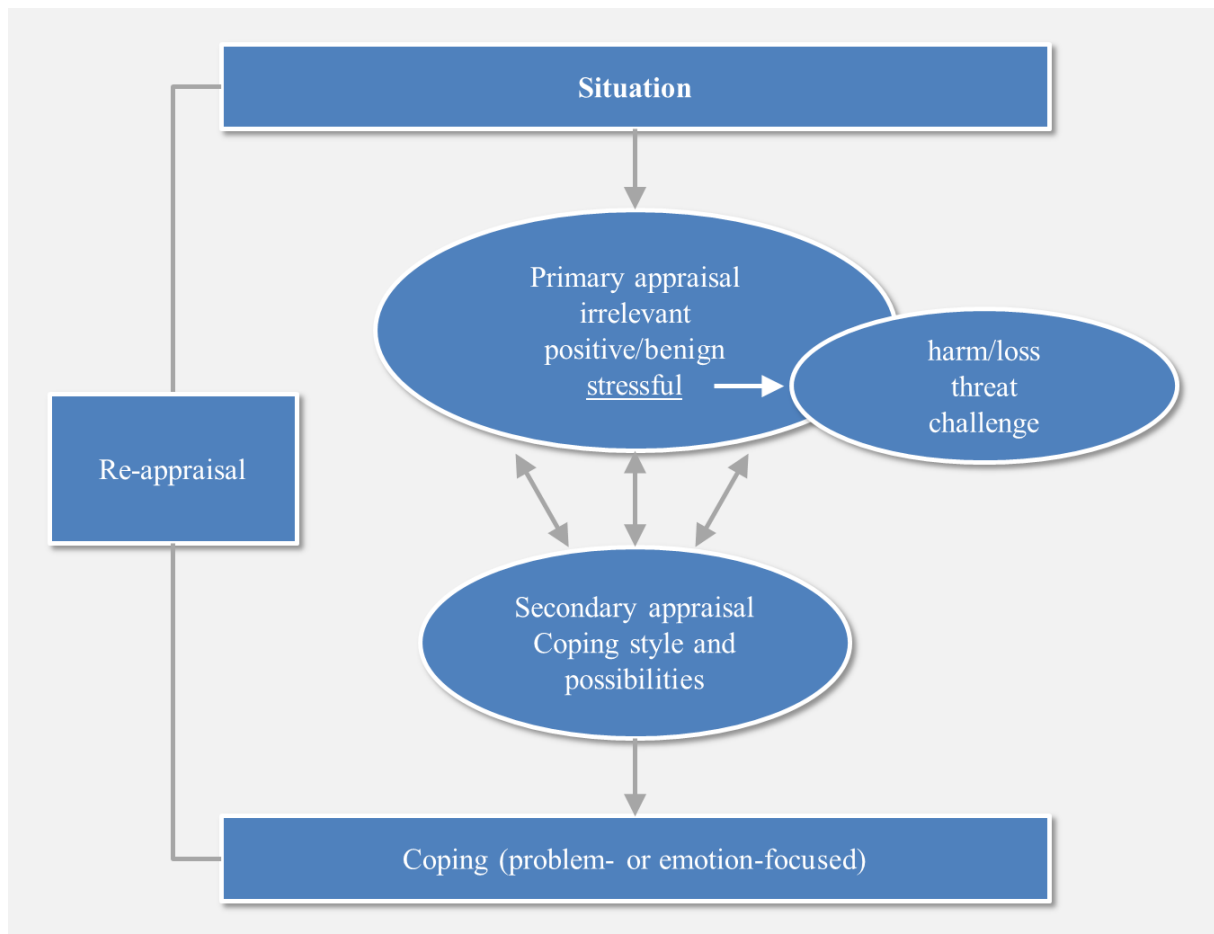


Figure 3. Lazarus' transactional stress model (adapted from Bamberg et al., 2007, p. 9)

3.2.3.3 Further coping theories and classifications

As touched upon above, coping is defined as “cognitive and behavioral efforts to master, reduce, or tolerate the internal and/or external demands that are created by the stressful transaction” (Folkman, 1984, p. 843). Thereby, coping efforts can aim at adapting oneself to

the stressor (assimilation) or at actively changing the environmental stressful conditions (accommodation; Bodenmann & Gmelch, 2009).

With regard to coping resources, personal and social resources are distinguished: Personal resources are conceptualized as relatively stable cognitive and personality characteristics that influence the coping and appraisal process, comprising hardiness, optimism, self-efficacy, sense of coherence, and internal locus of control (Holahan et al., 1996). Social coping resources comprise functioning relationships and emotional support or instrumental aid/informational guidance from family, friends, colleagues and supervisors.

As described in section 3.2.3.2, one way to classify¹² coping strategies is to distinguish them according to their function. Consequently, they are categorized either as problem-focused strategies (aiming at changing the person-environment-relationship) or assimilative, emotion-focused strategies (aiming at changing the interpretation or directly the related emotions). Studies showed that both kinds of coping styles were used in highly stressful conditions but that the usage of problem-focused coping strategies increased in conditions that were perceived as changeable (i.e., holding the potential for control) whereas the usage of emotion-focused strategies increased in situations that were perceived as not amenable to changes (e.g., Folkman, 1984). Accordingly, it is theoretically assumed that problem-focused coping strategies are rather effective in at least partly controllable stressful situations, (where they can actually make a difference) whereas emotion-focused coping strategies are more useful in dealing with uncontrollable stressors (such as incurable diseases) (Zimbardo & Gerrig, 2004). However, it is also understood that problem- and emotion-focused coping might work together in effectively dealing with particularly troubling stressors, as handling heightened emotions is necessary for effectively applying problem-focused strategies. Accordingly, it was shown that in most stressful situations both kinds of coping styles, emotion- and problem-focused coping, were applied. (Folkman, 1984)

Another common approach to classify coping styles is to categorize them according to their focus (i.e., a person's orientation in response to a stressor) as approach or avoidance coping. Approach coping describes attempts to actively approach the problem/stressful condition and to resolve it, whereas avoidance coping implies to avoid dealing with the stressor (Holahan, et

¹² It has to be noted that this section cannot cover all existing coping classifications, as there is large variety. Therefore, a selection was made according to the relevance of the different coping types and classifications for this dissertation project.

al., 1996). The fact that there is an overlap (conceptual as well as regarding the measurement) between avoidance and emotion-focused coping (Holahan et al. 1996) poses a problem to the adequate examination of the effectiveness of emotion-focused coping strategies (which is further described in the next section).

Focusing on the enhancement of stress management competence in the field of health psychology, Kaluza (2015) distinguishes between three kinds of stress management/coping strategies: Instrumental stress management (similar to problem-focused coping) tackles directly at the stressors. Mental stress management strategies (similar to emotion-focused coping) aim at critically questioning cognitive patterns or appraisals (i.e., personal stress intensifiers), which potentially increase perceived stress. Regenerative stress management strategies (such as relaxation techniques) aim at mitigating negative consequences of the stress reaction, but can also enhance the capability of resistance to stressors and thereby also have preventive effects.

The kind of coping strategies that aim at preventing negative stress consequences are considered in the coping model of Schwarzer and Knoll (2003) as a distinct category. The authors classify coping considering two dimensions: past versus imminent harm and certainty versus uncertainty. Consequently, they distinguish between reactive, anticipatory, proactive and preventive coping.

3.2.3.4 Coping effectiveness

Even if Lazarus and Launier (1981) defined coping explicitly independently of its outcome, the question about coping effectiveness has been repeatedly examined in research (see Aldwin, 2007; Somerfield & McCrae, 2000).

Coping is assumed to moderate (or mediate, if situational conditions are assumed to influence the kind of strategy used) the relationship between stress and health and corresponding empirical indications exist for both kinds of interactions (Aldwin, 2007; Holahan et al., 1996).

The question which kind of coping styles is the most effective in mitigating or buffering negative consequences of stress on health appears to be important with regard to preventive health programs. In studies examining this issue, problem-focused coping was repeatedly associated with better mental health (even if there were contradictory results, as well; cf. Aldwin, 2007), and emotion-focused coping was rather associated with ill mental health (Holahan et al., 1996). However, according to Aldwin (2007), these findings may be caused by the numerous methodological inaccuracies and imperfections in coping research. To begin

with, one needs to recall that the effectiveness of a certain kind of coping styles is assumed to depend on the nature of the stressor (controllable vs. uncontrollable situations; Zimbardo & Gerrig, 2004) or the kind of stressful situation respectively. Therefore, situational characteristics always have to be taken into account when making statements about the effectiveness of (a kind of) coping strategies. Related to that and as mentioned above, research indicated that persons tend to make more use of problem-focused coping strategies in at least partly controllable situations whereas in uncontrollably appraised situations, emotion-focused strategies might be applied more frequently (Folkman, 1984). This could also lead to the assumption that the use of emotion-focused coping strategies is confounded with the experience of rather uncontrollable stressors and was therefore repeatedly associated with mental health symptoms. Another crucial point to consider if one wants to examine which kind of coping strategies is more effective with regard to mental health (in certain situations), is the prevention of an overproportion of presumably dysfunctional coping strategies within the assessment of the emotion-focused coping construct. Measuring instruments for emotion-focused coping often additionally contain strategies that are based on avoidance behavior. This might be critical as the effectiveness of emotion-focused coping strategies such as cognitive restructuring or acceptance is likely to be underestimated due to the intermixture with avoidance-oriented coping strategies such as alcohol consumption.

In this context it has to be noted that numerous authors found a three-factor-structure of coping, distinguishing between emotion-focused, problem-focused, and dysfunctional or avoidance-oriented coping strategies (e.g., Endler & Parker, 1990). With this in mind, it seems recommendable to use more distinct measures of coping to prevent that the function (emotion- or problem-focused) of coping styles is (incorrectly) concluded to influence the effectiveness when actually the focus (approach or avoidant) or the fit of situation, person and strategy (see Aldwin, 2007) do.

Beyond that, there are new research approaches assuming that the overall pattern of coping styles of a person might be more predictive in terms of health than a specific category of coping strategies. In this context, the flexibility to assess which coping strategy is adaptive in a certain situation and to effectively apply it, is assumed to play the most important role (termed *coping flexibility*; Aldwin, 2007; Cheng & Cheung, 2005).

3.2.4 Stress in occupational psychology

As set out above (see section 3.1), in the 1970s, the mechanical stress-strain-concept was further elaborated and transferred to the field of human work, not only considering physical

stress (stimuli) but additionally considering psychosocial stress and its short- and long-term physical and mental consequences. Thereby, the area of application of the stress-strain-concept was enlarged, additionally comprising mental stress and strain (Sonntag et. al, 2012). By now, individual factors influencing the stress-strain-relationship such as abilities and resources are also considered in work and occupational psychology.

The International Organization for Standardization (ISO) defines mental stress and mental strain within the international standard “Ergonomic principles related to mental workload - Part 1: General concepts, terms and definitions” (ISO 10075:1991). Therein, mental stress is defined as the entirety of all assessable influences, which come up to a person from the external environment and affect the person mentally. Mental strain, on the other hand, is defined as the direct consequence of mental stress on the individual person, depending on the respective outlasting and current preconditions including individual coping strategies.

Similarly to other kinds of stress models and theories, work-related and occupational stress models can focus either on environmental stress stimuli (i.e., the (psychosocial) work environment), on the response component (i.e., short- and long-term consequences of work-related stressors), or on the interaction (or more precisely transaction) between person and environment (i.e., between employee and work place conditions). To date, one of the most acknowledged and applied occupational stress models, which can be classified as adopting a stimulus-based approach, is the demand-control(-support) model by Karasek and Theorell (1990). It postulates that high demands at work combined with low possibilities for control (and low levels of received support from supervisors and colleagues) will lead to mental and somatic strain. Similar to criticism regarding other rather stimulus-based models of stress, the model’s focus on only work-related environmental conditions and its neglect of individual factors, resources, and coping abilities has been criticized (Peter, 2002, Van der Doef & Maes, 1999). Acknowledged models that additionally consider individual components in the stress process are the person-environment fit (PE fit) model (Caplan, 1983; Caplan & Harrison, 1993) and the effort-reward imbalance model (Peter & Siegrist, 1999; Siegrist, 1996). The PE fit model postulates that misfits between the abilities and needs of employees on the one hand and demands and supplies at the work place on the other hand will result in stress and lead to negative mental and somatic health consequences. The effort-reward imbalance model states that an imbalance between the employee’s perception of invested effort (related to demands, responsibility, and obligations of the work environment) and perceived rewards (e.g., money, esteem, career opportunities) causes strain. An individual component which has an important

influence on this relationship of effort and reward is the motivational pattern of excessive work-related overcommitment (defining a set of emotions, behaviors and attitudes; Peter & Siegrist, 1999; Siegrist, 2010).

Nevertheless, even if Karasek's and Theorell's demand-control(-support) model of job stress follows a stimulus-based approach, it should be respected as an important model for examining the psychosocial work environment, which has been shown to have important effects on mental strain and health. The model is further described in the following section.

3.2.4.1 The Demand-Control-Support model of job stress

The demand-control(-support) model (Karasek & Theorell, 1990) implies that a balance of the three dimensions will cause higher levels of job satisfaction whereas an imbalance (high demand, low control and low support) will lead to stress and strain (e.g., burnout). While Karasek (1979) initially operationalized *high job strain* as resulting from high demands while having low control, the later version of the model includes additionally the dimension *support* (from co-workers as well as superiors; Johnson, Hall & Theorell, 1989). Work-related stress measured with the Job Content Questionnaire (JCQ; Karasek, Brisson, Kawakami, Houtman, Bongers, & Amick, 1998), which was developed based on the demand-control-support model was shown to be associated to job-related illness (e.g., coronary heart disease, musculoskeletal disease, and reproductive disorders; Karasek & Theorell, 1990) and psychological distress (overview in Van der Doef & Maes, 1999). The possible combinations of demands and control at the workplace can be visualized with a simple diagram showing four prototypical work environments (Figure 4). According to the model, work environments which fall in the *high-strain quadrant* (high demands, low control) result in adverse consequences whereas active jobs with high demands and high control facilitate learning and developing of new skills (Van der Doef & Maes, 1999).

However, assumptions about how demands and control (and support) are related concerning their influence on health are diverse. The so-called *strain hypothesis* claims that a *high strain job* causes the largest amount of distress and physical illness compared to other job types. Whereas this hypothesis mostly follows an additive approach of demands and control, the *buffer hypothesis* states that the effects of demands can be moderated by control. In this case, high levels of control could act as a buffer and reduce the negative effects of high demands. When adding the dimension support, social support might either function as the moderator of *high strain* (buffer hypothesis) or have an additive (positive) effect on health (*iso-strain hypothesis*, describing that the highest stress is experienced in work environments with high

demand, low control and low support (isolation)). There is considerable empirical support for the strain hypothesis whereas the buffer hypothesis was not as often replicated. Concerning the hypotheses including the dimension support, due to the few and inconsistent results, no definite conclusions about the functioning of support in the model can be drawn (Van der Doef & Maes, 1999).

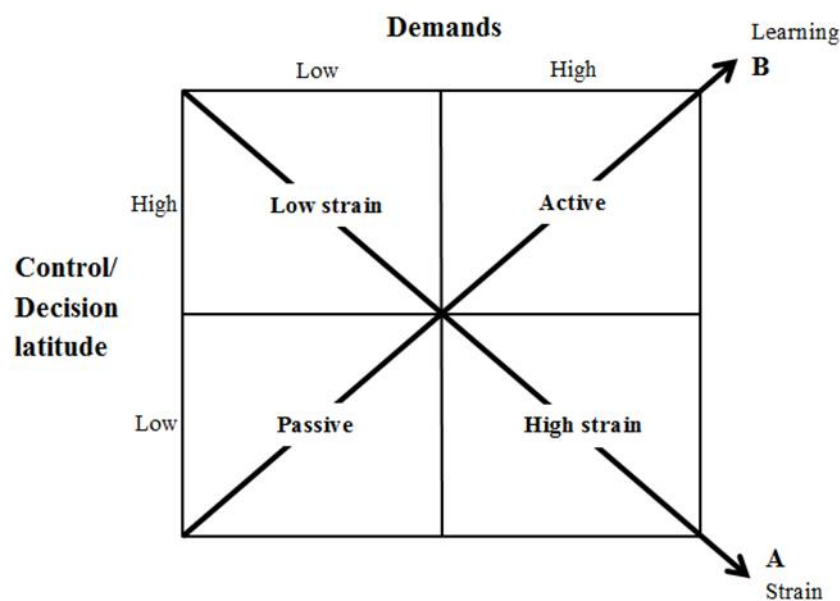


Figure 4. Type of work environments defined by the combinations of demand and control (adapted from Van der Doef & Maes, 1999, p. 88)

Within the demand-control-support model, demands are considered in the sense of psychological demands such as high work load, time pressure, and conflicting demands, as well as in the sense of physical demands. As outlined above, the dimension control also plays a crucial role in the model, as control is assumed to mitigate potentially stress-eliciting demands and to positively influence health. Consistent with this assumption, from the perspective of transactional stress models, personal control is assumed to influence the appraisal of coping resources and, thereby, to counteract stress (Folkman, 1984). However, in the demand-control-support model, control is defined in the sense of decision latitude at work. Decision latitude was shown to have a positive effect on health in different work settings (Van der Doef & Maes, 1999), though there is some doubt if it has a similar effect in work environments where possibilities for control are limited due to further environmental conditions as during the management of a disaster (Hering, Beerlage, & Kleiber, 2011). In complex situations where the scope of actions is limited even if having high decision latitude or where making decisions might be also related to an increased risk of having to justify for

wrong decisions with far reaching impacts (as during the management of disasters), the beneficial impact of decision latitude might be limited (Hering et al., 2011).

The variable *social support* is conceptualized in the demand-control-support model as “overall levels of helpful social interaction available on the job from both co-workers and supervisors” (Karasek & Theorell, 1990, p. 69). Social support (within the organization as well as in general) was repeatedly shown to impact the relation between experienced stress and the level of undesirable health consequences as well as job performance (Boren, 2014; Rhoades & Eisenberger, 2002; Upadhyay & Singh, 2014). As mentioned above, it is not clear which specific function social support has in the stress-strain-relationship (additive effect versus buffering). Regarding this question, there are different empirical indications and theoretical assumptions beyond the demand-control-support model (for an overview, see Cohen & Wills, 1985; Thoits, 2011): A lack of social support was identified as a stressor itself, having a main effect on mental symptomatology. Furthermore, (seeking) social support is considered as an important resource and stress management technique (Boren, 2014). In this context it was also shown that social support buffers the adverse psychological impacts of stress (e.g., caused by the exposure to critical life events) on mental and somatic health (Cohen & Wills, 1985). Even though no precise statement on how social support influences the relationship between stress and its adverse consequences can be made, it can be assumed that social support is one of the most important resources and has a beneficial effect on health.

3.3 (Health) consequences of stress

3.3.1 Short-term consequences of stress

Persons react to stress in different dimensions. As described in section 3.2.2, the physiological stress reaction results in observable manifestations such as a pounding heart, sweat, muscle tension, and so forth. However, on the emotional, cognitive and behavioral level, changes can be observed, too. As regards the emotional response, the amygdala elicits emotions like anger and anxiety that are part of the acute stress reaction (Kaluza, 2015; see section 3.2.2). Further cognitive-emotional, short-term stress manifestations are tensions, nervousness, hypersensitivity, lack in concentration, loss of energy and interest, feelings and thoughts of insecurity and of extensive demands, and impaired learning aptitude (Bodenmann & Gmelch, 2009). Further stress-related cognitive impairments concern the cognitive functions attention, memory, and judgement/decision making (Staal, Bolton, Yaroush & Bourne, 2008). Related

to these affected cognitive functions, also the cognitive performance is impaired, at least for high levels of stress¹³. For milder levels of stress, cognitive performance is enhanced up to a certain point, but if the stress rises further, it decreases rapidly. This u-shaped function of stress (arousal) and performance is called Yerkes-Dodson-Law after its founders Robert Yerkes and John Dodson (1908; see also Bourne & Yaroush, 2003).

Behavioral consequences of stress include irritability and aggressive behavior, shouting and crying, attacking people, frequent conflicts, (elevated) consumption of nicotine, alcohol, and pharmaceuticals, bad sensorimotor coordination, and carrying out tasks in an uncoordinated manner (Bodenmann & Gmelch, 2009; Wagner-Link, 2010).

3.3.2 Medium- and long-term consequences of stress

3.3.2.1 Somatic health

Stress can result in serious consequences for somatic health, as already touched upon in section 3.2.2. The fact that stress, or more precisely the stress-related, elevated cortisol levels, lead to a weakening of the immune system combined with a suppression of immune responses (such as fever) is particularly relevant in this context. This, in turn, leads to an increased susceptibility to infections and has a negative impact on the course of diseases such as multiple sclerosis, rheumatoid arthritis, skin diseases like psoriasis, herpes infections, as well as tumor diseases (for which the immune system/inflammatory processes play an important role; Kaluza, 2015; Peter, 2002; Schandry, 2004). One of the health consequences most frequently related to stress, for which the impairment of the immune system plays a crucial role as well, are intestinal ulcers. Beyond that, stress was shown to be related to diabetes (via elevated cortisol levels), to hypertension, as well as to vasoconstrictions/arteriosclerosis (via unmined energy in the form of glucose and lipids that block the blood stream). In this context, also coronary heart disease, manifesting itself in a reduced blood supply of the heart, and associated with that, myocardial infarctions/heart attacks have to be named as two of the most important stress-related, cardio-vascular diseases (Kaluza, 2015; Peter, 2002; Schandry, 2004). Figure 5 gives an overview of the most important somatic diseases which are caused (not exclusively) or influenced by stress.

¹³ Depending on the complexity of a task, e.g., for difficult problem solving tasks, a person's performance is assumed to be impaired already at relatively low levels of stress (Bourne & Yaroush, 2003).

Long-term consequences	
Brain	<ul style="list-style-type: none"> - Decrements in cognitive abilities (e.g., memory) - Cerebral infarction
Sensory organs: Eye, ear	<ul style="list-style-type: none"> - Intraocular pressure - Noise in the ear, tinnitus, acute hearing loss
Cardiovascular system	<ul style="list-style-type: none"> - High blood pressure - Arteriosclerosis - Coronary heart disease - Cardiac infarction
Musculature	<ul style="list-style-type: none"> - Headache and dorsal pain - Soft tissue rheumatism
Alimentary organs	<ul style="list-style-type: none"> - Disturbance in digestive functions - Gastro-intestinal ulcers
Metabolism	<ul style="list-style-type: none"> - Increased level of blood sugar/diabetes - Increased cholesterol level
Immune system	<ul style="list-style-type: none"> - Reduced immune competence towards infectious diseases, frequent infections - Adverse course of tumors, multiple sclerosis, rheumatoid arthritis
Pain	<ul style="list-style-type: none"> - Reduced pain tolerance - Increased experience of pain
Sexuality	<ul style="list-style-type: none"> - Loss of libido - Abnormal estrous cycle - Impotence - Disturbance of seed maturation, infertility
<p>Remark: This table lists the most frequently occurring physical diseases that can be caused or influenced in their course by long-lasting stress. This does not mean that the respective disease is caused exclusively (or in every case) by stress.</p>	

Figure 5. Stress and long-term somatic consequences (adapted from Kaluza, 2015, p. 39)

3.3.2.2 Mental health

Considering the mental health impairments associated with stress and the related consequences, the prevention and mitigation of stressors and the enhancement of stress management skills seem particularly important: Subjectively assessed in Europe, stress, depression, and anxiety are the second most frequent work-related health complaints (behind musculoskeletal disorders) and lead to long unproductive periods of time (Kippel & Walter, 2006).

In terms of mental disorders, two forms of stress-induced disorders can be distinguished. On the one hand, traumatic stressors or critical incidents are considered as causing the onset of

specific mental disorders, like Posttraumatic Stress Disorder (PTSD). This category of disorders is titled as “Trauma- and Stressor-related Disorders” (see below) in the diagnostic and statistical manual of mental disorders of the American Psychological Association (DSM-5; APA, 2013). In this category, having experienced one or more major stressors is an essential part of the diagnosis. On the other hand, stress (in its broader sense) is assumed to contribute to the onset of a number of mental disorders, within the scope of so-called diathesis-stress-models or more comprehensively, vulnerability-stress-models (based on Zubin & Spring, 1977; Nuechterlein, 1987). These models postulate that environmental conditions/stressors and a person’s vulnerability (i.e., the genetically/physiologically, mentally, and socially influenced stress tolerance limit) interact regarding the elicitation of mental disorders or episodes of these disorders, respectively. (Bodenmann & Gmelch, 2009; Plaumann et al., 2006). In this context, stress is assumed to contribute to the onset of episodes of mood, anxiety and obsessive-compulsive disorders, eating and sleeping disorders, sexual dysfunctions, and schizophrenia (Bodenmann & Gmelch, 2009; Schandry, 2004).

Also regarding mental disorders, the elevated activity of the HPA-axis (caused by severe or long-lasting stressors) plays an important role, considering that the involved hypothalamus has an impact on almost all vegetative functions (such as sleep and sexuality) as well as on emotional and cognitive processes (Schandry, 2004). In this context, it has to be noted that depression was repeatedly shown to come along with an overly activated HPA-axis, which is why it is acknowledged as one of the most important stress-related disorders. Researchers use the term *stress depression* when speaking of this kind of depression, caused by long-lasting or severe stress, and consider it as a prospective, wide-spread disease. According to a study of the World Health Organization (WHO), it is assumed to become the most frequent disorder world-wide besides cardio-vascular-diseases by 2020 (as mentioned in Kaluza, 2015). A stress-related syndrome that shows symptomatic overlaps with depression (and psychosomatic disorders) is the burnout syndrome. It is conceptualized as a state of exhaustion following chronic stress combined with somatic (e.g., headaches, back pain) and mental symptoms (such as depersonalization, reduced personal accomplishment or efficacy, cynicism; Maslach, Jackson, & Leiter, 1996). However, burnout does not constitute an independent diagnosis in today’s clinical classification systems so far, as its focus is more on specific eliciting conditions (such as chronic, work-related stress) rather than on distinct symptoms (Kaluza, 2015).

There are three¹⁴ main kinds of disorders categorized as “Trauma- and Stressor-related Disorders” in the DSM-5 (APA; 2013; see for detailed symptom criteria of the respective diagnoses): Acute Stress Disorder (ASD), Posttraumatic Stress Disorder (PTSD), and Adjustment Disorders (AD)¹⁵.

Both, the diagnoses of ASD and of PTSD require the exposure to a traumatic event (i.e., actual or threatened death, serious injury, or sexual violence). To be considered as a potential traumatic stressor, this event can have happened to oneself, or been witnessed happening to others, or in case of close family members or friends, it is sufficient to learn about such an event having happened to them. Experiencing repeated or extreme exposure to aversive details of suchlike events is also considered as potentially traumatic, thus also applying to first responders or others caring for victims of such events. Symptoms of PTSD and ASD are (1) involuntary, intrusive memories of the event, (2) avoidance of memories, thoughts, and external reminders of the event, (3) negative alterations in cognitions and mood associated with the event, (4) hyperarousal, and (5) dissociative symptoms such as depersonalization or derealization. ASD is diagnosed in the first month after experiencing a traumatic stressor if symptoms last for at least three days and up to one month. For a PTSD diagnosis, the symptoms must last for more than one month and the onset has to be during the first six months after the traumatic event (otherwise the subtype “with delayed expression” is diagnosed; APA, 2013). An adjustment disorder is characterized by emotional or behavioral symptoms in response to an identifiable stressor which occur within three months (from stressor-onset) and do not persist for more than six months after the stressor or its consequences have terminated. The experienced distress is out of proportion with regard to the stressor and serious functional impairments are observable on social, occupational, or other important areas of functioning (APA, 2013).

¹⁴ Further disorders falling in this category, which are not further described at this point, are: reactive attachment disorder, disinhibited social engagement disorder, as well as other specified and unspecified trauma- and stressor-related disorders (APA, 2013)

¹⁵ In the International Statistical Classification of Diseases and Related Health Problems (ICD-10; WHO, 1992), ASD, PTSD, and AD are categorized as “Reaction to severe stress, and adjustment disorders”.

4 Stress in Crisis Management – Current State of Research

4.1 Stress and leadership during crises – Persons of interest: Crisis managers

The management of disasters such as airplane crashes, terrorist attacks, or earthquakes and floods poses a special challenge to all forces involved including first responders like firefighters and rescue workers as well as crisis management leaders (Hadley et al., 2011), termed *crisis managers*.¹⁶ Disasters or public health and safety crises are defined as incidents with a relatively low probability of occurrence but a high impact and significance for the affected population, helpers, and crisis management professionals. They usually overwhelm local crisis management resources, threaten the public's well-being, health, and (feeling of) security, and cause severe infrastructural and financial damages (based on DIN 13050¹⁷; 2009; Hadley et al., 2011; Pearson & Clair, 1998). With regard to the relevant characteristics of stressors, disasters as unknown, uncontrollable, unpredictable, and ambiguous situations are assumed to cause particularly high levels of stress (see section 3.2.1). During disasters, there is a significant need for effective leadership (Hadley et al., 2011; Krüsmann & Butollo, 2006; Pillai & Williams, 2004). Potential failures might result in tragic consequences for the affected population as well as for crisis management personnel (Driskell & Salas, 1996; DuBrin, 2013).

Crisis leadership can be defined as “[...] the process of leading group members through a sudden and largely unanticipated, intensely negative, and emotionally draining circumstance” (DuBrin, 2013, p. 3). The duties and responsibilities of crisis management leaders within the scope of a disaster include risk and information assessment, judgment and decision making, implementation of emergency preparedness plans, provision and distribution of personnel and aid/psychosocial support supplies, mobilizing and coordinating first responders, leading and supporting subordinates, as well as identification of immediate needs of the affected community (Hadley et al., 2011; Monroe, 2009).

¹⁶ In this manuscript, the term *crisis managers* describes leaders and supervisors in the management of large-scale crises/disasters (see definition in section 2.3). The term *crisis management personnel* is used whenever first responders and crisis managers are referred to. The scope of the term *crisis and emergency management personnel* additionally includes personnel involved in the management/response of emergencies, such as paramedics.

¹⁷ norm of the German Institute for Standardization for rescue services

A lack of leadership skills resulting in poor leadership during crises may lead to serious consequences such as reduced system effectiveness and crisis management performance, compromised public safety, and increase of damages and costs (e.g., Salas et al., 1996). Advanced leadership skills and responsible leadership styles (e.g., ethical leadership; De Wolde, Groenendaal, Helsloot, & Schmidt, 2014), on the other hand, may create useful role-models, strengthen group cohesiveness, reduce stress, and mitigate its aversive consequences for crisis management staff (e.g., Krüsmann & Butollo, 2006; Pillai & Williams, 2004).

As the researchers Beaton, Johnson, Infield, Ollis, and Bond (2001) pointed out, poor leadership is not only associated with job dissatisfaction and burnout of staff/subordinates, but a perceived lack of leadership skills can also mean a stressor for the supervisors and managers themselves, especially in high-risk occupations. Accordingly, Halpern, Gurevich, Schwartz, and Brazeau (2009) showed, in their study with supervisors and front-line emergency medical technicians (EMTs), that skills, such as detecting stress among subordinates, providing social support, and acting as role-models in coping with critical incidents, were perceived as good leadership. Furthermore, the supervisors themselves experienced it as debilitating and stressful, whenever they were not able to recognize stressors and signs of stress among their staff.

Some research studies and professional recommendations address the topic of requirements regarding leadership in public health and safety crises and the corresponding necessary abilities of crisis management leaders (e.g., Beaton et al., 2001; Beerlage et al., 2008; Hadley et al., 2011; Krüsmann et al., 2006; Mitroff, 2007; Ungerer & Morgenroth, 2001).

Successful crisis managers are expected to have previous experience in working under pressure, to have taken actions to be prepared for crises, to take responsibility in critical situations, to have a realistic confidence in their own abilities, to remain focused, and to adapt to changing conditions (Adams, Dust, & Piccolo, 2013). In this context, transformational leadership styles are assumed to cause effective leadership performance in crises by enhancing self-efficacy of staff and group cohesiveness (Pillai, 2013; Pillai & Williams, 2004). Furthermore, self-management, individual responsibility, and skills in coping with stress in crises situations are seen as key competencies of crisis management leaders (Ungerer & Morgenroth, 2001).

Considering all of the above, the question arises why research examining specific stressors of crisis managers that may hinder effective leadership and performance in crises is still

fragmentary (Monroe, 2009; Ungerer & Morgenroth, 2001). As mentioned above (see section 2.3), most of the research regarding stress in crisis management focuses on first responders, emergency (medical) services personnel, or other kinds of disaster workers (such as firefighters, law enforcement or military personnel; as mentioned in LaFauci Schutt & Marotta, 2011; Monroe, 2009), whereas only few studies focus (additionally) on crisis managers (e.g., Brown & Campbell, 1990; Kirkcaldy, Brown, & Cooper, 1998; Regehr & Bober, 2005).

This dissertation as part of the research project PsyCris (see section 2) aims at closing this gap in research.

Across the next sections, previous research concerning stressors and psychosocial work environment as well as concerning stress management/coping and health consequences in crisis management is addressed. It has to be noted that most of the reported research was conducted with crisis and emergency management personnel (e.g., firefighters, law enforcement and emergency services personnel) in non-leading positions. However these research studies are deemed as relevant as most crisis managers hold leading positions in organizations such as fire service, police, and emergency service (see section 2.3, description of the target group). Beyond that, crisis managers often start from the positions of first responders in the field of crisis and emergency work, and thus might bear a similar risk because of earlier experiences. Therefore, members of these organizations (even if not in leading positions) are assumed to be the most comparable occupational population to crisis managers concerning work environment, stressors and related health consequences (Monroe, 2009).

4.2 Stressors in crisis management

During the management of a disaster, crisis management leaders are exposed to the same situational environment, i.e., to the same disaster scenario, as first responders. Furthermore, they belong to the same crisis management organizations and are confronted – depending on whether they work in an executive position on-site (e.g., incident commander) or in a strategic position (e.g., in a crisis management unit) – with more or less similar working conditions. Therefore, some stressors that arise from event-specific circumstances, occupational conditions, and organizational structures are also relevant for crisis managers. However, within this similar work environment, crisis managers have different duties and responsibilities than first responders, above all a particularly high level of decision-making- and managerial responsibility (Hadley et al, 2011). This encompasses potential resources such

as more control and decision latitude but also additional stressors such as higher responsibility for people and lives, and far-reaching and non-foreseeable consequences of failures.

The following section gives an overview of stressors occurring in the field of crisis and emergency management based on existing research about first responders, such as firefighters, rescue workers, law enforcement and military personnel. Potential and previously examined stressors and stress levels of crisis management leaders are addressed in particular.

There are different approaches on how to categorize stressors in emergency and crisis management: A relevant approach proposed by Fisher and Etches (2003) is the distinction between two categories of stressors, *traumatic workplace stressors* (e.g., dealing with victims of fire, accident or disaster, witnessing injury and death) and *systemic workplace stressors* (e.g., perceived lack of control, role ambiguity and conflict, severe work-life-conflict).

A similar approach is to distinguish between event-specific/critical incident stressors (e.g., demanding characteristics of the disaster environment, confrontation with severe suffering, injured, or dead persons), occupational stressors (e.g., time pressure, great responsibility, conflicting roles), and organizational stressors (e.g., conflicts with colleagues or supervisors, lack of recognition; e.g., Monroe, 2009). Wagner et al. (2001) distinguished between (1) *duty and occupation related strains*, (2) *confrontation with severely suffering, injured or dead persons*, and (3) *role dependent strains*. Bengel and Heinrichs (2004) consider stressors caused by (1) the *occupational structure*, (2) the *role and interaction structure*, and (3) the *organizational structure*. Concerning the specific stress on-site in the context of a disaster operation, frequently reported stressors are the following: the unpredictable, non-explainable, uncontrollable, and ambiguous character of the operation, difficult conditions of the environment like the impassability of the field, difficult weather conditions, noise, darkness, onlookers, time pressure, a risk of injury or danger to life of one's own or of colleagues, a high responsibility for affected people, and the (face-to-face) confrontation with victims (Wagner et al., 2001).

As several researchers pointed out, occupational (e.g., time pressure, conflicting roles) and organizational stressors (e.g., team conflicts) – although neglected in research for some time – have a considerable impact on the health and well-being of crisis and emergency management personnel (e.g., Murphy, Beaton, Pike, & Johnson, 1999); they are often perceived as more stressful than event-specific/critical incident stressors (Beerlage et al., 2008; Brown & Campbell, 1990, 1991; Regehr & Bober, 2005) or even better predictors for psychological

distress (Lieberman et al., 2002). Accordingly, it can be argued that crisis management personnel, who are (already) burdened by day-to-day occupational and additional organizational stressors (e.g., adverse organizational climate) are a risk group for the development of trauma-related symptoms in the scope of disaster missions (Beerlage et al., 2008). It has to be considered that crisis managers are usually involved in daily routines within their day-to-day work environment when they abruptly need to take action in the face of a disaster. In this context, it is assumed that ongoing concerns and organizational stressors form the basis to which critical incidents are added and can furthermore undermine resources for dealing with major incidents (Lieberman et al., 2002; Regehr & Bober, 2005).

Some studies indicate that stressors and stress levels differ depending on the positions and ranks of crisis management personnel within the organization (e.g., Brown & Campbell, 1990). As mentioned above, supervisor EMTs have been shown to experience it as stressful, whenever they are not able to recognize stressors and signs of stress of their staff (Halpern et al., 2009). A perceived lack of leadership skills in this context is assumed to be an additional stressor for crisis management supervisors and leaders (Beaton et al., 2001). Furthermore, Brown and Campbell (1990) showed in their cross-sectional study within the law enforcement field that the stressors reported by the police officers differed depending on their respective rank: “the constable ranks are more likely to feel stressed by time pressure and deadlines, long working hours, working with civilians, force or station politics; the sergeants by having to manage or supervise, working in isolation and lack of consultation; the senior managers by criticism from the media” (p. 314). Accordingly, Kirkcaldy et al. (1998) found in their study with senior police officers that supervisors, sergeants, and chiefs experienced the highest levels of stress within their organization. Regehr and Bober (2005) could show in their studies within the fire service that officers had significantly higher stress scores than frontline workers and also found a corresponding trend in the ambulance service. Based on those preliminary research findings, they assume that crisis managers, who belong to the middle management of their organizations, experience the most influential stressors and suffer to the highest extent from adverse consequences. Middle managers are involved (simultaneously) in the mission on-site as well as in strategic and supervisory duties. Besides, they are “sandwiched between upper management and workers and frequently must enforce decisions and policies that they did not make” (Regehr & Bober, 2005, p. 87f). Similarly, Brown and Campbell (1994) concluded from their examinations and the review of other studies that the rank of sergeants – meaning police officers in the middle management – experiences the highest combined stress score of occupational and organizational stressors.

Taken together, those findings may lead to the conclusion that crisis managers, related to their positions in crisis management, are at a particularly high risk to suffer from stressors, perceived stress, and adverse health consequences. However, it becomes apparent that in order to identify measures of stress management tailored to the needs of this target group, further research about the particular stressors and perceived stress level of crisis managers is necessary.

4.3 Stress related to the psychosocial work environment of crisis managers

As one of the most common models of work-related stress, the demand-control-support model developed by Karasek and Theorell (1990) has been previously applied for analyzing work-related stress of high-risk occupational groups involved in crisis and emergency management. As described in section 3.2.4.1, the model – based on the dimensions demands, control, and support – implies that work environments characterized by an imbalance of the three dimensions (high demand, low control, and low support) will result in somatic and mental strain.

Referring to Karasek et al.'s (1988) original study about job characteristics and myocardial infarction, where firefighters were placed in the upper part of the high strain quadrant (high demands, but less than average control; see Figure 4 in section 3.2.4.1), Murphy et al. (1999, p. 181) described the nature of firefighting as “a potentially ‘deadly’ high-strain occupational combination”. Drawing on the constructs of the model, Regehr and Millar (2007) reported in their mixed-methods study that emergency services personnel experienced their work environment as being high in demand and low in control and support.

On the other hand, general managers are placed in the active job category in Karasek et al.'s (1988) original classification, experiencing high demands, but also large possibilities for control. Regarding crisis managers involved in disaster operations, where possibilities for control are limited simply due to nature of disasters, this combination of demands and control might differ from the one experienced by managers in general. This study is amongst the firsts to examine the combination of demands and control in the work environment of crisis managers. Based on previous research, it is therefore not easy to hypothesize where in the demand-control-quadrant crisis managers would be placed, also considering that their “job description” is rather diverse: Compared to other occupational groups who are confronted with continuous, moderate to high levels of stressful demands potentially resulting in chronic stress, the stress situations experienced in crisis management positions are different. Crisis and disaster situations occur suddenly and are mainly unpredictable, ambiguous, non-

explainable, and (at least partly) uncontrollable (see section 4.1). They may cause acute and extremely high levels of stress which can last from days to weeks or months depending on the type of the disaster (e.g., airplane crash versus flood). The time between disaster operations or between disaster operations and missions of a smaller scale, respectively, can vary from overlapping missions to long time spans without any missions. In addition, crisis managers are a relatively heterogeneous occupational group, working in different kinds of organizations involved in crisis management and their responsibilities and related demands might be similar but not exactly the same (e.g., incident commander on-site versus head of a governmental crisis management unit). The same applies for the respective level of control/decision latitude of different kinds of crisis managers.

However what can be relatively safely assumed based on previous research, is that the work environment of crisis managers is related to various and high demands. As described in section 4.1, crisis managers are supposed to assess information and make important decisions under time pressure, to adapt efficiently to rapidly changing conditions, to take responsibility for their actions, and to lead, coordinate, and supervise crisis management personnel in emotionally draining circumstances (Adams et al., 2013; DuBrin, 2013; Hadley et al., 2011). These (and further; see section 4.2) demands have been repeatedly reported to cause stress (e.g., Beaton et al., 2001; Brown & Campbell, 1990; Halpern et al., 2009; Regehr & Bober, 2005).

Concerning the dimension control in the work environment of crisis managers, it has already been stated (see section 3.2.4.1) that decision latitude (as control is operationalized within the scope of the demand-control-support model) might not be the perfectly applicable indicator of control in the scope of crisis/disaster missions. Whereas decision latitude is assumed to be equivalent to possibilities for control or scope of action in the context of most work environments, in the management of disasters it might be more likely that a loss of or limited possibilities for control is/are perceived despite having decision latitude. Beyond that, decision latitude could even have a double-edged effect in the context of disaster missions, due to the related far-reaching responsibility for people and the potential need to justify decisions in the aftermath of a mission (Hadley et al., 2011; Regehr & Bober, 2015). Accordingly, Hering et al. (2011) found that control defined as decision latitude increased the relationship between complex missions and the burnout component *exhaustion*. However, as the reliability of the *decision latitude/scope of action subscale* of the applied Organizational

Check-up Survey (Leiter & Maslach, 2000) was not satisfying (Cronbach's alpha = .55), this finding has to be interpreted with caution.

The third dimension considered in the demand-control-support model is social support from co-workers and supervisors/superiors. As social support is one of the most frequently examined moderators of the relationship between stress and health and is assumed to be an important resource for coping with stress, research about the role of social support in crisis management shall be paid special regard at this point, also beyond the context of the demand-control-support model: Concerning support for crisis management personnel, the role of crisis managers includes the responsibility to adequately support their staff and, in turn, requires skills and opportunities to do so. On the other hand, crisis managers themselves need backing and support from their organizations and their superiors to deal with the high demands placed on them during the management of crises (Halpern et al., 2009).

In the field of crisis and emergency management, social support – including an exchange of experiences with supervisors and colleagues – is considered as an important protective factor to withstand the high demands of the work environment without adverse mental health consequences (Wagner et al., 2001). Several studies indicate that social support moderates the relationship between stress and stress-related mental health consequences such as PTSD in samples involved in the management of disasters and emergencies as well as in samples engaged in high risk environments (e.g., military units; Barnes, Nickerson, Adler, & Litz, 2013; Dinenberg, McCaslin, Bates, & Cohen, 2014; Fullerton et al., 1992; Marmar et al., 2006; Patterson, 2003; Polusny et al., 2011; Reinhard & Maercker, 2004; Stephens & Long, 1999; Stephens, Long, & Miller, 1997; Van der Ploeg & Kleber, 2003).

Although support from family and friends is also an important resource in mitigating adverse stress consequences, the support of an employee's organization (provided by superiors and colleagues) is assumed to play a key role in the prevention of stress reactions and the improvement of mental health in the context of high risk occupations (e.g., Barnes et al., 2013). In this regard, Van der Ploeg and Kleber (2003) showed in their longitudinal study with ambulance workers that a lack of social support and poor communication at work were the best predictors of mental health symptomatology. Examining PTSD, burnout, and social support of emergency (medical) services personnel, Reinhard and Maercker (2004) found social support to be significantly negatively correlated with the posttraumatic symptom clusters *avoidance* and *hyperarousal*. Additionally, studies within the field of civil protection indicate that perceived availability of organizational resources like team work and spirit,

willingness of supervisors to delegate, as well as open and transparent communication is correlated to less reported PTSD symptoms (Beerlage et al., 2008). Apart from that, Kelley, Britt, Adler, and Bliese (2014) found in a sample of military personnel that stigmatization of seeking treatment for PTSD symptoms mediated the relationship between perceived organizational support and PTSD symptomatology. The authors concluded that social support at work may create an organizational climate of reduced stigmatization which enables employees to address their burden and mental health symptoms.

4.4 Stress management/coping in crisis management

Coping styles belong to the most frequently examined moderators (or mediators; see section 3.2.3.4) between stressors and health symptoms and were shown to be associated with adverse consequences of stress in high risk occupations.

However, regarding the different coping styles (see section 3.2.3.3) and their relation with health within the field of crisis and emergency management, research comes to conflicting results. Most studies indicate that avoidance-oriented coping styles are associated with greater (physiological) distress and mental health symptoms. For example, LeBlanc et al. (2011) found in their study with paramedics during a simulated, high-stress clinical scenario that avoidance-oriented coping styles were associated with greater physiological responses such as higher cortisol levels. However, as the sample comprised only 22 participants, the findings should be interpreted with caution. In the context of exposure to critical incidents, avoidance-oriented coping styles were found to be the best predictor of psychological distress in a sample of firefighters from Northern Ireland (Brown, Mulhern, & Joseph, 2002). Furthermore, Boudreaux, Mandry, and Brantley (1997) showed within their study with emergency medical technicians (EMTs) that the coping style *escape/avoidance* was significantly associated with the burnout components *depersonalization* and *emotional exhaustion* as well as with physiological stress responses. Besides *escape/avoidance* coping, the authors also found the coping strategies *accepting responsibility*, *confrontive coping*, and *distancing* to be significantly associated with maladaptive outcomes.

Concerning emotion- and problem-focused coping, it has been stated in section 3.2.3.4 that, in general, problem-focused coping was mostly shown to be associated with better mental health and less distress, whereas emotion-focused coping tended to be associated with increased distress and related health symptoms (Aldwin, 2007). However, these findings were critically discussed against the background that coping definitions and measures differ notably and show confounding and other methodological inaccuracies (Aldwin, 2007; Brown et al. 2002;

section 3.2.3.4). Within the field of crisis and emergency management, findings regarding emotion- and problem-focused coping strategies differ between studies: In the above mentioned study of LeBlanc et al. (2011), emotion-focused coping was related to the experience of higher anxiety levels in the context of the simulated high-acuity event, whereas task-oriented coping (equivalent to problem-focused coping) was related to lower levels of anxiety. In another study examining 84 police recruits in a simulated high-stress event, LeBlanc, Regehr, Jelley, and Barath (2008) found that task-oriented coping was associated with less anxiety directly after the simulated event, whereas emotion-focused and avoidance coping were associated with stronger physiological stress responses and PTSD symptoms. In the context of traumatic stressors, emotion-focused coping was found to predict the number of PTSD symptoms in a sample of military personnel (Solomon, Mikulincer, & Benbenishty, 1989). Examining performance of military personnel, Matthews and Campbell (2009) showed that problem-focused coping was positively associated with hand-to-hand combat performance, whereas emotion-focused coping was negatively related to it.

In contrast, Brown et al. (2002) showed in their above-mentioned study with firefighters that problem- and emotion-focused coping were associated with less distress in the context of critical incidents. Furthermore, Patterson (2003) found in a sample within the law enforcement field that emotion-focused coping buffered the effect of critical life events on distress. Problem-focused coping, on the other hand, resulted in a “reverse buffering effect” and strengthened the relationship between critical work-related events and distress. Similarly, Marmar et al. (2006) found that greater levels of problem-focused coping predicted PTSD symptoms in a sample of police officers, a finding that the authors had also made in a sample of first responders involved in the 1989 Bay Area freeway collapse. As mentioned in section 3.2.3.4, the use and effectiveness of the different kinds of coping strategies is assumed to also depend on the type of situation the respective coping strategies are applied in (Zimbardo & Gerrig, 2004). It was shown that problem-focused coping strategies are rather used in controllable situations whereas emotion-focused coping is particularly frequently applied in situations in which appraised possibilities for control are low (Folkman, 1984). Accordingly, Young, Partington, Wetherell, St Clair Gibson, and Partington (2014) found in their qualitative study that the participating firefighters frequently used problem-focused coping strategies on their way to the incident and in early stages of missions, whereas emotion-focused strategies were more frequently applied after the incident.

Considering all of the above, the differences and contradictions in findings concerning the relationship between stress exposure, kind of coping strategies, and distress or health could be partly due to the different situations crisis management personnel are exposed to. However, the mentioned methodological differences in coping measures and concepts have to be considered in this matter, as well.

Some studies that examined coping in the field of crisis and emergency management used further, more distinct coping categories than the three most commonly distinguished ones: In their study with rescue workers, Prati, Prietrantoni, and Cicognani (2011) showed that so-called *emotion and support coping*, *self-blame coping*, and *self-distraction* mediated the relationship between stress appraisal and compassion fatigue. Furthermore, self-blame coping and religious coping were found to mediate the relationship between stress appraisal and burnout.

Examining which coping strategies were used by a sample of ambulance personnel in the context of critical incidents, Alexander and Klein (2001) found the coping methods *talking to colleagues*, *looking forward to off-duty*, *thinking about own family*, and *keeping thoughts/feelings to self* to be the most commonly used methods (by 94-82% of the sample, N = 110). The authors examined as well how useful the different coping strategies were perceived by the participants, leading to the important finding that even though the coping strategy keeping thoughts/feelings to self was assumed to be unhelpful by the majority of the participating ambulance personnel (59%) it was one of the most frequently reported strategies (used by 84% of the sample).

Taken together, these empirical findings lead to the assumption that coping styles – potentially having an impact on the health of crisis management personnel should be included in preventive measures such as stress management trainings. Accordingly, Kleim and Westphal (2011) state in their review about mental health in first responders that enhancing coping abilities is one of the most common aims of preventive measures for this target group.

Concerning stress management programs that address the specific stressors and health consequences in the occupational subgroup of crisis managers, the number of approaches is limited. One of the rare training programs in this context, which is based on work by Fisher (2003), is particularly directed to managers within the human, emergency, and health services. However, the majority of stress management programs concerned with stress in extreme environments is available from the field of law enforcement (for an overview see the review

of Patterson, Chung & Swan, 2012) and of military psychology. Measures for military personnel mostly aim at enhancing performance in highly stressful situations (e.g., mental readiness trainings; TADMUS (Tactical Decision Making Under Stress) program, Cannon-Bowers & Salas, 1998) or at increasing soldier resiliency. Stress management trainings for emergency services personnel in particular, are for instance available from Fisher (2001), from Porter and Johnson (2008), or from Varker and Devilly (2012).

4.5 (Health) consequences of stress in crisis management

As outlined above, crisis management personnel (i.e., first responders and crisis management leaders) belong to the high-risk occupations regarding stress and stress-related health consequences (e.g., Johnson et al., 2005; Kirkcaldy et al., 1998; Regehr & Bober, 2005). This group of professionals or distinct subgroups (such as emergency services personnel, first responders, firefighters, law enforcement personnel), respectively, were extensively examined regarding the potential health consequences of stress related to their work environment, which are addressed further on in this section.

With regard to further short- and long-term consequences of stress in the context of crises/disasters, several studies examined the performance of high-risk occupational groups during or after stress exposure (e.g., LeBlanc et al., 2008; LeBlanc, Regehr, Tavares, Scott, MacDonald, & King, 2012; Robinson, Leach, Owen-Lyn, & Sünram-Lea, 2013). As touched upon in section 3.3.1, long-lasting or high levels of stress can result in an impairment of human performance related to decrements in the cognitive functions attention, memory, judgment/decision making as well as complex problem solving (e.g., Alexander, Hillier, Smith, Tivarus, & Beversdorf, 2007; Renner & Beversdorf, 2010; Staal, 2004; Staal, Bolton, Yaroush, & Bourne Jr., 2008). The majority of research concerning stress and human performance in the context of crises originates from the military field and aims at a better understanding of the decrements in cognitive functions in highly stressful situations to prevent a degradation of operational effectiveness (Driskell & Salas, 1996; Hancock & Szalma, 2008; Harris, Hancock, & Harris, 2005; Liebermann et al., 2005; McNeil & Morgan III, 2010). By now, some studies also examined the relationship between stress, (physiological stress responses,) and performance in firefighters, paramedics, or law enforcement personnel, indicating that stress related to the respective work environment can cause an impairment of cognitive, clinical, or crisis management performance (e.g., LeBlanc et al., 2012; LeBlanc et al., 2008; Robinson et al., 2013).

The relationship of stress and mental health consequences in crisis and emergency management personnel is often examined in light of influential factors such as coping styles (see section 4.4). It was shown that occupational groups involved in crisis and emergency management are at elevated risk to suffer from mental health consequences of stress, such as PTSD, depression, anxiety, burnout, and substance abuse (Alexander & Klein, 2001; Beerlage et al., 2008; Bennett et al., 2004; Corneil et al., 1999; LaFauci Schutt & Marotta, 2011; Murphy et al., 1999; Wagner et al., 2001). Furthermore these occupational groups were shown to suffer from somatic health symptoms such as pulmonary and cardiovascular disease, myocardial infarctions and stroke, gastrointestinal symptoms, pains, and high blood pressure (Beaton et al., 1995; for an overview concerning ambulance personnel see Sterud, Ekeberg, & Hem, 2006).

One of the most frequently examined mental health consequences of stress in crisis and emergency management personnel is PTSD (see section 3.3.2.2). Reported prevalence rates range from 8 % up to 26% (according to the review of Kleim & Westphal, 2011; leaving out the therein incorrectly reported study of Clohessy & Ehlers, 1999). However, based on previous research, it is not possible to clearly define which group of examined crisis and emergency management personnel experiences the highest risk to develop PTSD, as prevalence rates for the single groups (such as firefighters or ambulance workers) differ notably between studies and countries (see Benedek, Fullerton, & Ursano, 2007; Kleim & Westphal, 2011). For instance, Kehl, Knuth, Hulse, and Schmidt (2015) found in their sample of 1,916 fire fighters from eight European countries a total PTSD prevalence rate of 7.7%, with country-specific prevalence rates ranging from 0% (Sweden) to 19% (Poland). In this context, it should be also considered that studies examining mental health in relation to the work-environment of crisis and emergency management personnel often use different mental health measures (for the same construct), sometimes also apply different cut-offs for the same measuring instrument (e.g., Kehl et al., 2015, and Fullerton, Ursano, Reeves, Shigemura, & Grieger, 2006), and assess mental health in the context of different kinds of work-related stressful events. However, Perrin et al. (2007) examined different kinds of crisis management personnel (i.e., policemen, firefighters, and emergency (medical) services personnel) in the context of the same stressful event, namely the 9/11 attacks, and reported different prevalence rates across occupational groups two years after the disaster: 6.2% for policemen, 12.2% for firefighters, and 11.6% for emergency services personnel (compared to 25% for unaffiliated volunteers).

At this point, it has to be noted that crisis and emergency management personnel working directly on-site of a disaster/an emergency is assumed to be at higher risk to be confronted with traumatic events than those working off-site. Accordingly, it was shown that on-site personnel report higher rates of PTSD (see Kleim & Westphal, 2011). This issue is particularly important taking into consideration that, even if some crisis managers, for example incident commanders or chief emergency physicians, are stationed on the disaster site, a large number of crisis managers is assumed to work off-site (e.g., in crisis management units) and is therefore probably not as often exposed to traumatic incidents involving badly injured or dead victims.

Examining 197 “emergency management professionals” (an occupational population similar to the one of crisis managers, even if the authors did not state the percentage of participants in leading positions) LaFauci Schutt and Marotta (2011) reported a PTSD prevalence rate of 13.2%.

Further important and frequently examined mental health consequences of stress in crisis and emergency management are depression and anxiety (Kleim & Westphal, 2011). Within their study with 617 ambulance workers, Bennett et al. (2004) found that approximately 10% of the sample reported potentially clinical levels of depression and 22% showed probable clinical levels of anxiety based on Hospital Anxiety and Depression Scale scores. Examining 207 disaster workers involved in the management of an airplane crash and unexposed controls, Fullerton, Ursano, Leming, and Wang (2004) found a depression rate of 21.7% thirteen months after the event (and a PTSD rate of 16.7%).

Considering all of the addressed varying findings for distinct kinds of crisis and emergency management personnel who are exposed to rather different stressful work environments, no clear assumptions can be made concerning the mental health status of crisis managers. Clearly, more research is needed to learn more about the mental health consequences related to their work environment and position(s).

5 Objectives and Research Questions

The two studies of this dissertation project were conducted within the scope of the work package *Stress Assessment and Stress Management* (WP4) of the EU-funded research project *PsyCris*, which aims at improving psychosocial support in crisis management (see section 2.1). As touched upon in section 2.2, this work package strives to develop two kinds of stress management trainings for crisis managers, a biofeedback-based training for the self-regulation of physiological stress responses, and a cognitive-behavioral training to better cope with work-/mission-related stress. In this context, the two studies of this dissertation sought to gain important information for the development of the cognitive-behavioral stress management training and, thereby, at building its empirical basis.

As outlined above, it is important to take into consideration that crisis managers have high responsibility related to their positions in the management of large-scale crises/disasters and are assumed to be a high-risk occupational group regarding physical and mental work-related stress consequences (see sections 4.1, 4.2, and 4.5). Therefore, it is deemed necessary to support this occupational group with regard to their stress management/coping abilities in order to prevent a stress-related harm of the crisis managers themselves (and related to that of their subordinates) and to facilitate an effective crisis management.

As the development of the stress management training follows an end-user focused approach, it is essential to include crisis managers into the developmental process (i.e., the stressors experienced by them, their stress management/coping abilities and requirements, etc.). As elaborated on in section 4.1, the majority of research examining stress, stress-related (health) consequences, and individual risk factors focuses on first responders or crisis management personnel in subordinated positions, respectively. This aspect particularly points to the need to learn more about the work-related stressors, individual risk and protective factors and stress management/coping skills of crisis managers before developing a training tailored to their needs. This information is crucial to ensure that relevant aspects are addressed, adequate knowledge is provided, and helpful skills are taught in the training, i.e., that the training meets the target group's requirements.

For the above mentioned reasons, the two studies of this dissertation aimed at examining the perceived stress of crisis managers, the stressors related to their work environment as well as the resulting (emotional) burden, and (applying to study 2) somatic and mental health consequences (i.e., strain). Whereas there was a strong focus on critical incident/traumatic

stressors in previous research with crisis and emergency management personnel, these two studies set a particular focus on occupational and organizational stressors.

The dissertation followed a multi-method approach combining qualitative and quantitative methods. Study 1 applied qualitative methods, using semi-structured, guideline-based interviews for data collection whereas study 2 comprised an online survey consisting of validated and well-established questionnaires. Both studies examined the psychosocial work environment of crisis managers in light of the demand-control-support model (Karasek & Theorell, 1990) by assessing the work-related demands, possibilities for control, and support from supervisors and peers experienced by crisis managers. Choosing a relational/transactional approach to stress (see section 3.2.3), which defines stress as a transactional process of environmental conditions and individual factors such as cognitive appraisal processes and coping behavior, both studies additionally considered and assessed individual factors such as coping styles. This is particularly important taking into consideration that coping styles were repeatedly shown to influence the relationship between stress and health or well-being and are assumed to be not dispositional but modifiable and extendible (see section 3.2.3.2), which is why they should be considered as part of the stress management training.

Study 2 additionally comprised further potential risk factors or protective factors, respectively: Stress reactivity (i.e., tendency to react to stressors with intense emotional stress reactions), which was associated with mental illness in previous studies (Schlotz, Yim, Zoccola, Jansen, & Schulz, 2011) and self-efficacy, which was previously associated with well-being and lower stress responses (Bandura, 1998). Concerning self-efficacy, a specific form applying to leadership in crises, namely crisis leader efficacy in assessing information and making decisions (Hadley et al., 2011), was assessed.

Considering the scarce research focusing on crisis managers and the quite different positions and related responsibilities of this occupational subgroup compared to subordinated first responders (see section 4.1), no concrete hypotheses could be derived from the existing literature. However, the two studies aimed at answering numerous research questions, which are elaborated on in the following.

Concerning perceived stress and stressors, these studies aimed at identifying which stressors crisis managers share with crisis management personnel in subordinated positions, and which additional stressors they experience related to their leading positions (study 1 and 2).

Furthermore, with regard to the psychosocial work environment of crisis managers, it was examined what kind of combination of perceived demands, possibilities for control, and support at work is perceived by crisis managers (study 1 and 2). This question was of special interest considering that general managers are assumed to fall in the active job category (Karasek et al., 1988), experiencing high demands but also large possibilities for control whereas emergency management personnel (e.g., paramedics) previously reported to experience high demands, and low levels of control and support (Regehr & Millar, 2007).

Regarding the important role that social support is assumed to play in the stress-health-relationship (see sections 3.2.4.1; 4.3), the question whether it has a similarly important role for crisis managers (study 1 and 2) was analyzed.

The same question applied to the individual factor coping: Besides learning more about the stress management/coping strategies used by crisis managers (study 1 and 2), it was aimed at identifying the relevance and kind of influence of the individual factors coping and stress reactivity on the stress-health-relationship (study 2). Considering the contradictory results concerning the effectiveness of different coping styles regarding health in the field of crisis and emergency management (see section 4.4), one further question was how emotion-focused, problem-focused, and dysfunctional/avoidance-oriented coping are associated with health in crisis managers (study 2).

In the context of identifying risk factors and protective factors for mental health, the question was if and how the individual factors coping, stress reactivity, and crisis leader self-efficacy, besides perceived stress and stressors related to the psychosocial work environment, predicted somatic and mental health in crisis managers (study 2).

With regard to well-being, distress and health, it was aimed at learning more about the respective condition of crisis managers (study 1 and 2). More precisely, a related question was if they are at a similarly elevated risk (compared to the general population) to develop somatic and mental disorders, as are first responders (study 2). In this context, study 2 aimed at answering the question if crisis managers differ from managers from other occupational fields regarding their somatic and mental health, but also regarding their perceived stress, stressors related to the psychosocial work environment, and applied coping strategies.

These research questions served the purpose to derive recommendations relevant for the development of the envisioned stress management training for crisis managers.

6 Study 1: Qualitative Assessment of Stress and Stress Management in Crisis Managers

6.1 Introduction

This study aimed at the qualitative, exploratory examination of perceived stress and burden, psychosocial work environment and related stressors, and stress management/coping strategies in crisis management leaders.

For this purpose, semi-structured, guideline-based interviews with crisis managers were conducted and analyzed with the qualitative text analysis program GABEK® WinRelan® to shed light on the following research questions:

- 1 How stressed and burdened are crisis managers?
- 2 What kinds of stressors occurring during a crisis are experienced by crisis managers as most demanding?
- 3 How do crisis managers perceive their work environment concerning the three dimensions demands, control, and support?
- 4 What kinds of stress management techniques/coping strategies do they use and/or find helpful?

The aim was to gain important information for the development of the stress management training (which was realized within the scope of the PsyCris project; see section 2.2) about potential needs regarding the mitigation of avoidable stressors and the building of awareness for inevitable stressors in crisis management. Beyond that, the crisis managers' perceived needs and requirements concerning stress management techniques and coping skills were assumed to be crucial information for the development of the training.

6.2 Methods

6.2.1 Data collection and recruitment

Before the data collection phase started, the research teams of all contributing project partners involved in conducting the interviews were trained in interview techniques and were acquainted with the interview guideline via online meetings and the provision of instructions. The interview guideline (see section 6.2.3 and Appendix I) was developed in collaboration between the research team of LMU and two further project partners, as it was supposed to simultaneously serve different research purposes. Thereby, an efficient data collection should

be ensured and the effort of the interview partners should be kept at a minimum level¹⁸. To cover the research questions of this study, section 3 (practical experiences in crisis management) and section 4 (stress and stress management) of the interview guideline were developed.

The recruitment of eligible interview partners took place in the respective countries. To achieve this, crisis management organizations were contacted and asked for support. The interviewed crisis managers had to meet the criterion of having responsibility for staff and decision making and must have been involved in the management of at least one major crisis. The interviews, which were planned to take about 60 minutes, were either conducted at the workplace of the interviewees or at the offices of the contributing project partners and were recorded on audio files. Ahead of the interviews, the interviewees were informed about the PsyCris Project and filled out a consent form as well as a previously developed sociodemographic questionnaire. At the beginning of the interviews, the interviewees were asked to choose one of three disaster scenarios¹⁹ developed in the PsyCris project and viewed the corresponding Microsoft Power Point presentation. This procedure had two purposes: To evaluate the disaster scenarios (not in the scope of this study but of another work package) and to give an introduction to the topics related to crisis management that were the core of the interviews (e.g., challenges and demands, psychosocial support aspects, etc.).

In total, 34 interviews were conducted across the partnering countries (all in the native language of the respective interviewees) between November 2013 and January 2014. Three interviews were excluded from the analysis, two because they did not meet the criterion of direct involvement in the management of a major crisis, one because of missing data (i.e., answers to relevant questions of the interview guideline were missing).

After conducting the interviews, the parts of the audio files relevant for this study (questions regarding section 3 and 4 of the interview guideline) were transcribed and translated into English, or German, respectively (if the interviews had not been conducted in German; see

¹⁸ For this reason, the complete interview guideline also included parts that were not relevant and not analyzed within the scope of this study, namely section 1 (evaluation of disaster scenarios), section 2 (status analysis of psychosocial support) and section 5 (end-user requirements on PSS; see Appendix I)

¹⁹ i.e., Microsoft Power Point-based scenario descriptions with information about the airplane crash in Luxembourg, 2002, the terrorist attacks in Madrid, 2004, or the flood in Germany, 2013.

section 6.2.4.3.1). The interview data was analyzed in German by means of the qualitative text analysis method and software GABEK WinRelan (see section 6.2.4).

During the GABEK analysis (for a detailed description of the method, see section 6.2.4), the transcripts were divided into short cohesive text sections or closed statements, respectively. In the next step, the coding process, key terms were identified and marked within these sections by two trained coders²⁰ of the LMU team, who had attended a GABEK WinRelan workshop in Hall, Tirol (3rd to 4th February 2014), which was held by Professor Zelger (the developer of the method) within the scope of the PsyCris project. The coded data was analyzed and presented with the help of network graphs and the examination of underlying quotes (see section 6.2.4.4).

6.2.2 Participants

In total, 31 interviews with crisis managers were included in the analysis, 12 conducted in Germany, 8 in Spain, 4 in Luxembourg, 4 in Lithuania, and 3 in Austria. Table 2 shows the sociodemographic information of the sample. According to the project's definition of crisis managers (see section 2.3), the interviewees held leading positions in crisis management organizations such as Red Cross, fire and rescue services, agencies for technical relief, the military, or in governmental crisis management units. As mentioned above, in their positions, they had responsibility for staff and decision making and had been involved in the management of at least one major crisis. Eleven of the interviewed crisis managers were directly responsible for the provision of psychosocial support, they worked in crisis intervention or pastoral care teams and/or coordinated psychosocial support forces (termed *crisis managers for psychosocial prevention and aftercare*, see section 2.3). On average, the interviewees were approximately 51 years old, had nearly 26 years of experience in crisis management and held their current positions since almost 12 years. 23 crisis managers worked in a regular paid position whereas only five worked on a solely voluntary basis and three were partly paid, partly voluntarily working. Of all interviewed crisis managers, those from Luxembourg were the oldest and the most experienced ones. All in all, the leading positions of the crisis managers participating in this study came along with high levels of experience in the respective occupational field.

²⁰ One of them being the author of this manuscript; who coded 28 of the 31 interviews. The other 3 interviews were coded by another member of the LMU team and were reviewed for correctness and congruence by the author of this manuscript to enhance objectivity of the coding process.

Table 2

Sociodemographic data of interviewed crisis managers

Country	Gender		Age	Work experience in years	Function		Work experience in the current position in years	Type of organizational membership			Total
	Female	Male	<i>M (SD)</i>	<i>M (SD)</i>	Crisis manager	Crisis manager for PSS ^{a)}	<i>M (SD)</i>	Paid	Voluntary	Paid + voluntary	<i>n</i>
Austria	0	3	45.67 (3.06)	26.33 (7.10)	2	1	12.67 (11.24)	3	0	0	3
Germany	2	10	51.08 (8.52)	24.83 (10.43)	8	4	11.13 (6.97)	8	1	3	12
Lithuania	0	4	51.50 (12.45)	29.00 (14.45)	3	1	9.25 (7.27)	4	0	0	4
Luxembourg	0	4	55.00 (7.44)	32.00 (10.99)	2	2	22.25 (11.41)	2	2	0	4
Spain	4	4	50.25 (8.23)	22.00 (10.03)	5	3	8.75 (5.26)	6	2	0	8
Total	6	25	50.90 (8.32)	25.71 (10.51)	20	11	11.86 (8.32)	23	5	3	31

^{a)} psychosocial support/psychosocial prevention and aftercare

6.2.3 Semi-structured interviews

As mentioned in the previous sections, the crisis managers were surveyed using semi-structured, guideline-based interviews. Semi-structured interviews are the method of choice for data collection whenever the participants' experiences, opinions, attitudes, and wishes on concrete topics are the focus of interest, for instance in the context of exploratory studies (Britten, 2006; King & Horrocks, 2010). Especially in the case of studies concerning the development and implementation of new processes, techniques, or programs, it is reasonable to integrate potential end-users, their opinions and requirements in the developmental process to enhance acceptance (Adler, Haus, Jakob, Erfurt, & Krüsmann, 2012). Furthermore, with the use of semi-structured interviews, it is possible to respond to specific topics which are stated by the interviewee. Thereby, new and so far unknown critical areas can be identified (Adler & Haus, 2013; King & Horrocks, 2010).

As mentioned above (see section 6.2), the interview guideline used in this study additionally comprised research topics or questions, respectively, which were relevant for other parts of the PsyCris project, to ensure an efficient data collection. The parts of the interview guideline that were developed for this study (parts 3 and 4) addressed the topics *experiences in crisis management, perceived stress, stressors and demands, possibilities for control, stress management/coping strategies, received (organizational) support, and possibilities for improvement*.

Figure 6 shows the parts of the interview guideline that were developed to answer the research questions of this study.

3. Own experiences in crisis management of an actual disaster situation (e.g. flood)
(could also be addressed together with point 4)

1. What roles and responsibilities do you have in the crisis management system and in your institution/organization?
2. How did you experience the measures/actions taken by the crisis management in this particular disaster/incident?
3. Who was involved and responsible for psycho-social support and what was done (measures, intervention methods etc.)?
4. With which sectors in the crisis management system was psycho-social support affiliated?

4. Stressors and stress management

1. What specific demands did the management of this crisis place on you?
2. Which aspects did you find challenging and difficult? Which aspects were easier?
3. How did you cope with arising difficulties? (*for the interviewer: on the operational as well as on the emotional level*)
4. Which aspects or individuals did you experience as being supportive?

Background of the questions: Important to ask further, especially in the cases of the underlined expressions.

Question 1 („demands“): components of the question

- How would you describe your stress level/strain/pressure during the management of this particular incident? (please refer to the different time phases: beginning phase, peak)

Question 2 („stressors“): components of the question

- What were the most stressful aspects during the management of the crisis??
- How much control over the situation did you have?
- In your opinion, what did you do really well? Where did you have difficulties?

Question 3 („stress management“): components of the question

- Which techniques or strategies did you use to deal with your stress or remain calm?
- Where did you learn these techniques?
- What would you recommend for younger colleagues to consider in coping with crises?

Question 4 („support“): components of the question

- Where would you have needed more support?
- How supporting did you experience your organization?
- What should have been done differently in your opinion? What would have helped you?

Figure 6. Relevant parts of the interview guideline.

6.2.4 Data analysis

The interviews were analyzed with the qualitative text analysis method GABEK® (Ganzheitliche Bewältigung von Komplexität, i.e., holistic processing of complexity) and the corresponding software WinRelan® (Winword Relation Analysis). GABEK (developed by Professor Zelger, 1990 - 2000) is a qualitative research and text analysis method that links opinions, knowledge, and experiences of different interviewed persons of (occupational) groups by filtering out the common key messages.

6.2.4.1 Basic concept of the method GABEK

To understand complex problems of a society or an (occupational) group, one must consider the opinions, attitudes, desires and goals of the corresponding individuals. Since the focus of individuals rests on the subjectively relevant aspects of a topic, these aspects must be viewed in a larger context to identify the shared key topics of a (occupational) group of persons. In social groups and organizations, the knowledge is distributed among many different individuals; additionally, it is developed, processed, selected, and exchanged constantly. Methods for organizing knowledge such as GABEK can help to systematically register relations of knowledge and common attitudes of members of social groups and organizations (Zelger, 2008).

Drawing on early Gestalt theory, GABEK is based on concepts of comprehension, explanation, learning and perception of so-called *linguistic Gestalten* (Zelger, 2002). Data that can be analyzed with GABEK are texts such as transcribed interviews or written statements, which are examined regarding their quintessence, and then illustratively presented. The opinions, experiences, knowledge and attitudes of interviewees are linked via GABEK to conceptual knowledge systems in forms of transparent networks. These networks are uncovered by means of analysis and display options such as network graphs (as applied in this study), evaluation profiles, cause-effect structures and relevance lists (Zelger, 2002). Thereby, GABEK enables the user to understand relations, to verbalize common goals and to identify trends of opinions. GABEK can be used, for instance, for the preparation of decision processes in organizations, for the orientation concerning the attitudes of personnel towards relevant topics as well as for the construction of theories. The corresponding software WinRelan supports by means of computerized steps of data processing. Each of those steps is verifiable, reproducible, and documented.

6.2.4.2 Structure of GABEK and the corresponding software WinRelan

Figure 7 shows GABEK as part of the qualitative research process and illustrates the core elements of research with this text analysis method and the corresponding software WinRelan. It is based on the model of qualitative data analysis of Huberman and Miles (1994, as cited in Buber & Kraler, 2000), which comprises four components: data collection, data reduction, data display, and conclusions.

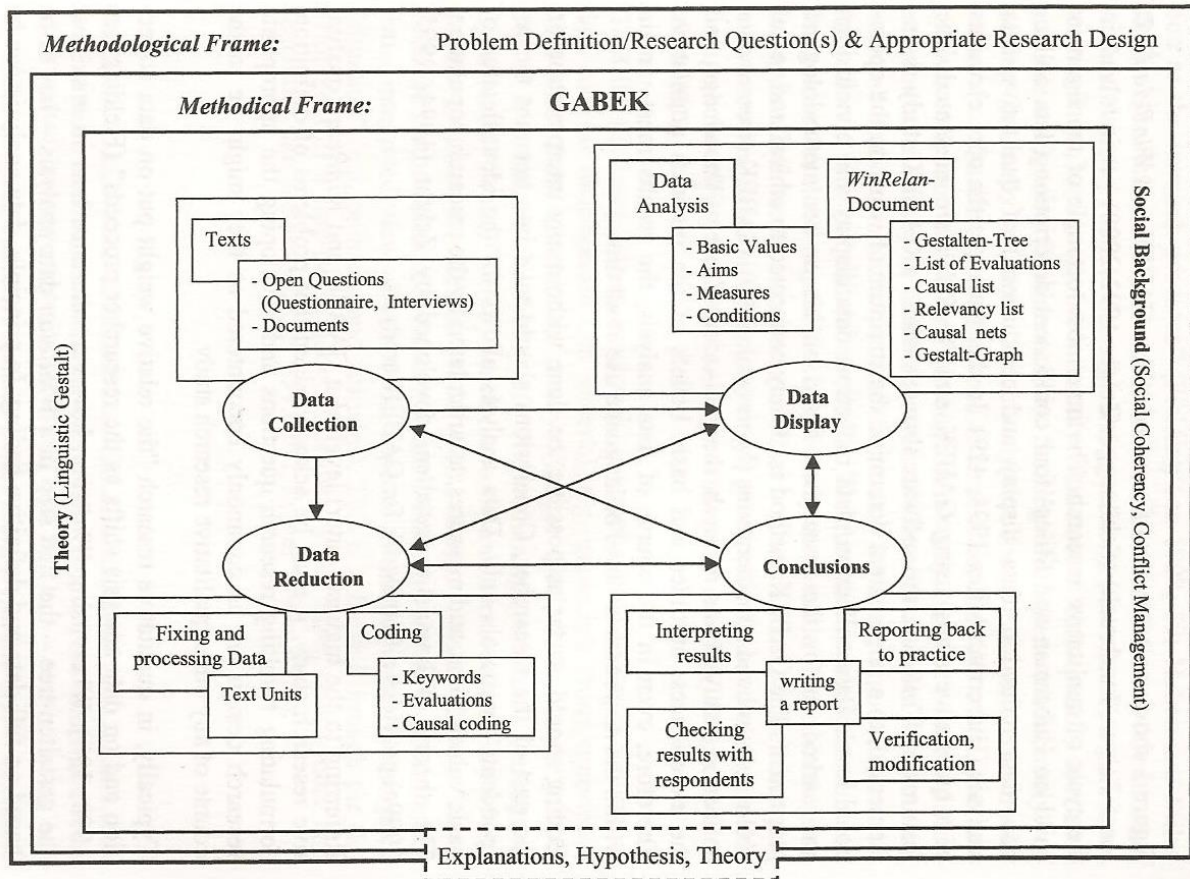


Figure 7. GABEK WinRelan in the cycle of qualitative research (Buber & Kraler, 2000)

When applying GABEK, the data collection is conducted preferably on the basis of open, guideline-based interviews which permit the interviewee to describe his/her opinions and attitudes in a subjectively weighted way. Furthermore, qualitative interviews assess exactly the aspects which are subjectively meaningful for the interviewee, even if they do not fit in predefined categories, as the application of standardized questionnaires requires.

Data reduction with GABEK is conducted on the basis of different steps such as defining cohesive text sections and coding of key terms (see next section).

Data display and the presentation of knowledge systems are provided by analysis and display formats such as network graphs, which are described in section 6.2.4.4.

The application of the WinRelan software affects the structure of the different work steps on a technical level. The transparency of work sequences is one important characteristic of WinRelan as the coding decisions of the analyzing researcher remain visible for any observer and can be reproduced at any time via the original statements/quotes that underlie the coding (Buber & Kraler, 2000).

6.2.4.3 Data reduction

The analysis of collected data aims at finding connections between the statements of the interviewed individuals. An indexing system, which connects all text units that contain a certain term, is required for this purpose. To develop such an indexing system, it is necessary to split the given text into short sections, that is, closed statements or sentences, each forming a cohesive *sense-unit* (meaning that content and thoughts are related, i.e., a spoken sentence).

A sense-unit should contain between three and nine relevant lexical terms²¹, i.e., terms with an individual semantical meaning which are necessary to understand the central message of the text section. After identifying these sense-units, one can directly convert these from Microsoft Word to so-called *index cards* within the WinRelan software (Zelger, 2002). Figure 8 describes the steps of reducing complexity with GABEK WinRelan.

²¹ According to Zelger (2002), this limitation is needed, as the capacity of human working memory is limited to a maximum of nine terms.

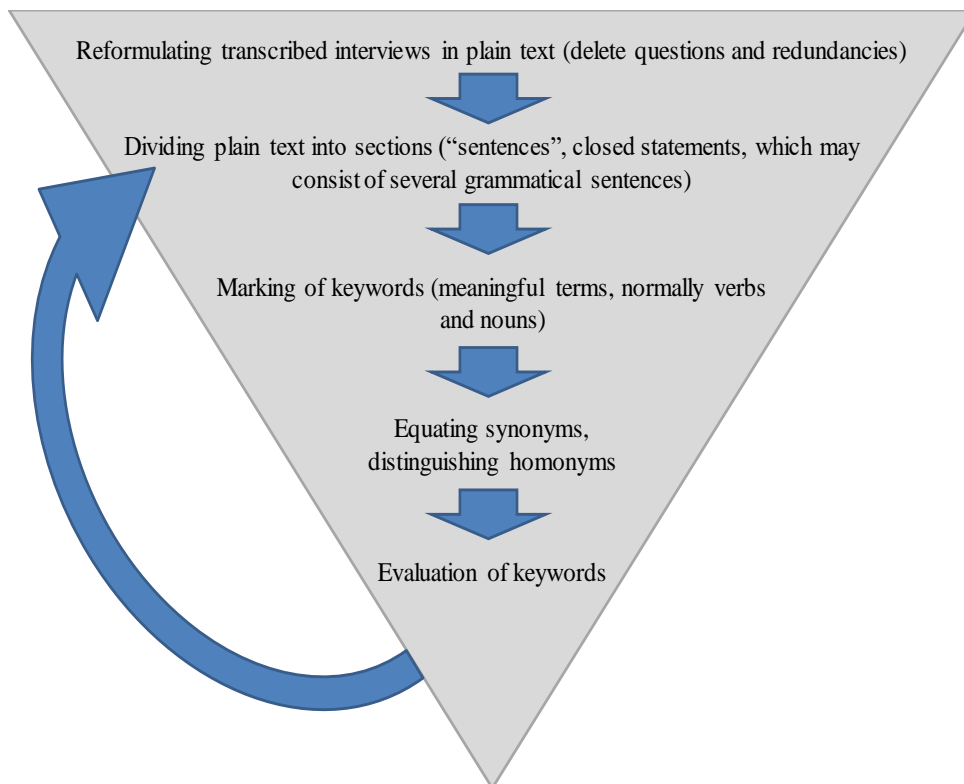


Figure 8. Reducing complexity with GABEK® WinRelan® (Adler et. al., 2012)

6.2.4.3.1 Coding

In the course of the coding process, in each text section (sense-unit), three to nine key terms (if possible, solely verbs and nouns) are identified. As mentioned above, the coded key terms/expressions should comprehensively reflect the central message of the respective text section.

In order to ensure an appropriate interpretation of the results, the collected data must be coded and analyzed in the context of the actual expressions used by the interviewees (Buber & Kraler, 2000). That means that the coded expressions stay close to the original data, i.e., mostly the interviewees own words are coded as key terms. However, as the developed indexing system should link all statements/quotes that contain the same key terms, it is also important that different expressions with identical or very similar semantical meanings (i.e., *around the clock* and *nonstop*) are coded with the same key terms. This balancing act is one of the biggest challenges for the researcher responsible for the coding process. The coder has to

make certain pre-assumptions about the connotations of the interviewees' expressions, without reinterpreting them. An example of a coded index card is shown in Figure 9.²²

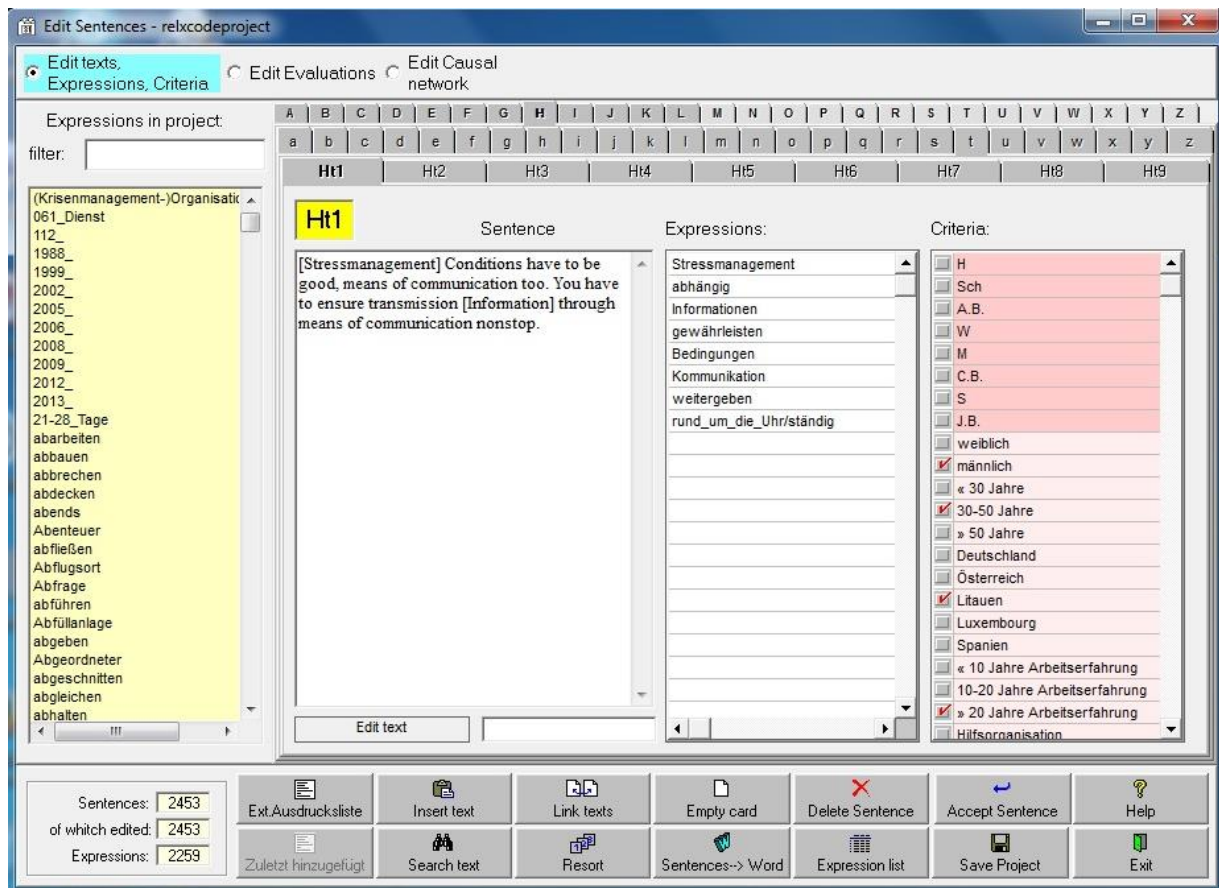


Figure 9. Sense-unit on index card and coded key terms in WinRelan

In the context of the coding process, it has to be noted that in this study the different languages of the interviews/transcripts and the various translations were a particular challenge for the analyzing researcher. The transcripts were translated from the original language (Spanish, Lithuanian, and Luxembourgish) either into English (Spanish and Lithuanian interviews) or into German (Luxembourgish interviews) by the responsible project partners (see section 6.2). To ensure a homogenous coding, all interview transcripts, including the English ones were coded using German key terms. Only the Austrian and German interviews were analyzed in the same language they were conducted in, namely in German.

²² The key terms were coded in German and are listed under the column labeled *Expressions*. In this case, the following key terms were coded: *stress management, dependent, information, ensure, conditions, communication, transmit, around the clock/nonstop*

Therefore, close collaboration with the different interviewers was necessary to avoid misunderstandings and to preserve information attached to the exact wording of the interviews as good as possible. In this context, it has to be further noted that the different crisis management and psychosocial support systems of the contributing countries resulted in very different terms and wordings of the interviewees, which was difficult to code using homogenous and consistent key terms. Consequently, considerable effort (detailed consultation with interviewers, country specific research concerning disaster response structures, etc.) was needed to consistently code the different transcripts and to identify common, shared topics.

On the basis of the coding process, a semantic indexing system is formed which contains all meaningful terms of the transcribed data and thus links connected or supplemental sense-units. This indexing system is represented within the so-called *expression list* (Figure 10) which contains all meaningful key terms that have been identified as being relevant within any of the text sections (sense-units).

Overall lists	Reduced list	Synonym list
341 Betroffene/Bevölkerung	Co1	Cr8 Cy5 Cy6 Cz2 Cz5 Da7 Dj7 Dj8 Dj9 Dk1 Dn4 Dn9 Do6 Do7 Dr3 Dw1 Dw3 Dw4 Dw
330 PSNV	Ey7 Ey8 Ey9 Ez1 Ez2 Ez3 Ez5 Ez6 Ez7 Ez8 Fa1 Fa2 Fa4 Fa5 Fa6 Fa8 Fa9 Fb1 Fb8 Fc	
299 Einsatzkräfte	Es4 Et3 Eu5 Eu6 Eu7 Eu8 Eu9 Ev3 Ev5 Ev6 Ev7 Ew4 Ex6 Ex9 Fa2 Fa3 Fa4 Fa7 Fa8 Fa	
278 Einsatz	Em7 Em8 Em9 En2 En3 En4 En8 Eo2 Eo8 Eq4 Eq8 Er8 Er9 Es1 Es2 Es3 Es6 Es7 Es8 Es	
249 Stress	Fx4 Fx5 Fx6 Fx7 Fx9 Fy1 Fy2 Fy3 Gc6 Gd8 Gf4 Gf5 Gf6 Gf7 Gf8 Gf9 Gg1 Gg2 Gg3 Gg	
243 Katastrophe	Fz6 Gc8 Gd9 Gh5 Gh6 Gh9 Gm8 Go7 Gx3 Gx7 Hc4 Hd8 Hg5 Hg6 Hg8 Hh4 Hh7 Hh9 Hh3 HJf	
180 vor_Ort	Fv2 Fv6 Fw4 Fw5 Fx2 Fz3 Fz4 Fz6 Fz8 Ga8 Gb1 Gb2 Gb7 Gc2 Gd7 Ge2 Ge3 Ge4 Ge6 Ge	
175 Hochwasser	Fq7 Hm7 Hn2 Hn3 Hn4 Hn6 Hn7 Hn8 Hn9 Ho1 Ho6 Hq2 Hq9 Hr8 Hs3 Hu5 Hu6 Hu8 Hu9 Hv	
173 wissen/Wissen	Gg5 Gi3 Gi4 Gj6 Gk7 Gl2 Gm4 Gn3 Gn4 Gp8 Gq2 Gs2 Gu1 Gu6 Gu7 Gu8 Gv1 Gv6 Gw5 Gv	
166 Bedarf	Fi2 Fn1 Fo2 Fo5 Fz7 Ga6 Gf1 Gh4 Gk8 Gl2 Gn8 Gp5 Gq4 Gs5 Hh4 Hk5 Hk7 Hn2 Hn5 Hp	
156 Informationen	Hs6 Ht1 Hu2 Hu3 Hu9 Hv1 Hv2 Hv5 Hv6 Id9 Ii1 Ij4 Ij5 Jf5 Jf6 Jn6 Jn7 Jn8 Jn9 Jo	
150 Krisenmanagement	Je7 Jg7 Jg8 Ji3 Ji4 Ji5 Ji6 Ji7 Jo5 Jp1 Jp3 Jp6 Ka1 Ka2 Ka3 Ka4 Ka5 Ka6 Kb5 Kf	
145 Unterstützung	Hf1 Hg6 Hg8 Hi1 Hj4 Hl9 Ht6 Ht7 Ie4 Ie5 Ie8 Jb3 Ji9 Jj7 Jn2 Jo6 Jo7 Jo8 Kc4 Kc	
144 funktionieren	Fz1 Fz2 Ga2 Ga7 Gb2 Gc7 Gd8 Ge7 Gj8 Gm2 Gm9 Gn7 Go8 Go9 Gp7 Gq5 Gs8 Gt4 Gz8 Hb	
140 Stressmanagement	Ke1 Kk7 Kl4 Kl5 Ko6 Ko7 Ko8 Ko9 Kr8 Kr9 Ks1 Ks2 Ks3 Ks4 Ks5 Kv4 Kv5 Kv6 Kv7 Kv	
137 Belastung	Fv2 Fv7 Fv8 Fw5 Fx4 Ga2 Gt5 Gt7 Gu5 Gv1 Gv6 Ha6 Hb1 Hb2 Hb3 Hc8 Hf2 Hk7 Hm2 Hp	
137 Problem	Gq4 Gr2 Gs5 Gs7 Gv6 Gv8 Ha4 Hb9 Hd1 Hd9 Hm2 Ho5 Ht3 Ht4 Ht5 Hy5 Hy6 Hy8 Ib8 Ic4	
136 Ausmaß	Hx7 Hx8 Ib9 Ig7 Ih1 Ih2 Ih3 Ih9 Ij1 Ij3 Ij6 Ij7 Jd4 Jf2 Jk8 Jk9 Jj7 Jn6 Jo1 Jo	
130 wichtig	Hy7 Ie8 Ih2 Ih4 Ij2 Ij4 Ij5 Ij7 Je9 Jf1 Jg3 Jg4 Jg5 Jg7 Jg8 Jh2 Jh3 Jh7 Kb8 Kc	
121 Aufgabe	Hi5 Hi6 Ib4 Ie3 Ii1 Ja5 Jc1 Ka6 Kb9 Kc3 Kc9 Ke8 Kg3 Kg5 KJ2 Kp1 Kp4 Kp6 Kq2 Kt	
110 Anzahl	Kq1 Kt7 Ku7 Kw1 Kw8 Kx5 Lb6 Ld3 Lg3 Lh6 Lk3 Lk9 Ll3 Lm6 Ln1	
109 Dauer	Hw5 Ji6 Ji8 Jp4 Kd4 Kd5 Ke2 Ki5 Kj7 Kk2 Kk7 Kk9 Ki1 Ki2	
109 Koordination/koordinieren	Ks6 Kt1 Ku1 Kw9 Kx8 Kx9 Ky2 Kz4 La7 La8 Lg9 Lh1 Lk5 Lk6	
109 schwierig	Kd8 Kj3 Kl4 Kn6 Kt9 Ku1 Ku2 Ku7 Lb3 Lc1 Le6 Lh2 Lm7 Lm8	
102 Entscheidungen	Kr9 Lb4 Lb5 Lb9 Lc2 Li1 Lk2	
102 arbeiten	Hb7 Ia7 Ic6 Ku9 Kz5 La2 Lf2	
101 Erfahrung	Lk9 Ll1 Ll2 Ll6 Ll7 Ll8	
100 Angehörige/Familien	Ko5 Kp5 Kw8 Lf6 Lj2	
97 Anfang	Kz3 Lj8	

Figure 10. List of key terms in WinRelan ordered by frequency

The expression list enables to search and navigate within the collected data and, by linking key terms with the respective index cards, contributes to making the analysis with GABEK traceable. It helps to identify the most important and most frequently addressed topics by showing how often the different key terms were used across all interviews. In the final step of the coding process, the expression list is examined and coding decisions have to be revised, if homonyms or synonyms are detected in this step.

6.2.4.3.2 Assigning criteria

Another feature of GABEK WinRelan is the assignment of criteria (e.g., gender, nationality etc.) to the different sense-units or index cards, respectively. By means of the criteria, parts of the data (i.e., interviews of different subgroups) can be selected. This enables the researcher to compare attitudes and experiences of different subgroups of interviewed persons which differ in specific criteria. However, in this study, comparisons between different subgroups were not intended, as the study aimed at gaining holistic, all-embracing information about stressors and requirements relevant for the envisioned stress management training for crisis managers (see section 2.2). Apart from that, for the purpose of comparisons of subgroups (e.g., of countries), the different samples ought to have been bigger and more similar in terms of size. However, the assignment of criteria is also an important step to make the research process verifiable, traceable, and transparent as they reflect which index cards belong to the same interview.

6.2.4.4 Data display with network graphs

The results of the coding process can be used to identify and display the connections between terms or topics addressed by the interviewees, by means of so-called *network graphs*. The network graphs help to structure the statements' contents by displaying the connections between terms that have been mentioned frequently in the same context. According to Zelger (2002), network graphs may be interpreted as an offering of mental systematization that shows the aspects worth considering during the examination of the central topic of the network.

For each of the network graphs, one initial key term of interest (i.e., one of the predefined variables of interest, e.g., *stress*) is chosen as basis (i.e., central topic) of the graph. The automatically generated graphs show all key terms (and their connections) that were mentioned in combination with the initial key term at least as often as a previously chosen minimum. Thereby, relevant aspects of a topic can be displayed and their connections can be examined. In order to obtain sufficiently clear and interpretable network graphs, the software WinRelan enables the user to determine a minimum number of connections for each network

graph. With that, it can be ensured that the network graph contains only those terms that are relevant for the respective analysis and avoid showing arbitrarily connected terms. The minimum number of connections between displayed terms should be determined in a way that sufficient readability is ensured, without compromising important aspects of interest.

Given the different prominence of topics in this study (e.g., stress as main topic of the interviews), the determined minima varied across the different graphs. For example, for the network graph with *stress* as initial key term, which is addressed 249 times across all interviews, the determined minimum number of connections (i.e., the minimum number that key terms displayed in the corresponding network graph have to be mentioned in the same context with the initial key terms *stress*) has to be relatively high to ensure readability.

One of the most important features of WinRelan regarding the interpretation of connections is that all original statements that form the basis of the connection between two key terms can be selected and checked by the user. This feature is used to choose representative text units/quotes that explain and underpin the connections shown in the graphs. An exemplary screenshot depicting this feature is shown in Figure 11. In this example, the connection between *stress* (the initial key term) and *beginning* was selected²³ and all underlying quotes can be checked within the small window.

²³ To illustrate the selected connection within the network graph it is highlighted in colour.

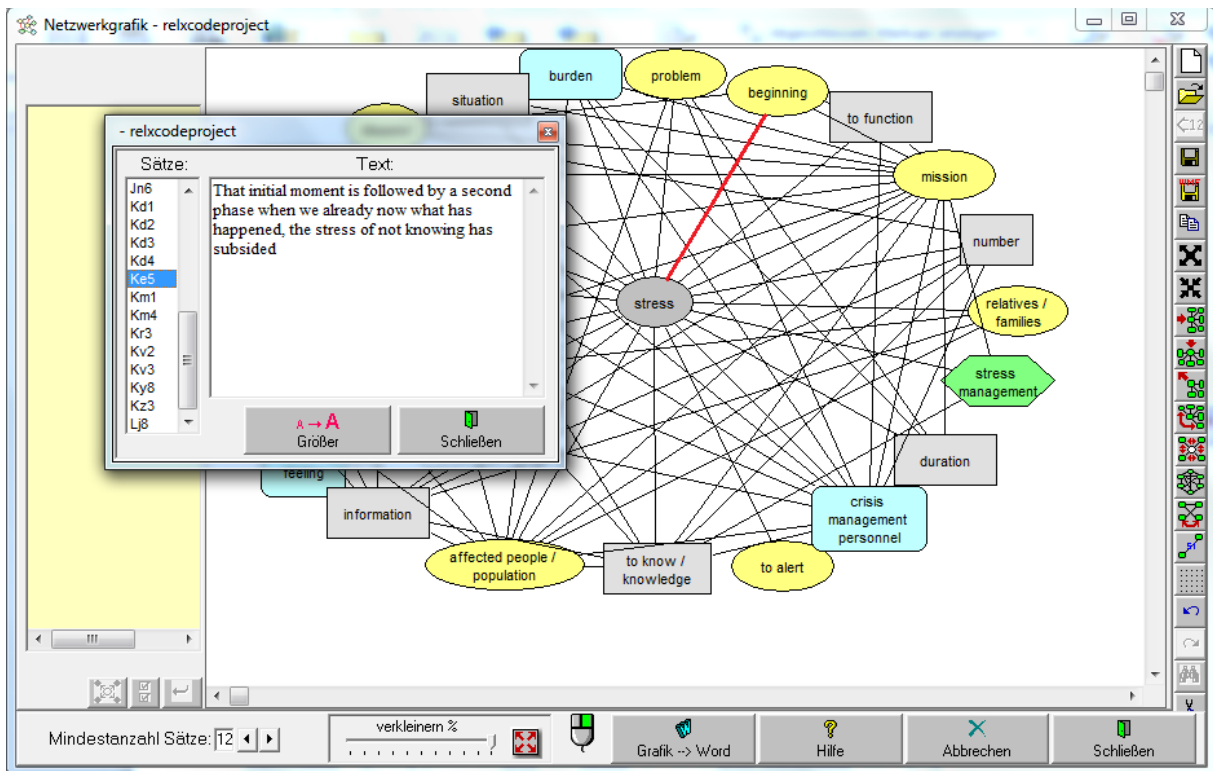


Figure 11. Quotes underlying a selected connection within a network graph in WinRelan

In this study, which includes a relatively high number of interviews (against the background of the conceptual idea behind GABEK, Zelger, 2002), theory-based categories of key terms were highlighted in the graphs by means of different colors and shapes, to enhance the readability of the complex network graphs.

6.3 Results

6.3.1 Preliminary remarks

The analysis of the interviews focused on the reported status-quo and *possibilities for improvement*²⁴ regarding perceived *stress* and *burden*, as well as *stress management* and coping techniques and related needs (*helpful/important*) of the interviewed crisis managers. The experienced stress and stressors were further examined by analyzing the factors *demand*, *control* and *support* within the work environment of crisis managers according to the demand-control-support model (Karasek & Theorell, 1990; see section 3.2.4.1). The term *burden* was included to comprehensively examine the construct *stress* with regard to emotional stress

²⁴ The expressions that were chosen as initial key terms of the network graphs are written in italics.

responses and consequences for health and well-being. Figure 12 shows the focus of the GABEK WinRelan analysis.

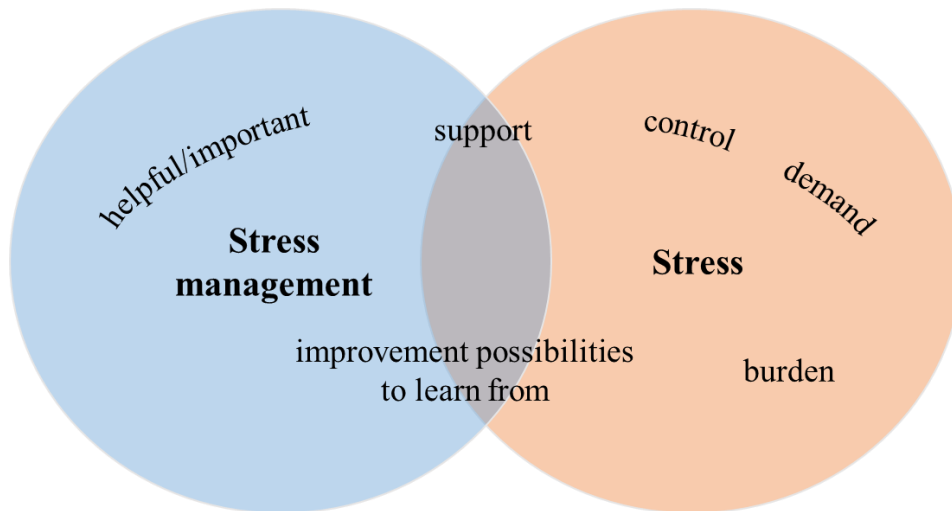


Figure 12. Focus of the GABEK analysis on stress and stress management

In the following section, general information about the interviews is presented. In the subsequent sections, the results of the analysis are reported by means of network graphs for the constructs mentioned above (see Figure 12) and by means of quotes underlying the connections between the key terms. As mentioned in the previous section, the software WinRelan enables the user to check all statements on which the connection of two terms in a network graph is based (see Figure 11). Out of all statements, the presented quotes were chosen based on their relevance for the respective connection. The presented quotes aim at representing the majority of statements and were chosen accordingly. Whenever points of view differed notably, all quotes relevant for a comprehensive understanding of the topic of interest are reported and the difference is addressed. The quotes were translated into English²⁵, while trying to preserve the original choice of words as much as possible. Consequently, some quotes still capture grammatical errors as in the original version.

Within the presented network graphs, different categories of terms are distinguished by their shape and color, to enhance readability and comprehensibility.

²⁵ Referring to the German, Austrian and Luxembourgish interviews, the Spanish and Lithuanian transcripts had previously been translated by the respective project partners, see section 6.2.4.3.1.

6.3.2 General results

In total, the 31 transcribed interviews were divided into 2,453 sense-units. For a general overview, Table 3 shows the 20 key terms that were coded most frequently or, in other words, mentioned most frequently by the interviewed crisis managers.

Table 3

Most frequently used key terms in WinRelan

Term	Frequency
Affected people	341
Psychosocial prevention and aftercare	330
Crisis management personnel	299
Mission	278
Stress	249
Disaster	243
On-site	180
Flood	175
To know/knowledge	173
Need	166
Information	156
Crisis management	150
Support	145
To function	144
Stress management	140
Problem	137
Burden	137
Extent	136
Important	130
Task	121

The most frequently mentioned key terms appear to be in accordance with the fact that the crisis managers were interviewed about their experiences in crisis management with particular focus on psychosocial support (or, as termed in the analysis, *psychosocial prevention and aftercare*), as well as about their perceived stress and stressors during disaster missions.

6.3.3 Network graph stress

To analyze the perceived stress and stressors experienced by the interviewed crisis managers in the context of disaster operations, a network graph based on the key term *stress* (Figure 13) and the underlying quotes (or connected sense-units) were examined. The graph shows the connections between key terms that were frequently mentioned (12 or more times²⁶) in relation to the initial key term stress.

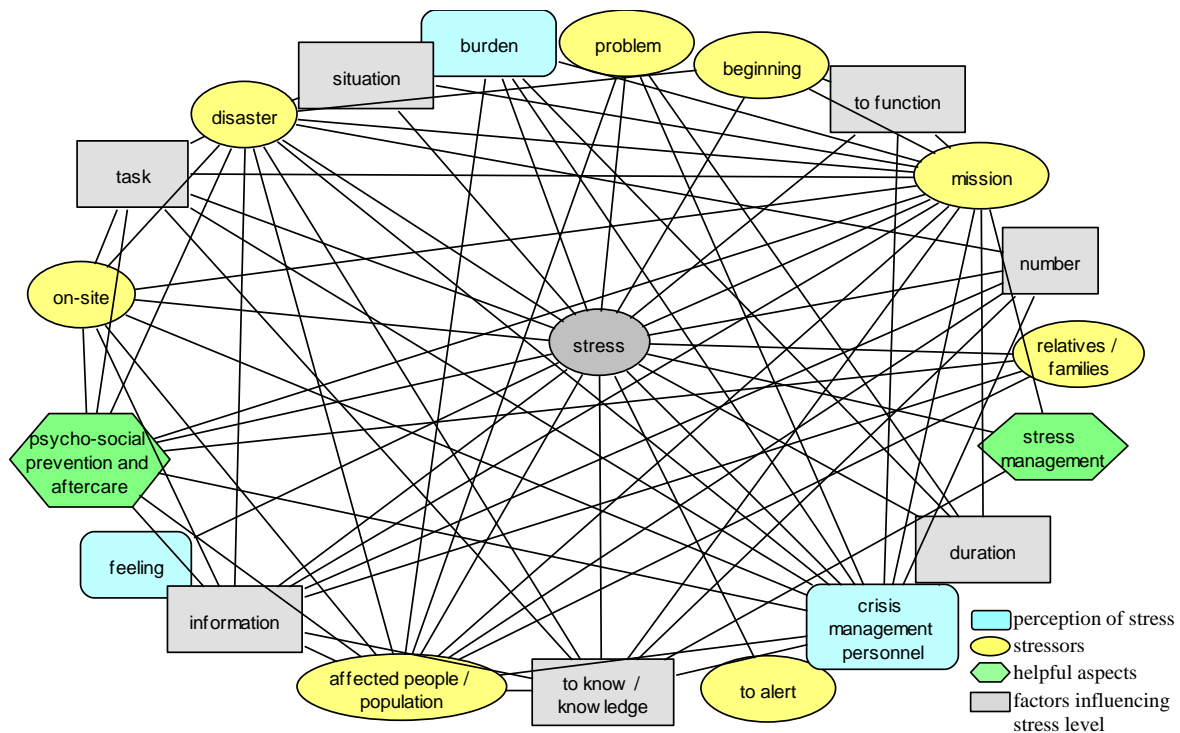


Figure 13. Network graph stress

Within the network, the terms associated with the initial key term stress are strongly cross-linked in a complex way. This might indicate that the stress experienced by the interviewees in the context of crisis management is not caused by isolated stressors but by an interaction of stressors (e.g., dealing with affected persons), environmental conditions (e.g., duration) and individual factors (e.g., knowledge) as well as resources (e.g., stress management techniques).

Overall, the interviewees associated stress repeatedly with emotions (key term *feelings*) and the perception of *burden*, experienced by themselves and their colleagues (*crisis management personnel*; presented in blue, rounded rectangles).

²⁶ The minimum number of connections was determined in order to ensure sufficient readability, without compromising important aspects (see section 6.2.4.4).

Quote representing the connection between the initial key term *stress* and the key term *burden*:

“It's funny because even though we'd studied these things and had training, I was really surprised to see how everything had affected me [burden]²⁷. It was as if a relative of mine had died, I felt exactly the same as if someone close had been killed.” [Kk8]²⁸

Apart from the expectably related key terms, *disaster* and *mission*, specific stressors frequently reported by the crisis managers were dealing with *affected persons*, *relatives/families*, *problems* arising during the *mission*, and the situation *on-site* (stressors presented in yellow ellipses).

Quotes representing the connections between the initial key term *stress* and the key terms *mission*, *affected persons*, and *relatives/families*:

“So this was really stressful...It wasn't that you would have been tired because you were so involved with this [mission]...It started in the morning at 10am and at midnight you were still around...It was like this 'Duracell bunny' so you just worked, you didn't know why, you didn't realize if you had eaten something or whether you would have been hungry or not...” [Gm9]

“It's such a challenge that you would lie if saying that you weren't under a great deal of pressure [stress] during this time. And you must imagine that you have to live up to so many things: Your own staff, the affected people, the government, the media; and that really is a challenge not to be underestimated.” [Je7]

“[Stress] That was the hardest thing to do because the families were extremely disturbed and tired, and giving them information about the identifications at the moment ... well, you know, the situation was really irrational [...] But of course, you can't say anything. Things got very heated but I hung on in there. What the families wanted was that the person responsible comes forward and gives them an explanation.” [Kn6+7]

²⁷ If not obvious, the respective key terms coded in a sense-unit are provided in square brackets.

²⁸ This combination of letters and numbers identifies the respective index card in WinRelan.

The examination of quotes underlying the connection between *stress* and *beginning* led to the assumption that the level of stress perceived by the interviewees depended on the different phases of the disaster. In this context, it was reported that the highest levels of stress were perceived in the beginning of the disaster operation, shortly before and after disaster alert was given, due to uncertainty about what to expect and lack of information. During the disaster operation itself, the crisis managers frequently reported concentrating on working without consciously perceiving stress. After the mission, when crisis managers had time to think about the incident, stress was likely to return:

Quotes representing the connections between the initial key term *stress* and the key terms *beginning* [*first phase*] and *mission*:

“But, as said, the amount of stress was quite high in the beginning, uncannily high, because we were just a few people and what was asked from us was enormous, because we also put ourselves under pressure, that’s for sure.” [Fw9]

*“If I had to assess the level of stress, I would say that most stress is caused by the initial [*beginning*] sense of uncertainty.” [Kv2]*

*“Until you start to have any information and all the services start coordinating their interventions to resolve the crisis in a manner as coordinated and orderly as possible, resulting in the best possible care for citizens [*affected persons_families*], stress levels don't return to normal levels.” [Kz4]*

“And when you see that you have enough people so that you can fulfil the demands that were brought to you...To actively start this mission in this moment so you can fulfil it within a first phase...Then, the stress reduces.” [Gg6]

“Because I actually was under the impression that, as long as a man is under stress, he works, he functions, but then the time comes all of a sudden, when the injured people have been recovered, the first phase has elapsed and now comes the second phase, and then one gets calmer and maybe stress isn’t as enormous anymore, and then one starts to realize certain things and one looks at things closer, I must say.” [Fu7+8]

“During the mission people hardly ever have stress. That happens later, maybe when they relax. [...]” [Ho8]

“Yes, as long as you help [mission], you don’t have this problem, because you don’t have the time to think about something, you only do when you come to rest [...]”
[An4]

Other aspects that influenced the level of stress experienced by the crisis managers were the kind of *tasks* and duties, the extent of available *information* and *knowledge*, the *duration* of the mission and the *number* of affected people (influencing factors presented in grey rectangles):

Quotes representing the connections between the initial key term *stress* and the key terms *information*, *duration*, and *number*:

“[Stress] I was out there at the fire station in the incident command center and there it’s extremely important that, from out there, you obtain information from the disaster site, and when the information flow does not work with 100 percent, then you are powerless because one can only manage or request personnel or whatever, if one is up to speed from outside all the time.” [Bs4]

“The stress lasted the whole time [...] so, that is, for me, I think, the biggest factor of stress, to take a break for the first time, to know when...That tomorrow is another day, that you need to sleep at so some point...And because you didn’t know from the very beginning [how long it would take]”[Gm8]

“One thing is not knowing how many people are at risk and another is knowing that 50 or 100 people are in danger. It’s still stressful [...]. The next step is to deal with the most critical situations in the shortest time possible.” [Ke7]

By examining the quotes underlying the connection between *task* and *stress*, tasks and duties causing particularly high levels of stress during the disaster operation were identified. In this context, the crisis managers experienced the communication with press and media, face-to-face victim contact, the high degree of responsibility (for far-reaching decisions to be made under time pressure) and having to answer for potential failures as particularly stressful:

Quotes representing the connection between the initial key term *stress* and the key term *task [responsibility]*:

“Yes, our [psychosocial support team] specific area of operation was the morgue [...]. The pressures arose at team level and when dealing directly with the victims.” [Kt5]

“And then you must function correctly, i.e., you must make the right decisions, within the shortest period of time, because you have a huge responsibility, and then the stress is extremely high.” [Fw6]

“[Stress] The press is a bit of a problem, that I must say as well. I am well aware of this sensationalized tabloid press and everything, but it’s nearly impossible to handle this [...]” [Ax8]

“[...]That is something, I think, what burdens many: This hostility, why this way and not differently. You have to decide on short notice in this situation, and I think, for making decisions in this situation, one must consider that we are under pressure.” [Bc4]

“[Stress] Because after three, four weeks, as it always was, you heard these things as well, who is responsible for this flood. [...] Yes, of course mistakes happen in such operations.” [Jf3]

Concerning the mitigation of stress effects, *psychosocial prevention and aftercare* and *stress management* were frequently mentioned by the interviewees (presented in green hexagons). Psychosocial prevention and aftercare was provided for victims, families and crisis management personnel, who were reported to show reactions to stress, but rarely for crisis management leaders:

Quotes representing the connections between the initial key term *stress* and the key terms *psychosocial prevention* and *aftercare*:

“We also provided group support to the fire fighters during the operation because one fire fighter had a textbook reaction to the stress.” [Kk5]

“[superiors admitting stress] It is more difficult in this case [with superiors], it is more difficult. They have a task here, see themselves differently, and they face it...It

did not happen to me that I would have had to consult a superior into that direction.”
 [Ev9]

6.3.4 Network graph burden

To analyze the perceived burden reported by the crisis managers, a network graph for the initial key term *burden* was created. It needs to be noted that although stress and burden are closely related, the term burden was used by the interviewees (and accordingly coded by the analyst) to describe aspects applicable to all affected groups (i.e., mainly emotional stress responses), whereas the term stress was used to refer to aspects primarily applicable to crisis management personnel (i.e., mainly work-related stress). This network graph (Figure 14) shows the terms that were mentioned by the interviewees (at least 7 times or more frequently) in connection with the initial key term burden as well as their connections.

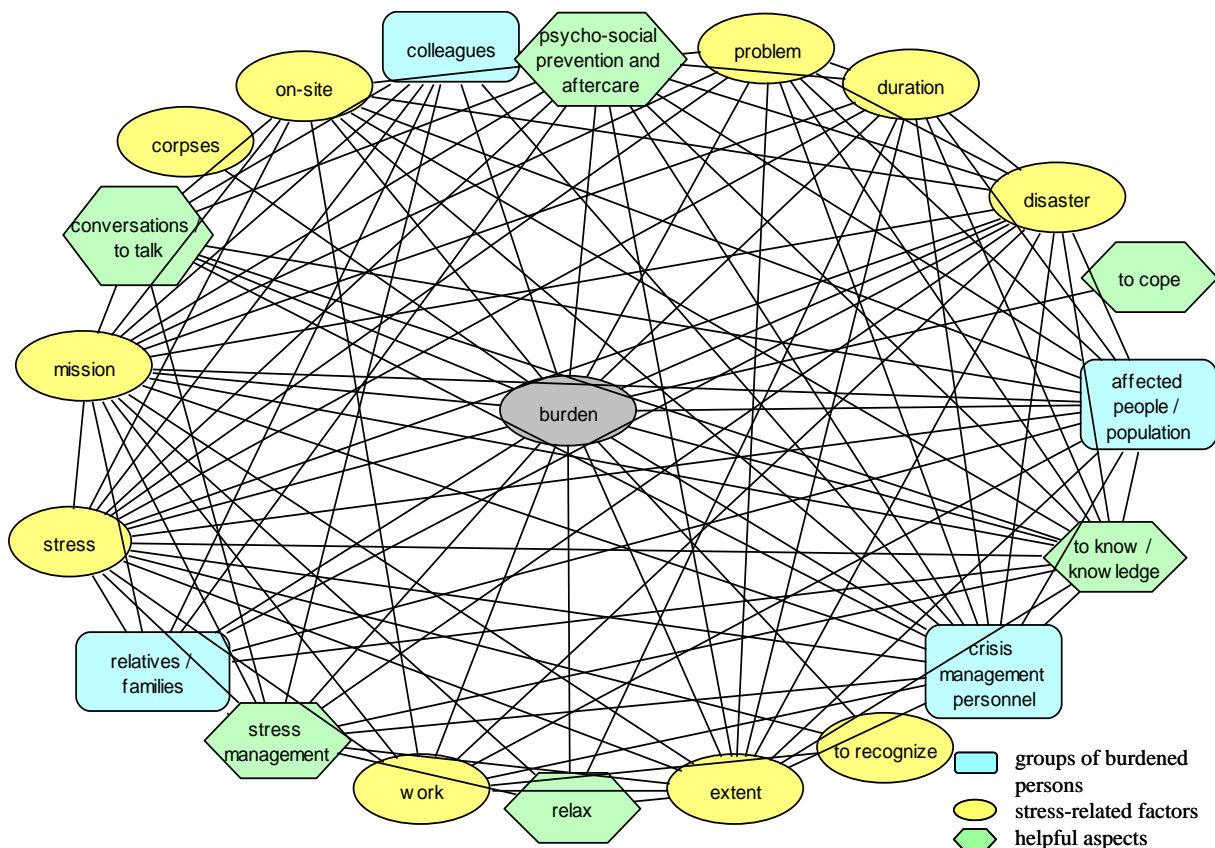


Figure 14. Network graph burden

As highlighted in the graph via blue rectangles, the *affected population*, *relatives and families* as well as *crisis management personnel* were reported to be burdened by the disaster (and its management, referring to the latter).

Quotes representing the connections between the initial key term *burden* and the key terms *crisis management personnel* and *affected people*:

“It was intense, because this was not at all a normal situation for me... I really felt burdened... Because you see the misery of the people and in addition you have the responsibility to be the leader.” [Ha6]

“There were ten days of continuous work load, one blow of fate after another [affected people], which had to be dealt with.” [Bj6]

The interviewed crisis managers frequently mentioned burdening aspects (presented in yellow ellipses) like the *duration* and *extent* of the *mission*, the situation *on-site*, being confronted with *corpses*, the scale of the *disaster*, and *problems* occurring during the mission, also regarding *affected persons* (see stressors in section 6.3.3). One critical and difficult aspect frequently reported by the crisis managers was to *recognize* signs of stress and burden for themselves and for staff:

Quotes representing the connection between the initial key term *burden* and the key term *recognize*:

“Unfortunately, one does not realize it until it is actually too late, but some back out, others get euphoric. It is difficult to assess as a layman. Mostly it is the withdrawal and then you realize that something is wrong.” [Ao3]

“Frequently, in the periodic crisis management meeting, I pointed out to the executives that they should keep an eye on the burden of their staff and on the 48 hours rhythm, that there is constant replacement, shift changes.” [Fh7]

Concerning aspects that were perceived as helpful in dealing with the burden during and after the crisis mission (presented in green hexagons; see associations with *stress management*) the interviewees mentioned *conversations* (with colleagues), *knowledge*, as well as contact with their families and partners frequently in this context. These aspects will be further elaborated on in the context of the network graph on *stress management* (see section 6.3.8).

With regard to *psychosocial prevention and aftercare* to mitigate the burden caused by crisis missions, the crisis managers addressed the importance as well as a lack of psychosocial support opportunities but also barriers to make use of them:

Quotes representing the connection between the initial key term *burden* and the key term *psychosocial prevention and aftercare [psychosocial support]*:

“[...] although this support was introduced after the latest missions, psychosocial support after missions has sometimes been deficient because sometimes it's taken for granted that we can handle the strain because we're professionals. But what about the side-effects after such missions?” [Ks7]

“[...] There was the offer [psychosocial support], but not everyone made use of it, since we all are broad-shouldered and we do not always admit that we have problems.” [Fv3]

“I think it's kind of... Actually I don't know, but my impression is that it is not really a system that works. Because you know, the notion of a psychologist is somehow stigmatized. So it means that the rescue men are thinking that if they're going, looking for help, to a psychologist, then maybe they're not 'valid', not good enough to continue to work.” [Hi8+9]

“Well, it's just like that; they all are heroes and strong men. So that's [psychosocial support] rather not the topic. [...] 'I am a hard rescue worker' and things like that... the question is if that's clever...I think that this is an issue of [organizational] culture, to make use of such [psychosocial support] offerings.” [Jn2+3]

6.3.5 Network graph demand

The aspects of disaster operations that were perceived as most demanding and challenging by the interviewed crisis managers were analyzed by means of a network graph with the initial key term *demand/challenge*. The graph (Figure 15) shows the terms that were frequently addressed in relation to the key term (at least 5 times) and their connections.

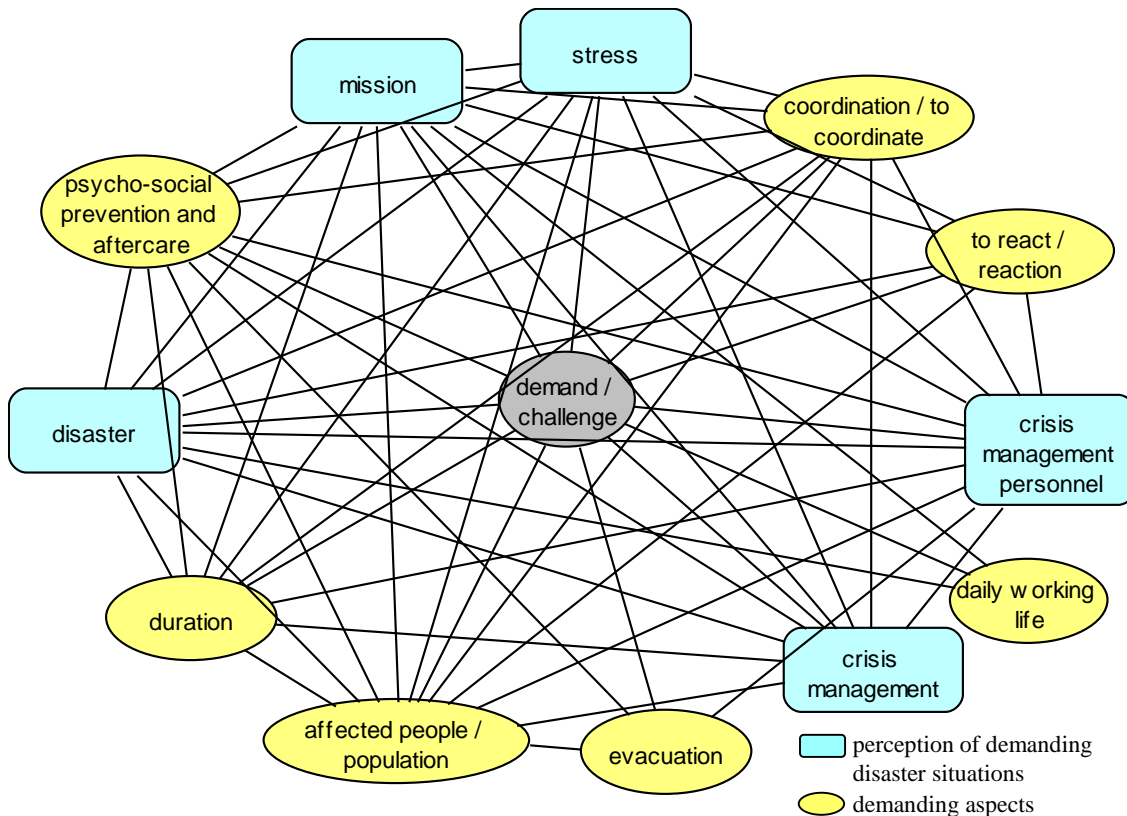


Figure 15. Network graph demand/challenge

During *crisis management* and *disaster operations (missions)*, the *crisis management personnel* are confronted with numerous changing and newly occurring demands and challenges, which was also stated by the crisis managers (as presented in blue rectangles). A high level of perceived demands was frequently addressed by the interviewees in relation to *stress*.

Quotes representing the connections between the initial key term *demand/challenge* and the key terms *crisis management personnel*, *disaster*, *mission*, and *stress*:

“It’s such a challenge that you would lie if saying that you weren’t under a great deal of pressure during this time. And you must imagine that you must live up to so many

things, your own staff, the affected people, the government, the media, and that really is a challenge not to be underestimated.” [Je7]

“[...] I think the level of stress would have been constantly on a high level until we had recovered all severely injured persons. During this time you are challenged and you are under stress.” [Fx6]

“And this is followed by another more stressful period when we think about how quickly we can respond to critical demands.” [Ke6]

“Looking at it this way, I’d say that the ten days were continuously stressful: High demands that we were just able to manage. You always wonder about yourself, how this actually worked, physically, how you were able to go through with it.” [Eo6]

Concerning particularly demanding aspects (presented in yellow ellipses), the crisis managers described a long *duration* of the disaster operation, difficult cases of taking care of *affected persons* (as during *evacuations*), and the need to *react* as fast as possible to specific challenges. Furthermore, the change from *daily working life* and day-to-day occupational structures to the implementation of disaster response structures and crisis management was experienced as demanding. Beyond that, the *coordination* of psychosocial support, personnel resources and walk-in volunteers during disaster operations represented a big challenge for the interviewed crisis managers.

Quotes representing the connections between the initial key term *demand/challenge* and the key terms *duration*, *affected people*, *evacuations*, and *reaction*:

“The first day, all of us did not sleep. That was a challenge. Those people [affected persons] had to be evacuated; our people [crisis management personnel] worked around the clock with equipment.” [Ic6]

“All this chain of things that is dragged behind such a disaster [consequences], power supply disconnections, and the fact that the provision of food and drinks for the population was not guaranteed anymore, this was the main problem during the first week [challenge].” [Ab2]

“[challenge] Reaction. Fast reaction! Every event has to be reacted upon very fast. You cannot tarry: to help or not to help, to save or not to save. You cannot think; you have to convince a person to be rescued.” [Hr6]

Quotes representing the connections between the initial key term *demand/challenge* and the key terms *daily working life* and *coordination*:

“Thanks god, compared to day-to-day emergency missions, up until now, there were not so many disaster missions within the area we work in. Of course, the acute phase was very chaotic because there was no structure in place yet, meaning the structure that is needed in addition to the existing structure for day-to-day missions. This was quite a challenge for everybody during the first week.” [Aa4]

“Biggest challenge was to just put pressure on these government organizations and to implement this. I would say it was to get this coordination [of psychosocial support] working.” [Hl4]

“It’s a challenge to gather the people [personnel] on time. When remembering, there was a point in time, after a couple of hours, when my ear was swollen because of all these calls I had to make. You know, if one or the other did not answer again [feedback]”. [Fq2]

“What I consider a difficulty and a challenge, but also as a point that one needs to seriously address in the future, is the coordination of everything. I mean it is really great if so many people come, helpers and volunteers that want to help. So don’t get me wrong. This is great! They came from everywhere. What I want to say is that this must be more strictly coordinated though.” [Bq9]

6.3.6 Network graph control

To analyze the level of control perceived by the interviewed crisis managers and potentially related factors, a network graph with the initial key term *control* was created (Figure 16). It shows the connections of terms that were frequently mentioned (at least 5 times) in relation to this initial key term.

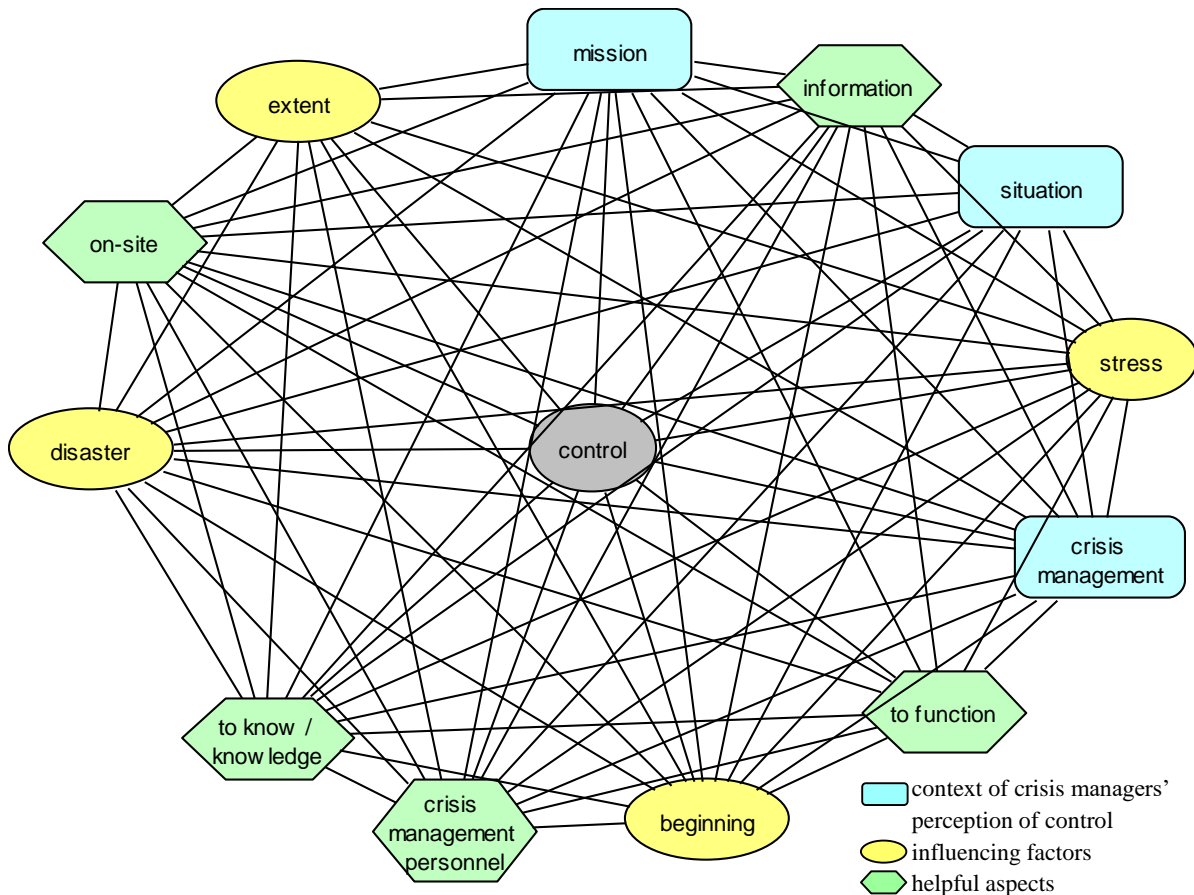


Figure 16. Network graph control

The interviewed crisis managers addressed the limited possibilities to fully control the *situations* during *missions* in *crisis management* (as presented in blue rectangles).

Quotes representing the connections between the initial key term *control* and the key terms *situation*, *mission*, and *crisis management*:

“You are not completely helpless at that moment [situation, disaster mission], but you do not know, what will happen next. This is beyond your control [...]. “[Dm1]

“[...] and here [situation, disaster mission], our capabilities were exceeded. We were powerless [control] against the water. But there were some regions where it worked out and there, we also sent the right people on-site.” [Ep2]

A perceived lack of control was reported to cause *stress* and was rather experienced in the *beginning* of a *disaster*, depending on its scale or *extent* (as presented in yellow ellipses). In this context, the crisis managers described that it is hardly possible to control the situation in the case of large-scale disasters.

Quotes representing the connections between the initial key term *control* and the key terms *stress*, *beginning*, and *scale/extent*:

“I perceive situations as stressful when I cannot control them, independently from the fact whether I really cannot control them or whether I just realize that I do not know how to deal with them.” [Ax4]

“It is in the very beginning, as said, that was when we did not have the fire extinguished for 100 percent and we didn’t know if the people were still alive or not, that’s really the most stressful time until the situation is under control...then, the stress relieved.” [Fy3]

“I think it was the first day [beginning]. You think you know everything, how to control the situation when you are dealing with the human factor. When the equipment is supplied, you put all the things inside and say that you want to evacuate them [affected people]; they suddenly say that they are not going anywhere. How do you behave then?” [Ia8+9]

“Yes, that’s [disaster mission] always like that, when things abruptly run out of control... That’s something difficult to control directly. Honestly, that’s because we do not have much experiences with missions of this scale, fortunately... but this might also be a disadvantage.” [Gh5]

Aspects the crisis managers reported to be important for controlling the situation (as presented in green hexagons) were (previous) *knowledge* as well as *information* and feedback they got (particularly concerning the situation *on-site*).

Quotes representing the connections between the initial key term *control* and the key terms *information* and *knowledge*:

“[Possibilities to control the situation] do not always exist completely. Since there is always a lack of information, you cannot control everything, because you do not know everything. For example, when I requested some additional forces, I did not know

whether and when I would get them. This is outside of one's area of influence and one must wait until you get a response." [D19]

"Prevention activities, like exercises or drills, are crucial. The more training you have and the more exercises and drills [experience, knowledge] you've done, the better you're going to control the situation." [Lc3]

"[Control] You always have in mind, [...], that there is another manager on-site... you have to rely on him and that he can fulfil our demands on-site. [...] This is what bothers you, because you want to know whether your instructions were carried out within the required time frame and, of course, I also wait for feedback. [information]" [Es3+7]

Furthermore (helpful aspects in green hexagons), the interviewees perceived more control in situations when they had enough and competent human resources in terms of *crisis management personnel* to manage the crisis and reliable contact persons who kept them informed. Beyond that, the perceived level of control increased, once processes and communication *functioned* properly.

Quotes representing the connections between the initial key term *control* and the key terms *crisis management personnel* (in the sense of human resources) and *to function* (e.g., communication):

"You only get it under control, if you get support within the management, which means from each field you get a person in charge, some support, to whom you can delegate duties." [Gc4]

"At this point there was not much more we could do [control], so I relied on the know-how of colleagues, who tried to call other people [...]." [Dy4]

"[possibilities of control] Good, I knew who was responsible in which section and I could contact them. They had their cell phone or a radio set with them [...]." [Gq3]

"I had enough possibilities to control the situation. I could get hold of the people [contact persons], and when something did not work, I addressed and readjusted it." [Fq8]

6.3.7 Network graph support

To examine the support received and needed by the interviewed crisis managers in the context of the described disaster operations, a network graph with the initial key term *support* was analyzed (Figure 17). It shows the connections of terms that were frequently mentioned (at least 8 times) in connection with the key term *support*.

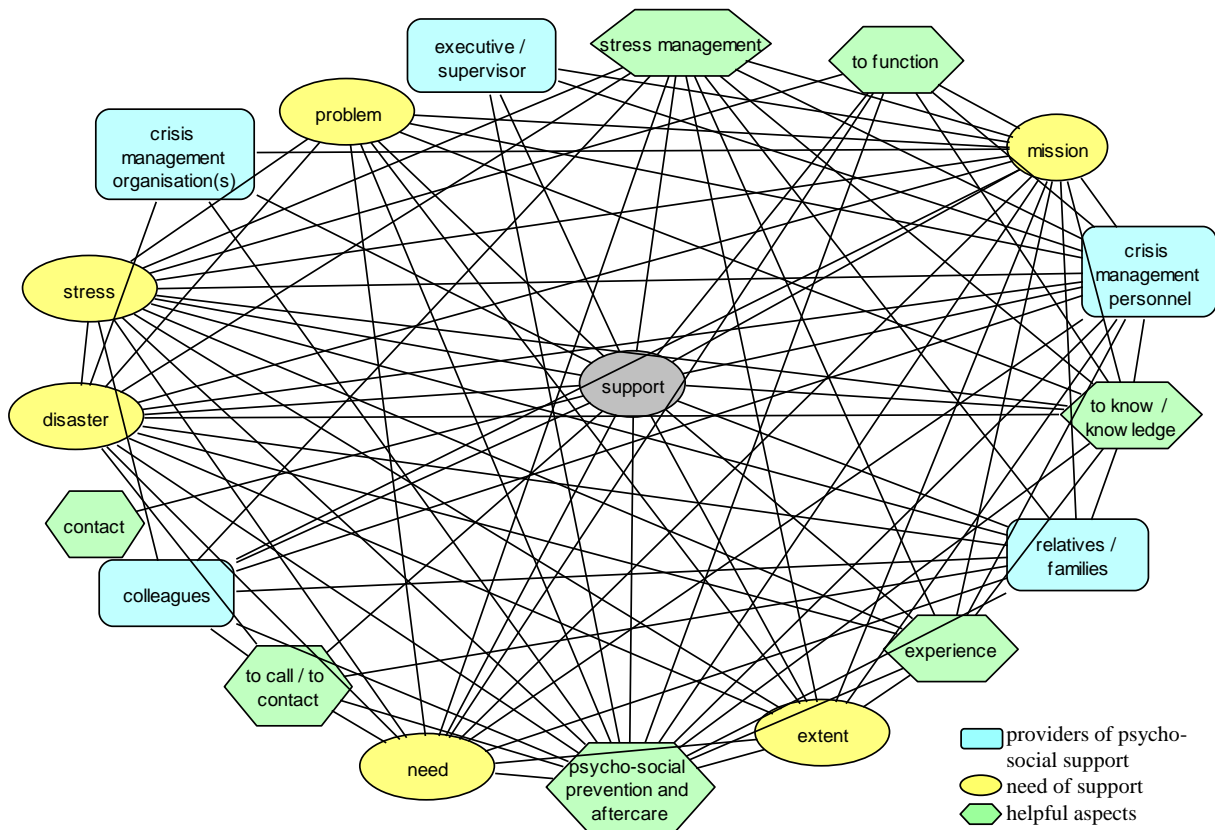


Figure 17. Network graph support

The interviewees stated the importance and *need* of support with regard to reducing *stress* during and after *disaster missions* (see connections of yellow ellipses). In this context, *relatives and families* but particularly the *organization, executives and supervisors* as well as *colleagues* were named as important providers of (psychosocial) support (presented in blue rectangles):

Quotes representing the connections between the initial key term *support* and the key terms *organization, executive/supervisor, and colleagues*:

“[support] [...] One week after the intervention, they [organization] called me to see how I was doing and to congratulate me for the work I'd done. That call is one of the most positive things I remember, not just because [it showed] they valued my work

during the crisis but also because they were concerned about how I was one week after the intervention. That was important to me.” [Lg5, Lg6]

“Yes, the superiors were crucial. There were always some compliments from above and they contributed as well [support]. This was not one-way; we all were in the same boat.” [Er7]

“He calls, and he is actually the leader, and he says, whenever there is a problem or you need me, I am there for you, day and night. I will not interfere in your mission, I know that you can do it, that you are doing it very well, but when you need me, I am here [support]. And this is already enough. This gives inner secureness [...]” [Bu3]

“But it's also true that one advantage - if you can call it an advantage - is that my closest companions, those who help me manage the unit, were well aware of the pressure I was under and they tried to give me their support.” [K15]

Experience and knowledge were described as helpful to effectively support staff and co-workers (presented in green hexagons).

Quote representing the connection between the initial key term *support* and the key term *experience*:

“If there is someone [colleague], who has a certain level of experience, the people who work with him are calmer. Maybe it changes their way to deal with things. They have the feeling, that someone is there who helps them to reduce the stress.” [Gi7]

Beyond that, the *need* of support and its actual provision were reported to differ between the different phases of disaster missions as well as to depend on the scale/*extent* of the disaster (aspects describing the need of support are presented in yellow ellipses):

Quotes representing the connections between the initial key term *support* and the key terms *need*, *disaster*, *mission*, and *extent*:

“In the first phase, we are alone anyway, we must be able to function alone, too, but it is certainly a big support to have contact persons for different questions and problems which occur later, for example how do I deal with the corpses, what do I do with them [...] that one can ask people who are responsible for that. [...] But this was missing back then” [Ga7]

“I have to say that was a mission that one could still handle alone. If it had lasted longer or had been different regarding the demands [extent], I would have needed support. One couldn’t have managed it alone, to work like that, to document the mission...” [Fr3]

6.3.8 Network graph stress management

A network graph for the term *stress management* was created to analyze the strategies that the crisis managers use to apply during and after disaster missions to cope with the mission-related stress. Beyond that, it was aimed at gaining insight in the interviewees’ requirements and needs concerning stress management techniques and training programs. The graph shows the connections of terms that were frequently mentioned (8 times or more) in relation to the initial key term stress management (Figure 18).

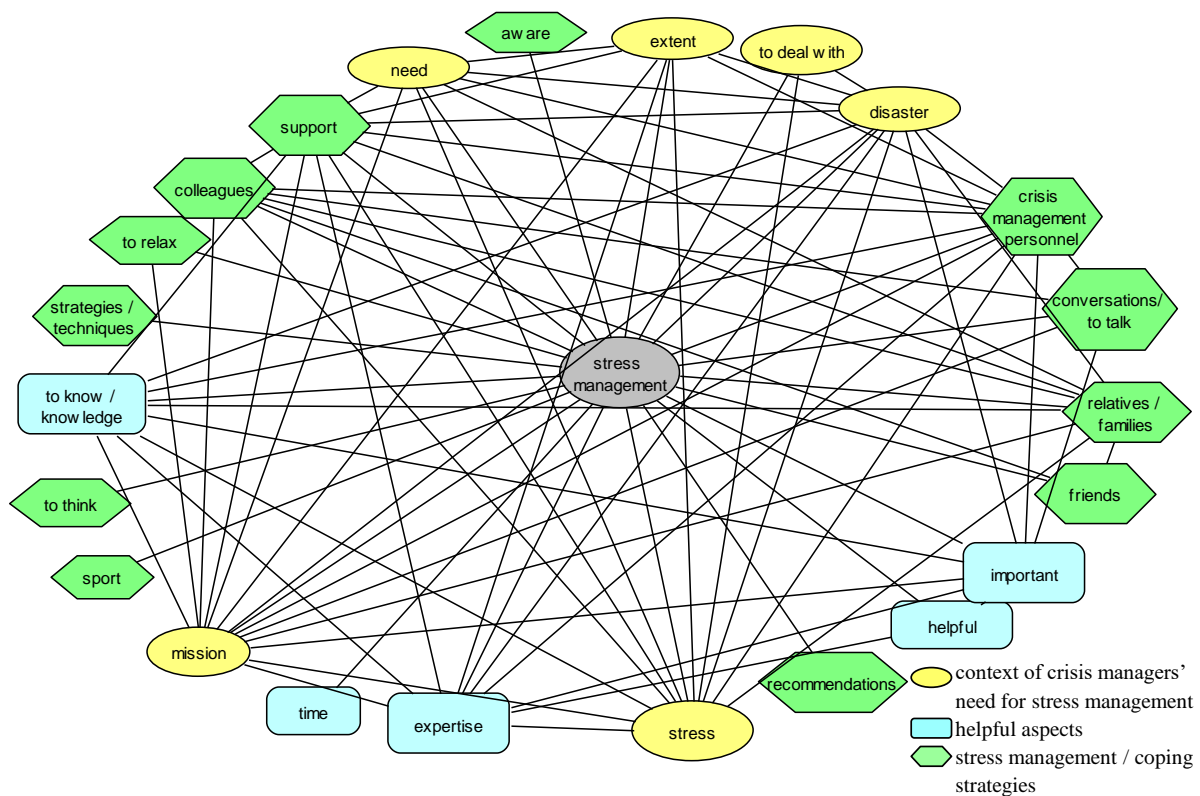


Figure 18. Network graph stress management

The crisis managers described a *need* to competently *deal with* the high levels of *stress* related to *disaster missions* (as presented in yellow ellipses). In this context, they addressed the importance of stress management techniques to effectively manage a disaster. They also described the general need for comprehensive stress management trainings.

Quotes representing the connections between the initial key term *stress management* and the key terms *disaster, mission, need, (to) deal with, and stress*:

“[stress management] You have to act step by step, otherwise you'll end up losing your temper and you won't manage the crisis properly. [...] The experience teaches you that you have to keep calm and control yourself [deal with stress], because getting nervous and responding inappropriately will get you nowhere.” [Ll1+4]

“It's always useful to know relaxation, stress management, personal debriefing or defusing techniques and to use them.” [Kv8]

“But what we realized during the mission: Stress management techniques were necessary as there were exhausted helpers who were burdened.” [Eh6]

“But we also noticed, that is what we now realized, that a change is actually necessary in the professional field of crisis intervention and emergency counselling, especially regarding more comprehensive trainings of these [stress management] techniques” [Fj4]

Several crisis managers mentioned that they had not received any stress management training and would not apply any specific *strategies/techniques*, and if they did, they had learned them by themselves:

Quotes representing the connection between the initial key term *stress management* and the key term *strategies/techniques*:

“[stress management] As far as I know, no one of us has applied something as specific as an autogenous training yet” [Ae9]

“No, I haven't applied any [stress management strategies]” [Hg2]

“I learned these [stress management] techniques by trial and error.” [Lf1]

Concerning *recommendable stress management strategies/techniques*, the interviewees assumed that individual persons are very different in this context and everyone has to find out what works best for him- or herself, preferably with the help of training. The crisis managers also addressed the importance of recognizing own signs of stress and knowing own limits.

Quotes representing the connections between the initial key term *stress management* and the key terms *strategies/techniques* and *recommendations*:

“[stress management] I think, everyone has to find out for oneself, because I know a lot of colleagues who have completely different strategies, and I believe that I would recommend to someone, who cannot cope with this, to explore different trainings and to think about how these are supportive. But at the end of the day, everyone has his or her own ways to compensate for this.” [Bd5]

“[recommendations stress management] I would not say that you are relaxed during such [disaster] missions. You just need to try to find your own way [strategies] to cope with this.” [Je8]

“[stress management, strategies] Yes, I had to find out for myself first, that’s true. When I started within the field of disaster control, for orientation I observed what the more experienced colleagues did.” [Er1]

“[stress management] Yes, I can really recommend this... to observe these signs [aware] that are different for everybody. For me, it’s the stomach, for example. Whenever the situation gets unsecure or I’m stressed, I always feel a bit nauseous.” [Fr9]

“[recommendations stress management] [...] at some stage you would have needed this, I would say. As a professional helper you should be able to assess for yourself [aware] when the point has come where you need to take a step back and take a deep breath.” [Bl8]

The interviewees also addressed the responsibility supervisors and *colleagues* have for their co-workers (*crisis management personnel*) in recognizing signs of stress and burden and in supporting them. Supervisors shall ensure appropriate durations of shifts and structured and regulated breaks and replacements. Furthermore, they should take burdened subordinates off duty if they recognize signs of stress. Beyond that, the interviewees recommended that supervisors and senior *colleagues talked* to their staff about the stress and stressors experienced during the disaster *mission*. In this context, the appreciation of the staff’s effort was seen as important.

Quotes representing the connections between the initial key term *stress management* and the key terms *colleagues*, *crisis management personnel*, and *conversations/to talk*:

“And this is what makes a good supervisor during a mission: If he or she addresses certain things in person-to-person talks or if he or she realizes changes within the group of professional helpers [crisis management personnel] and provides advice on how to proceed in that situation right away” [Af8]

“[stress management][...] To take someone off duty or to replace someone is really important; to make sure that they don’t work eight or ten hours in a row or even more as the firemen did when they were of the opinion they had to work for 15 or 16 hours. That simply doesn’t work.” [Cx2]

“[stress management] Based on our experience from previous missions we established something similar to a mentoring system which means we had contact persons, experienced colleagues as mentors, for the younger colleagues.” [Bm8]

“[recommendations stress management] They should definitely turn to someone being responsible [...]. Conversational skills are really important when talking to young colleagues to reprocess the operation in which they were involved, and to appreciate their work, which is important.” [Eq4]

Regarding applied *techniques* or *strategies* to deal with the stress related to a disaster mission (presented in green hexagons), the crisis managers described doing *sports*, retreating from the situation (during breaks), and seeking *support* from *families* and *friends*. Further reported techniques and coping strategies were breathing and *relaxation* techniques, humor, distracting oneself, socializing and continuing day-to-day activities. Beyond that, *support* from peers and *colleagues*, for instance by means of *conversations*, has a key role in coping with mission-related stress. During crisis management, focusing on the task was often described as an effective way to not let the stress affect oneself.

Quotes representing the connections between the initial key term *stress management* and the key terms *sport*, *relax*, *conversations/to talk*, and *strategies/techniques*:

“Especially for me, I must say, it is simply the peace and quietness; to get away from it all, to be somewhere at home, to walk the dog, or to do some sports. These are the right things.” [Af2]

“Stress...I don’t know, for me it went reasonably well. But whenever I had the possibility to take a step back, I went down to my office and said I’d be off for ten minutes or so.” [Gq6]

“[strategies stress management] To have a meal, to consciously have a meal: We used to just have something to eat while continuing to work and the food supply was not too bad but if you say let’s go to the canteen for 20 minutes, that helps.” [Dl1]

“[stress management] I try to get into an ‘I do not care’ feeling. [...] I tend to ridicule things as a technique to compensate.” [Bc9]

“The second technique, if we notice a greater sense of anxiety or uncertainty, is to practice breathing and relaxation techniques ...and share [our feelings] with a colleague who we know is trustworthy and prepared.” [Kv5+6]

“Then, we had a few glasses of [liquor] and a beer for each one, and a bit of cheese, and that helped us to sleep well without any nightmares and without thinking what would be damaged [...]. On the next day, we were fit again.” [Co9]

“If I knew that the next 12 to 13 hours would be calm, I went to the beer garden, talked intensively with a couple of people, and had two or three beers. Just doing anything completely different is what helps me.” [Dk8]

“Specific techniques? Well, in my opinion, what is most helpful is to recover the things you normally do because I became perfectly aware that I’d stopped doing things I normally did, like going out, going cycling or going for a walk.” [Ko7]

“When you become stressed in a crisis situation, you have two options: either switch off or act. When I’m in a stressful situation, I focus on acting and handling [the situation] with the team. Stress may come later. When we’re intervening, we focus on the task at hand and that’s how we handle it [stress], by focusing on the task.” [Kt3+4]

Quotes representing the connections between the initial key term *stress management* and the key terms *friends, relatives/families, support, colleagues, and conversations/to talk*:

“Do it because when you have a little time to rest [relax] during operations, being able to ask a friend how he is will reduce your level of stress because you'll feel that your life is continuing normally and you'll feel that support.” [Lg1]

“[stress management] Yes, one technique is to keep it out of your mind. Another technique is to simply talk about it, ideally with people who had the same experiences. To talk to people helps very quickly and it is good. It's like they say, if you talk about it, it becomes easier, and that's really how it is. The others have experienced the same as you have and talking about it helps to progress.” [An1]

“[stress management] Yes, the way I do it is to be surrounded by people that are valuable to me [friends, family, colleagues] and that I can talk to but who also openly tell me their opinion and give me advice if I ask them” [Bt9]

Thinking things through was sometimes seen as a helpful stress management technique and sometimes avoided, probably out of fear that bad experiences could be triggered.

Quotes representing the connection between the initial key term *stress management* and the key term *to think*:

“[stress management] [to distance oneself] And then I calmly thought about what went well and what didn't go well and what still had to be done. After that, I continued. This was not about breath control or anything alike but just about putting a little distance between me and the situation and to think about where we are – just for me.” [Gq7+8]

“[stress management] And when that happens, it is already a fact. Some think about it, others don't. Some make up some legend in their minds. Another one comes back without seeing anything and his head is spinning. Just because he keeps thinking about it.” [Hp3]

“[stress management] You just eliminate that out of your head. You don't give it prominence. [...]” [Hp5]

Aspects that are described as *helpful* or *important* in dealing with the stress (presented in blue, rounded rectangles) are *knowledge* and crisis management *expertise*, which is especially helpful as it may sometimes compensate for a lack of stress management skills. However, it is important to note that perceiving oneself as experienced can also result in the (false) conclusion that one is resilient to all forms of stress and therefore does not need to achieve more comprehensive stress management and coping skills. Nevertheless, the interviewees assumed that expertise cannot completely replace stress management training as it takes time and experiences in disaster operations to build expertise.

Quotes representing the connections between the initial key term *stress management* and the key terms *to know/knowledge*, *expertise [experience]*, *important*, and *helpful*:

“Performing drills, having procedures, knowing and implementing them and knowing whether they work or not, all that helps you.” [Ks3]

“[stress management] I haven't learned any [technique or strategy]. What has helped me are all my years of experience.” [Lk8]

“[stress management] I don't need anything for myself, I have seen enough already. I was involved in more than [high number] missions which were really difficult. And there wouldn't be anything which I had not experienced yet. You can cope with everything quickly then.” [Am7]

“[stress management] I'd recommend training in the different techniques that exist because experience cannot be transmitted. This type of training is very important and necessary for people who are starting out [in this profession] because they'll come across these types of situations all the time.” [Ll7]

6.3.9 Network graph *important – helpful*

Aspects that were perceived as important and helpful during crisis management by the interviewees were examined by means of a network graph with the initial key term *important* which was extended at the key term *helpful* (Figure 19). It shows the terms that were frequently mentioned in relation with the two initial key terms (important: at least 8 times; helpful: at least 6 times) and their connections.

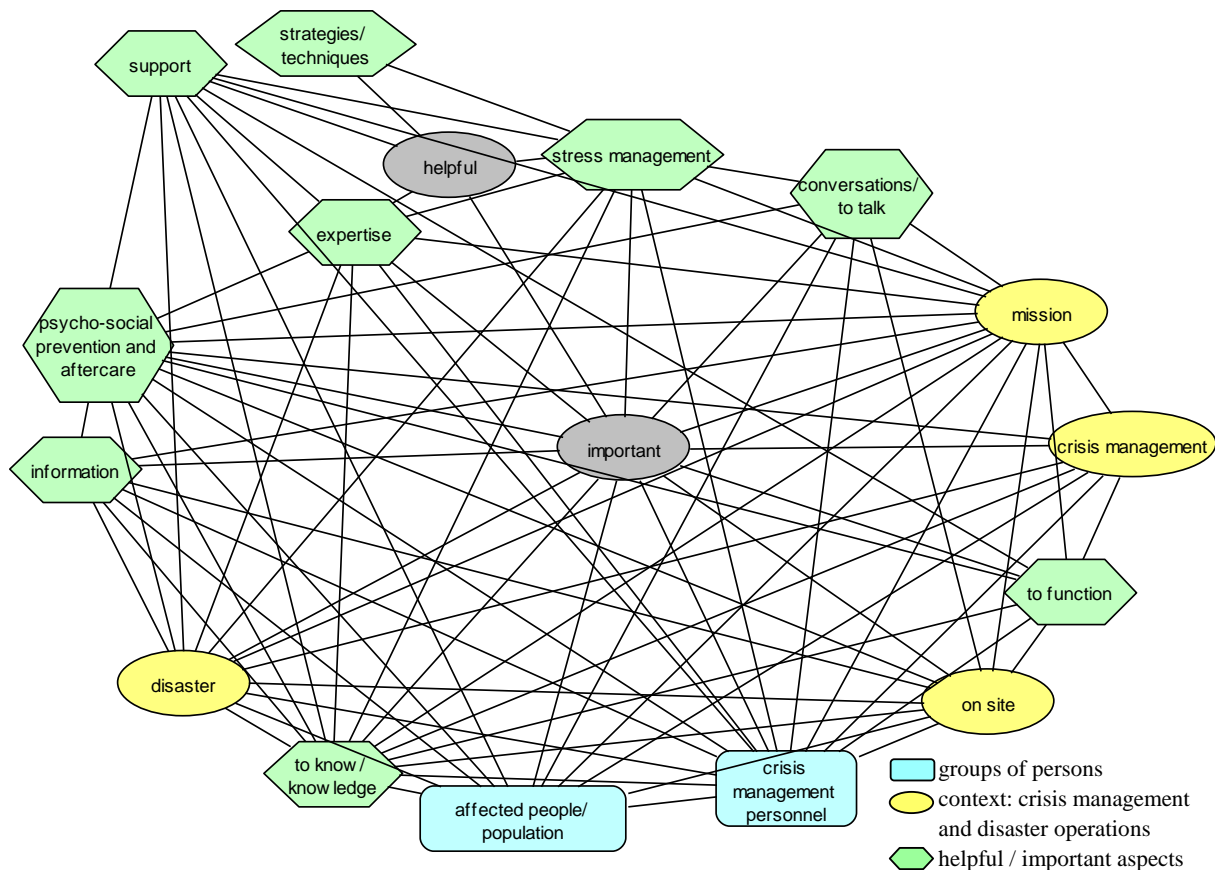


Figure 19. Network graph *important – helpful*

Regarding *crisis management* and working *on-site* within the scope of *disaster missions* (context presented in yellow ellipses), different aspects were described as important by the interviewees.

Those aspects concern the *affected persons* and the population as well as *crisis management personnel* (as presented in blue rectangles):

Quote representing the connection between the initial key term *important* and the key term *crisis management personnel*:

“I think the most important thing is to have an organized and structured system. This helps people [crisis management personnel] to work more safely, calmly and with all the necessary tools.” Kz5

Specific aspects (presented in green hexagons), which were reported to be important and helpful in managing a disaster, were previous *knowledge, expertise*, and knowledge about the current situation. Additionally, obtaining enough *information* was described to have a key role in this context.

Quotes representing the connections between the initial key term *important* and the key terms *to know/knowledge* and *information*:

“For me, it is important to know what are the tasks in an acute situation, and to know that in six to eight weeks there is the task to organize a meeting for the bereaved... after one year there is the Remembrance Day; and after six weeks there is the report to the ministry...” [Ea8+9]

“Knowing the situation is also very important. When you start to become aware of and learn about a situation, for example whether or not there are victims, the level of stress is low.” [Ks1]

“The most important skill is obtaining information that allows you to take the appropriate decisions.” [Lb5]

“In this case, using a helicopter is the optimal solution, because one is able to see the situation on site. This is most important because otherwise you cannot make a decision: What is most urgent? You need this information, because otherwise ...” [Cj4]

“People sit at computers and respond to messages, because information is sometimes more important than help itself.” [Hn6]

Quotes representing the connections between the initial key terms *important* and/or *helpful* and the key terms *helpful* and *expertise*:

“We have daily expertise in handling small emergencies, which helps us [helpful] when we have to deal with a major crisis. [...]” [Kw3]

“This kind of experience [expertise] is crucially important [in crisis management] and people with different experiences being part of the same team are a very positive thing.” [Ih4]

“Coordination is only possible with people who are experienced [expertise], and this clearly is a benefit. The straightforward communication was the most important part, to understand an instruction, to assess it and carry it out.” [Ef7]

Furthermore, the importance of *conversations* with colleagues and other *crisis managers* as well as getting *support* was also frequently stated by the interviewees.

Quotes representing the connections between the initial key terms *important* and/or *helpful* and the key terms *conversations/to talk*, *crisis management personnel*, and *support*:

“It is important to me to have people around with whom one can talk about these things, a peer system [crisis management personnel], so there is someone who understands you.” [Je9]

“Talking with colleagues about the mission was important: What was achieved, what was positive...” [Em7]

“What I think and what we’ve noticed as very important to us as a team [crisis management personnel] and very helpful, was this good team spirit: We met together as a team, many times, talked long about missions, evaluating them, especially after this flood.” [Bm7]

In terms of *psychosocial prevention and aftercare* provided for affected persons and crisis management personnel, the crisis managers stated the importance that these offerings are accessible for all groups of persons in need:

Quotes representing the connections between the initial key term *important* and the key terms *psychosocial prevention and aftercare* and *support*:

“For me [as a supervisor], it was important that they [psychosocial support providers] are there, that people can make use of the offering. I won’t control anybody, and check if he talks to somebody or not, but it is important that they have the possibility. And without having to call anybody first, but in that form that those people [psychosocial support providers] come to the places where they are needed”. [Bx4]

“[...] as it is important to include this special field [of psychosocial prevention and aftercare], that means that psychosocial support workers were available in the area already during the first days.” [Ah4]

“[...] It [the need of psychosocial support] gets more and more. Because it is an important service and it gets more important every day. And by now, actually, more manpower or womanpower is needed.” [Jg3]

“[psychosocial prevention and aftercare] We are also going to do this again, this is the next step, the mid-term or the long-term support, it is important for the affected people to meet others who also experienced the disaster.” [Dz4]

Regarding stress management, the crisis managers stated the importance of applying individual techniques and knowing own limits and signs of stress (see also section 6.3.8):

Quotes representing the connection between the initial key term *important* and the key term *stress management*:

“[Stress management techniques] It is always important for me to go to work and back home by bike [sport]; this is the first thing. This is what I always do, even when it is raining. Even if it’s only half an hour it is something very important to me. [...]” [Du4]

“[to know own signs of stress] Yes, this is most important, to begin with... Because then, one can hit the break in time, it does not matter how.” [Fs2]

6.3.10 Network graph improvement possibilities – to learn from

To analyze areas of necessary improvements in the crisis managers’ occupational field as well as to identify aspects where crisis management organizations and their employees can learn

from, a network graph with the initial key term *improvement possibilities/to improve* was created and extended at the key term *to learn (from)*. This network presents the terms that were frequently linked with the two initial key terms (improvement possibilities: at least 6 times; to learn from: at least 5 times) as well as their connections.

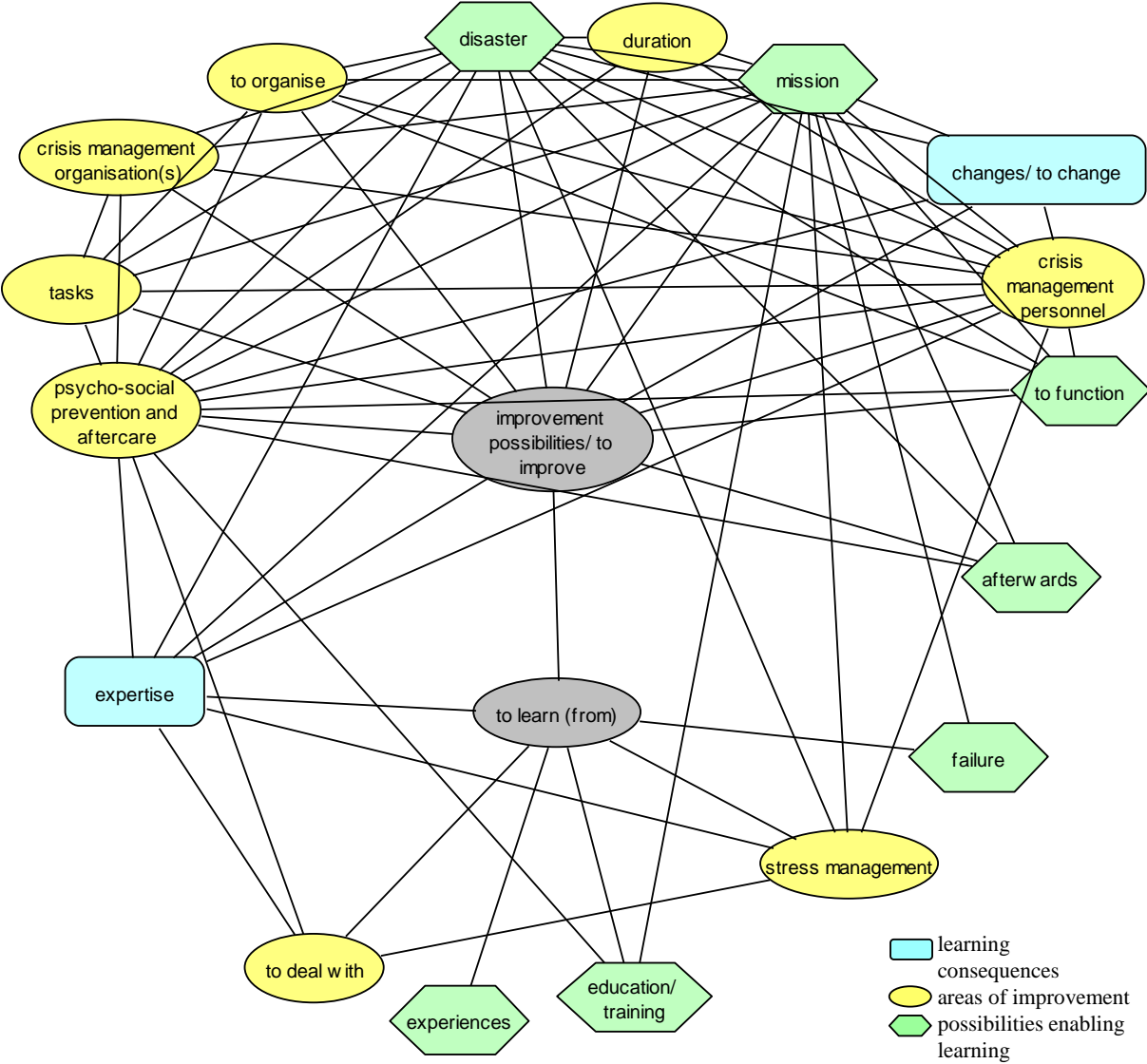


Figure 20. Network graph *improvement possibilities – to learn (from)*

The interviewed crisis managers mentioned different areas of improvement (presented in yellow ellipses) where further learning was recommended, particularly concerning *stress management* and *psychosocial support* but also *organizational factors*.

Quotes representing the connections between the initial key terms *to learn (from)* and/or *improvement possibilities/to improve* and the key term *psychosocial prevention and aftercare*:

“Perhaps that's one of the lessons learned. Perhaps we should've done something [psychosocial prevention and aftercare] at that level ... I saw colleagues who were really affected, they got very touched whenever anyone spoke about the mission; their eyes would fill up with tears.” [Kl3]

“And beyond the support and aftercare for the affected people, a very important aspect that could be improved, would be the provision of inclusive prevention and aftercare for crisis management personnel.” [Be5]

“There is always room for improvement. I wish that a psychologist would be employed who is exclusively responsible for psychosocial services within [the organization] [...]” [Jg3]

“He wasn't the type of psychologist that was necessary at the time. He was a doctor that came to treat the patients. Some general understanding [was lacking]. All he said was: ‘What are you suffering from?’ [...] I don't know [what would have been helpful]. Debriefing methodology is well known among us and there are people who can conduct that and we did not need professional medics there. Maybe a psychologist who knows all the nuances [of stress] could help somehow.” [Ig3-5]

“To implement long-term psychosocial support...that would be one aspect where I'd say, we should have done this, to contact the first responders [...] three month later or something like this...” [Hc6]

“[psychosocial prevention and aftercare] I can't say that the organization did anything wrong but I do think that we have to work with [to attend to] everyone [involved in the mission] in future interventions.” [Lg7]

Quotes representing the connections between the initial key terms *to learn (from)* and/or *improvement possibilities/to improve* and the key terms *crisis management organizations, crisis management personnel, and to organize*:

“With regard to our work, we realized that we have to improve the shift schedule. Those enduring 15/16-hours-workdays have to be avoided in the long run. That's ok

for two or three days, but we work on improving the arrangement/schedule of personnel so that it is less extreme.” [Dl4]

“...but also to the Incident Command Centre, that we have contact with them. In such long-lasting missions, you realize that there is always an opportunity of organizational improvements and this is where we will start.” [Dh2]

Furthermore, it was recommended and seen as important to learn from *experiences* and *failures* in *disaster missions* and to evaluate them *afterwards* (possibilities that enable learning are presented in green hexagons).

Quotes representing the connections between the initial key term *to learn (from)* and the key terms *mission, disaster, afterwards, and failures*:

“Therefore, since such high-risk circumstances [disaster] do not repeat themselves and are infrequent, we have to try to take maximum advantage of them. This is related to the lessons we can learn from such circumstances.” [Kf8]

“You learn from every mission. Of course things [failures] happen that could have been done better, you can identify that afterwards. It is difficult to identify that during the mission, as you function completely different during this time.” [Er8]

Learning from disaster missions was reported to create *expertise* and *knowledge* as well as to induce *changes* (presented in blue rectangles):

Quotes representing the connections between the initial key terms *to learn (from)* and/or *improvement possibilities/to improve* and the key terms *expertise* and *changes/to change*:

“In this disaster case, I profited by all of this: first of all, because of the expertise - sixth disaster mission - and my training within the fire service... that I had to learn to deal with crises like that... and there you were also thrown in at the deep end.” [Cd7]

“The level of communication is changing [in the organization]. We have more diplomacy now, dialogue and understanding. The situation has improved over the last few years. [...]” [If1]

6.4 Discussion and recommendations

To support crisis managers in dealing with the stress related to the management of disasters, the PsyCris project aims at developing a stress management training program tailored to their specific needs. For this purpose, this study examined stressors, perceived stress and burden of crisis managers by means of guideline-based interviews. Stress was further analyzed according to the demand-control-support model of job stress (Karasek & Theorell, 1990; see section 4.2). Furthermore, requirements regarding stress management techniques and possibilities to support crisis managers were assessed. The interviews were analyzed with the qualitative method GABEK. The GABEK analysis ensured that stakeholders and end-users are involved in the conceptual design and development of the envisioned stress management training for crisis managers. In the following, the results of this study are summarized and discussed and derived recommendations concerning the development of the stress management training are addressed²⁹.

Different parameters that have been shown to have an impact on the health and well-being of crisis management personnel lie within the area of influence of crisis management organizations (Reynolds & Wagner, 2007): above all, the availability and quality of social support (provided by supervisors and peers), the organizational climate and stigmatization of seeking help and addressing perceived burden, and organizational stressors. Furthermore, the provision of structured and high quality methods of mission aftercare and prevention measures like stress management trainings are seen as important organizational responsibilities referring to the mitigation of stress-related health consequences in the context of disaster missions. Up to now, few empirical studies are available that can be of use for crisis management organizations regarding the establishment of health promoting, organizational conditions (Beerlage et al., 2008). With the additional aim to fill this gap, this exploratory study strived to gain information about the stress and burden experienced by crisis managers and to derive recommendations on how to meet their requirements regarding organizational support and stress management trainings.

²⁹ In this section, the presented network graphs with the initial key terms *stress*, *burden*, *demand*, *control*, *support*, and *stress management* are discussed. The results of the network graphs with the initial key terms *important/helpful* and *improvement possibilities/to learn (from)* are not separately addressed but discussed in relation to the previously mentioned topics.

6.4.1 Stress and burden

Most of the interviewed crisis managers reported to perceive stress during and after the management of a disaster. The strongly cross-linked terms in the network graph with the initial key term stress indicated that stress experienced during crisis management might not be caused by isolated stressors but by an interaction of stressors (e.g., dealing with affected persons), environmental conditions (e.g., duration) and individual factors (e.g., knowledge) as well as resources (e.g., stress management techniques).

The statements of the crisis managers indicated that the level of stress depended on the different phases of the disaster. In this context, the highest levels of stress were experienced in the beginning of a disaster operation, due to uncertainty about what to expect and lacks of information. During the ongoing disaster operation, the crisis managers frequently reported to concentrate on their tasks and duties without consciously perceiving stress. After the mission, when they had time to think about the incident, stress levels were reported to increase again. These aspects lead to the assumption that – related to the stress level – needs and requirements regarding stress management and psychosocial support differ according to the different phases of a disaster. This issue should be considered and addressed when establishing and enhancing psychosocial support structures for crisis management personnel (which was realized within the scope of other work packages within the PsyCris project) as well as within the development of stress management trainings for crisis managers.

Regarding specific stressors and stressful duties, the crisis managers interviewed in the study addressed some stressors that are relevant for first responders as well, like event-specific aspects of the mission (e.g., high number of affected persons, long duration, and scale/extent), dealing with affected persons and families, problems arising during the mission, and the situation and conditions on-site. In addition, the crisis managers described stressors and stressful tasks associated with their leadership position: the issue of communication with press and media, high responsibility for population and staff, far-reaching decisions to be made under time pressure and having to provide explanations on potential failures. These results support the limited number of previous findings regarding stressors of supervisors and leaders in crisis management (e.g., Hadley et al., 2011; Regehr & Bober, 2005).

Important aspects that influenced the level of stress experienced by the crisis managers were the extent of available information and (previous) knowledge, the duration and scale of the mission and the number of affected people. Particularly against the background that information, knowledge, and also expertise (see the following sections) have been repeatedly

mentioned as helpful and important aspects in dealing with mission-related stress, it seems recommendable to ensure and train the transfer and provision of relevant information during disaster missions as well as to increase knowledge and expertise via crisis management trainings/exercises.

In relation to the mitigation of stress, psychosocial prevention and aftercare and stress management (discussed in section 6.4.3) were frequently mentioned by the crisis managers.

Regarding perceived burden in the scope of disaster missions, the interviewees also reported to feel burdened by factors (some of them reflecting the above mentioned stressors) such as the duration of the mission, the situation on-site, the scale of the disaster, problems occurring during the mission, and dealing with affected people and their relatives as well as with staff. In this context, the interviewees addressed necessary improvements regarding organizational aspects like the duration of shifts, clear operational schedules and structured regulations on breaks and replacement, particularly in consideration of longer-lasting crises.

A particularly difficult aspect frequently reported by the crisis managers was to recognize signs of stress and burden for themselves and their staff. For this purpose, psycho-education about stress reactions and training to recognize symptoms of burden, held by professionals competent in that field (psychologists, psychotherapists) are recommendable (see also Halpern et al., 2009); as well as education about constructive ways of providing support to prevent dysfunctional but frequently used strategies like co-rumination and excessive problem talk (Boren, 2014).

Aspects that were reported by the crisis managers to be helpful in dealing with the burden during and after crisis missions are contact and conversations with colleagues, previous knowledge (due to experiences, expertise and training), as well as contact with their families and partners. Beyond that, the interviewees addressed the importance of psychosocial support for the mitigation of the burden caused by crisis missions, but also a lack of psychosocial prevention and aftercare offerings for crisis management personnel. With regard to related possibilities of improvement, they recommend to involve professionals who are exclusively responsible for the provision of psychosocial support and for the implementation of psychosocial prevention and aftercare programs in crisis management organizations.

In this context, the interviewed crisis management personnel described existing barriers to make use of psychosocial support programs, above all their professional and societal role as crisis managers that implies to be perceived as strong, broad-shouldered and stress resistant.

This role concept hinders addressing topics of stress and excessive demands. Beyond that, it contributes to the maintenance of the existing stigmatization of admitting burden and seeking support in crisis management organizations (see also Pieper & Maercker, 1999, about the personality profile of the alpha-man). This role-concept and cultural component of crisis management personnel is recognized but not well addressed in practice up to now. In this context, working against the stigmatization of help and support seeking behavior (e.g., through awareness trainings) has to be considered as one of the biggest and most important challenges in the context of crisis management. This seems particularly important considering that an organizational atmosphere characterized by acceptance and normality of experienced stress and need of support in the context of crises missions is assumed to influence the usage of psychosocial support opportunities (and connected to that, the health of crisis management personnel; Stephens, 1997) in a positive way (Beerlage et al., 2008; Kelley et al., 2014). In this context, factors like quality of leadership and a family friendly organizational climate have been shown to be negatively related to stigmatization of seeking treatment (Britt, Greene, Castro, & Hoge, 2006 as cited in Kelley et al., 2014).

Concerning the development of stress management trainings tailored to the needs of crisis management personnel, aspects like the previously described role concept and the existing stigmatization of admitting stress and burden in crisis management organizations have to be taken into account. Only on this basis, it can be ensured that crisis managers are supported in coping with the high levels of stress caused by disaster missions. This is assumed to enable them to take care of themselves and their staff without being hindered by the need to fulfil their professional role or by the fear of stigmatization.

6.4.2 Psychosocial work environment: Demand, control, and support

The stress experienced by the crisis managers in the context of disaster missions was further examined in light of the demand-control-support model of job stress (Karasek & Theorell, 1990; see section 3.2.4.1), by examining the corresponding dimensions, perceived demands, possibilities for control and received support. The interviewed crisis managers reported that they experienced high demands, limited possibilities to fully control the situations, and different levels of received support. According to the demand-control-support model, this can be seen as a critical combination of the three dimensions and might result in strain and adverse health consequences. However, numerous crisis managers reported to feel backing and support from their organizations, which they perceived as important. Against the background of the model, it is assumed that this received social support was an important factor in

mitigating the effects of the high demands and limited possibilities of control experienced by the crisis managers (see section 3.2.4.1).

Overall, the crisis managers reported high demands and challenges during disaster management (e.g., the change from day-to-day occupational structures to disaster response structures, the need to react fast, and coordination issues); some of these reflected the above described stressors, referring to the extent of the disaster and particularly difficult tasks like large-scale evacuations. Beyond that, the coordination of psychosocial support, personnel resources and new phenomena like “walk-in volunteers” during disaster operations represented a big challenge for the crisis managers.

Regarding perceived control during crisis management, the interviewees addressed limited possibilities to fully control the situation during disasters. Thereby, a perceived lack of control was reported to be related to stress and was rather experienced in the beginning of missions, also depending on the scale of the respective disaster. In this context, the crisis managers described that it is hardly possible to control the situation in the case of large-scale disasters. Considering that sense of helplessness has been associated with PTSD in previous studies (Bryant & Harvey, 1996), it is essential that crisis managers are aware of and prepared for the uncertainty, ambiguity and limited possibilities for control during disasters. It is recommendable to address these aspects in stress management trainings for crisis managers.

It has to be noted that in this study, the dimension control was not examined in the sense of occupational decision latitude as conceptualized by Karasek and Theorell (1990) for everyday work environments. It has already been stated that, in the context of disasters, decision latitude might not be a perfectly suitable operationalization of control (see section 4.3). As the qualitative approach of this study provided the opportunity, control could be assessed in the more applicable sense of actual possibilities for controlling the situations during crisis management.

Concerning aspects that were perceived as helpful and important to control the situation, the crisis managers mentioned (previous) knowledge as well as information and feedback they got (particularly concerning the situation on-site). Beyond that, they perceived more control in situations when they had enough and competent human resources to manage the crisis and reliable contact persons who kept them informed. Furthermore, the level of control increased once processes and communication functioned properly. Again, this points to the importance to recheck, improve, and train processes and crisis management structures extensively and repeatedly, also with regard to the mitigation of potentially avoidable stressors.

As concerns support within the scope of crisis management, the interviewees stated the importance and need of support with regard to reducing stress during and after disaster missions. In this context, particularly the organization, executives and supervisors were mentioned as important providers of (psychosocial) support, similar to findings of Halpern et al. (2009) in interviews with emergency medical technicians (EMTs) and their supervisors. Expressing honest concern about the employee's well-being, backing and trust, appreciation, feedback, understanding, and offering help are ways of support provided by supervisors that were described as helpful by the interviewees. In this context, it has to be kept in mind, that, on the one hand, crisis managers are responsible to adequately support their staff/subordinates and, on the other hand, they need backing and support themselves to deal with work-related stress, particularly from their organizations and superiors.

Besides support from supervisors, additionally, peer-to-peer support provided by empathetic and considerate colleagues was perceived as highly important in mitigating stress during and after disaster missions. Experience and knowledge were mentioned frequently as useful to effectively support staff and co-workers. Considering the statements of the interviewees as well as previous research findings (e.g., Halpern et al., 2009), it is recommendable that supervisors contribute to the development of a health-promoting organizational climate by being sensitive and empathetic regarding experienced stressors and perceived stress of their subordinates or co-workers and by acting as role models in addressing own burden and critical incidents (see also Fullerton et al., 1992; Krüsmann, 2003; Krüsmann & Butollo, 2006).

6.4.3 Stress management/coping

Regarding stress management in the face of disaster missions, the interviewed crisis managers emphasized their need to competently cope with mission-related stress, also to ensure an effective crisis management. In this context, they addressed the importance of stress management techniques and described a general need for comprehensive stress management trainings. Several crisis managers mentioned that they had not received any stress management training so far and would not deliberately apply any specific strategies, and if they did, they had learned them by themselves. In light of this background, it seems even more important to consider the development and implementation of stress management trainings for crisis management personnel as a priority in the field of crisis management.

Concerning applied strategies to handle mission-related stress, the interviewed crisis managers reported a broad variety of methods, reflecting all kinds of coping styles. Emotion-

focused coping was described in form of self-instructions, thoughts about what went right and what went wrong during the mission and reframing failures. Furthermore, reported coping strategies like seeking (emotional) support and appreciation from family, friends and colleagues can be categorized as emotion-focused strategies. Problem-focused coping was reported in form of focusing on the task and seeking practical/instrumental support of colleagues or other services involved in the mission. Several crisis managers reported avoidance coping in form of retreating from the situation (during breaks), distracting oneself with different activities, meeting friends, and going for a drink.

Thinking things through was sometimes assumed to be a helpful stress management technique and sometimes avoided; probably out of fear that bad experiences could be triggered. Few crisis managers reported to apply previously trained stress management strategies like breathing and relaxation techniques.

Knowledge and crisis management expertise, which may at times compensate for a lack of stress management skills, were often perceived as helpful in dealing with mission-related stress. However, to perceive oneself as experienced was also reported in relation to the (false) conclusion that one is resilient to all forms of stress and therefore does not need more comprehensive stress management and coping skills. These aspects should be considered as a potential barrier for the implementation and establishment of stress management training programs for crisis managers. Nevertheless, the assumption that expertise cannot completely replace stress management training as it takes time and experiences in disaster operations to build expertise, was addressed as well.

Concerning recommendable stress management techniques, the interviewees expressed the assumption that there are no stress management techniques and strategies that are suitable for everybody. They rather recommended that – with the help of training – everybody should find and practice strategies that work for oneself.

This recommendation is in accordance with assumptions and theories about coping reported in the literature: For example, Aldwin (2007) states that clear recommendations about which kind of coping strategies to prefer are not reasonable as the effectiveness of a particular coping strategy depends on individual determinants as well as on situational circumstances (see section 3.2.3.4). As an example, problem-focused approaches seem to be recommendable whenever at least parts of the situation can be controlled whereas emotion-focused strategies might be more effective to regulate emotions in uncontrollable circumstances or in the

aftermath of a disaster (Jensen & Wrisberg, 2014; Young et al. 2014). As mentioned in section 3.2.3.4, coping research suggests that the overall pattern of coping styles as well as coping flexibility (i.e., the flexibility to assess which coping strategy is applicable in a certain situation and to successfully apply it; Cheng & Cheung, 2005) might be more relevant in terms of mental health than the use of a particular coping strategy. With regard to stress management trainings for crisis managers, it is important that they aim at enhancing the coping repertoire and coping flexibility, also considering the variety of (stressful) situations occurring in the scope of disaster missions.

In addition, the interviewed crisis managers stated the importance of recognizing own signs of stress and knowing own limits in relation to stress management during disaster missions. In this context, it should be noted that health psychologist Gert Kaluza (2015) also points to the importance to know one's own, individual (bodily) signs of stress, as they can serve as an early-warning system which supports the person to take stress management measures in time. With regard to the development of a stress management training program for crisis managers, it is recommendable to consider those aspects and to address them in the training.

In addition, the interviewees addressed the responsibility that supervisors have for their staff in recognizing signs of stress and burden and in supporting them. Supervisors shall ensure appropriate durations of shifts and structured, regulated breaks and replacements. Furthermore, they should take burdened staff off duty if they recognize signs of stress. Beyond that, the interviewees recommend that supervisors and senior colleagues talk to their staff about the stress and stressors experienced during the disaster operation. In this context, the appreciation of the staff's effort is seen as important. These results reflect the managerial responsibility and the requirement of leadership skills of crisis managers. In this context, it has to be considered that a perceived lack of leadership skills (e.g., communication skills) can be an additional stressor for crisis management leaders (see section 4.1). Therefore, it is recommended that a stress management training for crisis managers should contain leadership components in general as well as regarding the provision of adequate support for staff.

As mentioned above, the potential stigmatization of admitting stress and burden (depending on the organizational climate and role concept of crisis managers) has to be considered when developing a stress management training for crisis managers. The implementation of stress management trainings that is initiated or encouraged by crisis management organizations can have a positive effect in this context. It is assumed that these kinds of initiatives of crisis management organizations can work twofold: One the one hand, the crisis management

personnel may perceive that the organization cares about their well-being and supports them. On the other hand, this can sensitize to the importance of addressing burden in crisis management and contribute to the development of an organizational atmosphere that considers the special stress of crisis management personnel and facilitates seeking and accepting support.

6.4.4 Summary

As this study is one of the first to examine stress and stress management in a sample of crisis management leaders across different European organizations and institutions involved in disaster response, it forms an essential basis to identify the specific stressors and corresponding needs that come with management positions in the disaster response field. This section summarizes the most relevant aspects of the previously discussed results in light of their practical relevance for supporting crisis managers in the context of disaster missions and for the development of the stress management training for crisis managers, which is part of the PsyCris project.

Besides the mitigation of potentially avoidable stressors (e.g., by providing functioning communication structures, information flow etc.), it is recommendable to sensitize crisis managers for the inevitable stressors related to their professional position. Reflecting and anticipating the specific demands and challenges in crisis management will enhance preparedness for and predictability of expectable stressors (e.g., a perceived loss of control due to particularly adverse conditions during a mission). This kind of predictability (see Thompson, 1981; control through information), in turn, is assumed to increase the level of perceived control and may buffer the distress due to experiencing momentarily feelings of helplessness.

For this purpose and in light of the gathered views and experiences of this sample, it is reasonable to include the following aspects in stress management trainings for crisis managers:

- Sensitizing about potential stressors during disaster response and about limited possibilities for control in particular as well as reflecting and fostering functional strategies to cope with the related distress.
- Enhancing coping flexibility (not only the variety of the coping repertoire but also the flexibility to assess which coping strategies are applicable in which situation)

- Educating about stress reactions and about recognizing symptoms of stress in oneself and others.
- Educating about constructive ways of providing support considering the crisis managers' role as supervisors with responsibility for their staff.
- Addressing the (organizational and individual) role concept of crisis managers as well as the existing stigmatization of admitting distress and need of support. Overall, stress management programs should not endanger or weaken the professional role of crisis managers, but trying to de-stigmatize experiencing stress and seeking support.

It is assumed that supporting crisis managers in recognizing their own stressors and signs of stress and in applying functional strategies to deal with them, will help them to lead more effectively in crises situations, to act as role models and to support their staff in dealing with mission-related stress.

Figure 21 summarizes the previously discussed results. It focuses on the requirements of crisis managers regarding the topics of interest *stress* and *burden*, perceived *demand*, *control* and *support* and *stress management*. In relation to that, the figure presents derived aspects that are recommendable to consider in the development of the stress management training for crisis managers.

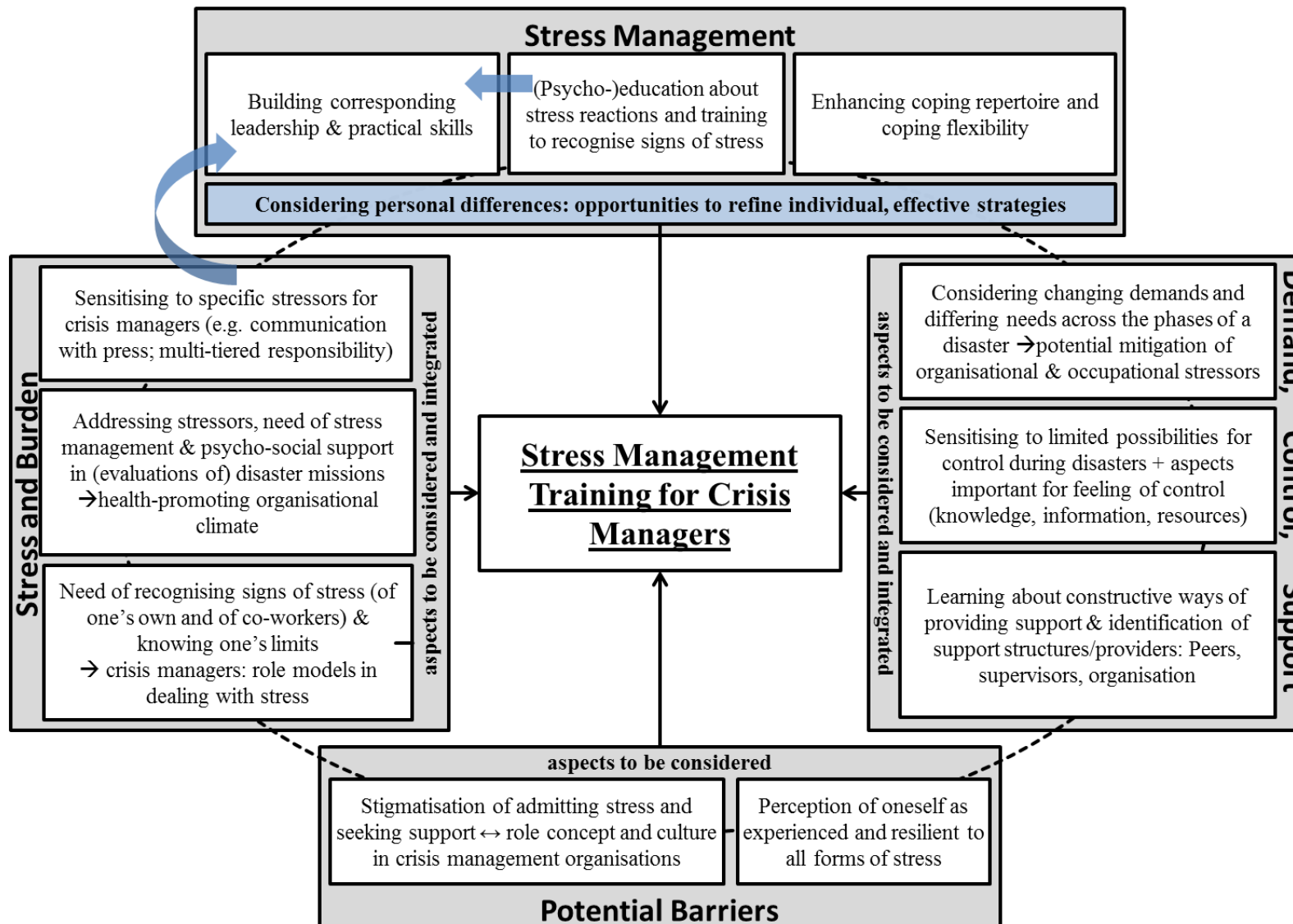


Figure 21. Recommendations derived from study 1

6.5 Limitations

One limitation in this study concerns the recruitment of the participating crisis managers. As they were recruited by reaching out to respective organizations, systematic self-selection cannot be completely ruled out. On the other hand, the project's definition of crisis managers (see section 2.3) is sufficiently precise and the inclusion criterion of having practical experience in the management of at least one disaster limited eligibility in a way that might render the sample generalizable to the rather small and heterogeneous community of experienced crisis managers, at least in smaller countries as Luxembourg, Lithuania, and Austria. Altogether, crisis managers from five different European countries were included in this study. Therefore, interviews from Spain (eight interviews) and Lithuania (four interviews) were translated into English, which, as already mentioned, represented a great challenge with regard to the analysis and a relevant limitation of the study (see section 6.2.4.3.1). As the analysis of interviews with GABEK WinRelan sets a special focus on the exact wording used by the interviewees, it cannot be ruled out that the translation of the interviews compromised some of the validity of the data. However, the risk of limited validity was minimized by collaborating closely and rechecking repeatedly with the respective interviewers and translators.

Finally, as this research was exploratory and qualitative interviews were used for data collection, it shares the drawbacks of all such qualitative research regarding generalizability (with regard to the relatively small sample size compared to quantitative studies), as well as regarding objectivity and reliability. However, a detailed interview guideline as well as clear instructions for the interviewers were developed and applied to counteract these limitations.

Beyond that, it has to be noted that within the analysis of qualitative data with GABEK, the interpretation of interrelations is clearly distinguished from the coding process. Furthermore, the analysis is supported by computerized, rule-based steps of data processing that are reproducible and verifiable. These aspects are assumed to account for a certain degree of transparency, objectivity, and reliability of qualitative research with GABEK WinRelan.

7 Study 2: Quantitative Assessment of Stress, Individual Factors, and Health in Crisis Managers

7.1 Introduction

In combination with the qualitative assessment of perceived stress, stressors, and stress management strategies of crisis managers within the scope of study 1, the quantitative examination of potential risk factors (e.g., work-related stress, demands, possibilities for control, perceived support, overall perceived stress, stress reactivity, and coping strategies) with regard to mental health in this target group aimed at a comprehensive understanding of stress and its potential consequences for crisis managers.

The specific aims of this study were as follows:

- Quantitative analysis of the above mentioned variables and their relationships within the target group crisis managers via an online survey.
- Analysis of the potential predictive power of supposed risk factors for stress-related disorders in crisis managers.
- Comparison of crisis managers with managers from another occupational field in terms of stress, individual factors, and health.

The quantitative assessment of stress, individual factors (coping, stress reactivity, and crisis leader self-efficacy), and the extent of health complaints (somatic, depression, anxiety, and posttraumatic stress symptoms) was realized via an online survey comprised of well-established and validated questionnaires, the PsyCris Stress Assessment Battery (PSAB).

It was aimed to get information relevant for the development of the stress management training which should address and aim at changing actual risk-factors for mental health in crisis managers (see section 2.2).

7.2 Methods

7.2.1 Data collection and recruitment

The online survey assessing perceived stress, individual factors such as coping styles, and mental and somatic health symptoms was implemented with the software tool IBM SPSS Data Collection Interviewer Server, version 6.0.1. Participants could access the survey by using a web-link and were informed on the front page about the study, its background, the

PsyCris project as well as about the anonymity of the participation, and data protection issues. Afterwards, they were asked to actively give their consent to take part and to create an individual code to prevent duplicates. At the end of the survey, a set of sociodemographic questions was attached. The data collection phase started in March 2015 and ended by the end of July 2015. The PSAB was disseminated by all contributing project partners in the partnering countries (Austria, Germany, Lithuania, Luxembourg, and Spain) via different media: distribution of flyers containing the online survey's web-link at conferences and crisis management exercises or workshops, appointments with stakeholders, distribution via the main stakeholder organizations, and reaching out to further crisis management organizations via phone and e-mail, news post at the project's website, and twitter posts.

In addition, a control group of white-collar workers was acquired by reaching out to different companies. An institution within the public sector in Germany was acquired to participate, meaning that employees in management positions formed the control group, which was needed for the planned group comparison with crisis managers. The PSAB was adapted to be applicable for the control group by removing the *Impact of Event Scale-Revised* (IES-R; see section 7.2.3.1), two questions of the *Patient Health Questionnaire* (PHQ; see section 7.2.3.2) and by adjusting the sociodemographic questions. After the data protection office of the above mentioned institution authorized the questionnaire, an information day was organized where employees could get information about the background of the study and the PsyCris project. In preparation of the data collection phase, the employees were provided with instructions and additional information about data protection, purpose and procedure of the study, assessment instruments, and follow-up offerings via e-mail and intranet. Data collection took place from May 2015 until the end of July 2015. To present and discuss the results and potential implications with the employees, an in-house-workshop was held at 30th September 2015.

7.2.2 Participants

According to the project's definition of crisis managers (see section 2.3), only participants who matched the criteria of having responsibility for staff and decision making and additionally, of having practical experience in crisis management, were included in this study. Participants who did not hold a leadership position in a crisis management organization and who had not been involved in the management of at least one major crisis were excluded from this analysis. The crisis managers' sample consisted of 86 participants (29 from Spain, 19 from Germany, 14 from United Kingdom, 6 from Austria, 4 from Luxembourg, 3 from Lithuania, 10 from other countries; 58 men, 28 women) with a mean age of 49.88 years

(SD = 9.86). Apart from that, exclusively for the crisis managers' sample, additional sociodemographic information regarding their work in crisis management was assessed: the type of organization they were affiliated with, their current responsibilities in crisis management, and if they were employed on a voluntary or regular basis. Furthermore, the participating crisis managers were asked if they had a strategical or operational (on-site) position during their last disaster mission, if they had ever received psychiatric or psychotherapeutic treatment, and if they had ever taken medication to treat a mental health condition. This sociodemographic information is reported in Table 4. The control group consisted of 91 participants holding a leadership position at an institution in Germany within the public sector (64 male, 26 female, 1 not specified) with a mean age of 46.99 years (SD = 8.87). Further sociodemographic variables and tests for potential differences in these variables between the two groups are reported in Table 7 in section 7.2.3.

Table 4

Sociodemographic variables for crisis managers' sample

Sociodemographic variables	<i>n</i> (%)
Type of organization	
Civil defense	15 (17.4)
Governmental	14 (16.3)
Disaster relief with PSS	30 (34.9)
Disaster relief without PSS	7 (8.1)
Others	12 (14.0)
Not specified	8 (9.3)
Current responsibility	
PSS	17 (19.8)
Non-PSS	60 (69.8)
Not specified	8 (9.3)
Type of employment	
Voluntary	13 (15.1)
Regular	45 (52.3)
Voluntary and regular	28 (32.6)
Position during last disaster mission	
Operational (on-site)	38 (44.2)
Strategic	34 (39.5)
Not specified	12 (14.0)
Ever received psychiatric or psychotherapeutic treatment	
Yes	10 (11.6)
No	74 (86.0)
Ever taken medication to treat a mental health condition	
Yes	5 (5.8)
No	79 (91.9)

7.2.3 Questionnaires

The first selection process of the questionnaires followed some pre-conditions like availability in European languages, study design, chosen research constructs and published studies. Most of the chosen questionnaires were available in English, German and Spanish (the three languages spoken in most of the project's partnering countries; Lithuanian and Israeli participants had to complete the English version).

However, the support scale of the *Job Content Questionnaire* (JCQ; see section 7.2.3.3) as well as the *Crisis Leader Efficacy in Assessing and Deciding* (C-LEAD) Scale (see section 7.2.3.7) had to be translated into German language (by members of the LMU Team). Team members of the project partner *University of Granada* (UGR) translated the PHQ, the JCQ, the C-LEAD Scale, and the *Perceived Stress Reactivity Scale* (PSRS; see section 7.2.3.5), which were not available in Spanish language. The three language versions of the PSAB were transferred into the IBM SPSS Data Collection program.

The constructs assessed with the questionnaires of the PSAB are listed in Table 5. Together with the sociodemographic part, the PSAB comprised seven questionnaires (with altogether 154 items), covering mental health outcomes on the one side (posttraumatic stress symptoms, anxiety and depression symptoms, and somatic symptoms), and possible predictors on the other side (psychosocial work environment/job stress, stress reactivity and perceived stress, coping strategies, and self-perceived crisis leadership efficacy).

Table 5

Study design, constructs, and instruments in the PSAB

Construct	Questionnaire
Outcomes	
Posttraumatic stress (22 items)	Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997)
Depression (9 items), anxiety (7 items), somatic symptoms (13 items) + 1 item	Three Modules of the Patient Health Questionnaire (PHQ; Spitzer et al., 1999)
Predictor variables	
Psychosocial work environment/job stress (22 items)	Job Content Questionnaire (JCQ; Karasek et al., 1998)
Perceived stress (20 items)	Perceived Stress Questionnaire (PSQ; Levenstein et al., 1993)
Stress reactivity (23 items)	Perceived Stress Reactivity Scale (PSRS; Schlotz et al., 2011)
Coping (28 items)	Brief COPE (Carver, 1997)
Crisis leadership self-efficacy (9 items)	C-LEAD Scale (Hadley et al., 2011)

In the following, the single questionnaires of the PSAB are described in detail and their internal consistencies for the overall sample are reported.

7.2.3.1 *Posttraumatic stress*

The *Impact of Event Scale-Revised* (IES-R; Weiss & Marmar, 1997; Weiss, 2004) is one of the most widely used self-report measures for assessing posttraumatic stress symptoms. In the internationally predominant English version, the current IES-R's response format is a classical 5-point Likert scale where participants rate to what extent they were distressed in the past seven days by difficulties related to a stressful life event (from 0 "not at all" to 4 "extremely"). The three subscales consist of 8 items each to cover *intrusion* and *avoidance* symptoms, and of 6 items assessing *hyperarousal*. It is recommended to compute subscale scores and a total score by using the means of non-missing items, but as found in the literature, the scales often are simply summed up, resulting in a range from 0 to 88 points for the total scale.

Overall, the IES-R has shown good psychometric properties, with high internal consistencies. Kehl et al. (2015) reported a Cronbach's alpha for the total scale of .93 in 1,916 firefighters

from eight predominantly European countries (i.e., eight different language versions of the IES-R). In the sample of this study (crisis managers only), Cronbach's alphas were good to excellent, with .94 for the total scale, and .92 for intrusion, .83 for avoidance, and .87 for hyperarousal.

Normative data in the sense of clinical or healthy population norms are not useful in the case of PTSD severity measures like the IES-R because posttraumatic symptom severity always varies with time elapsed since the traumatic event(s) and with their number, extent and individual meaning. Still, the IES-R has proven to be an efficient screening for PTSD (see Adkins, Weathers, McDevitt-Murphy & Daniels, 2008; Morina, Ehring, & Priebe, 2013). Proposed cut-offs indicating probable PTSD range from 22 to 44 (see overviews in Adkins et al., 2008, and Morina et al., 2013). Up to now, mostly the cut-off proposed by Creamer, Bell, and Failla (2003) was used in research (e.g., in Kehl et al., 2015), with a total score of 33 (or 1.5 if the scale's mean is computed) indicating PTSD.

7.2.3.2 Health (depression, anxiety, and somatic symptoms)

To examine the participants' current state of (mental) health, three modules of the *Patient Health Questionnaire* (PHQ; Spitzer, Kroenke, & Williams, 1999; German version: Löwe, Spitzer, Zipfel, & Herzog, 2002) were used, to assess symptoms of anxiety and depression as well as somatic complaints. The PHQ has been extensively validated and tested for its psychometric properties and is widely used in international clinical research (Kroenke, Spitzer, Williams, & Löwe, 2010):

- Depressive symptoms are measured with the PHQ-9 (Kroenke, Spitzer, & Williams, 2001) that comprises 9 items scoring from 0 to 3 (not at all, several days, more than half the days, nearly every day; how often bothered over the last 2 weeks) and provides a severity score, ranging from 0 to 27. Scores of 5, 10, 15, and 20 represent cut-off points, pointing to possible mild, moderate, moderately severe, and severe depression, respectively. Against this background, scores of 10 and more can be considered as possibly clinically relevant and further diagnostic measures should be applied in these cases.
- Symptoms of anxiety are covered by the GAD-7 (Spitzer, Kroenke, Williams, & Löwe, 2006) comprising 7 items that are, again, scored from 0 to 3 (not at all, several days, more than half the days, nearly every day; how often bothered over the last 2 weeks), thus resulting in a range from 0 to 21. Scores of 5, 10, and 15 represent cut-off points for mild, moderate, and severe anxiety, respectively.

- Somatic symptom severity is measured with the PHQ-15 (Kroenke, Spitzer, & Williams, 2002), with 13 items that assess common somatic symptoms and are scored from 0 to 2 (not at all, bothered a little, bothered a lot; how much bothered during the last 4 weeks). In addition, two items from the PHQ-9 are added (for sleeping problems and feelings of tiredness), resulting in ranges from 0 to 30 points for the PHQ-15. Scores of 5, 10, and 15 represent cut-off points for low, medium, and high somatic symptom severity, respectively. Being a self-report measure, the PHQ-15 cannot distinguish between medically explained and medically unexplained symptoms, so the PHQ-15 in itself is largely a measure for somatic symptom severity although it can also be applied as a screener for somatoform disorders (Kroenke et al., 2002). At the request of the data protection office of the participating public sector institution, two items (pain or problems during sexual intercourse; menstrual cramps and other problems with period) were excluded from the PSAB administered to the control group, so here the possible range was from 0 to 26. Thus, for the comparison between the samples these two items were excluded in the crisis managers' sample as well.

The given cut-off points of 5, 10, 15 (and 20 in case of the PHQ-9) are rules of thumb for depressive, anxiety, and somatoform symptom severity developed on the basis of data from samples in primary care. In this study, continuous severity scores of each module were used as outcome variable, rather than categorizations. A large representative study (N = 5,030) conducted in Germany reports means for anxiety severity (Löwe et al., 2008) and for depressive and somatic symptom severity (Kocalevent, Hinz, & Brähler, 2013a, b) in the general population, together with gender- and age-specific norms. According to Löwe and colleagues (2008) these data might be also be generalizable to other countries with similar census data.

Psychometric data are mostly good, for all three modules, with Cronbach's alphas ranging from .80 to .92 in the original validation sample (Kroenke et al., 2001; Kroenke et al., 2002; Spitzer, Kroenke, Williams, & Löwe, 2006) and from .82 to .89 in the German population sample (Kocalevent, Hinz, & Brähler, 2013a; Kocalevent, Hinz, & Brähler, 2013b; Löwe et al., 2008). In the total sample of this study, internal consistencies were good as well, with Cronbach's alpha = .83 for the PHQ-9 and .89 for the GAD-7. As two items from the PHQ-15 were not included in the PSAB administered to the control group, internal consistencies were computed per subsample: Cronbach's alpha was .82 (15 items) in the crisis managers' sample and .82 as well (but with 13 items) in the control group sample.

7.2.3.3 Psychosocial work environment (job stress)

The stressors related to the psychosocial work environment of the participants were examined with the *Job Content Questionnaire* (JCQ; Karasek et al., 1998). The JCQ is based on the demand-control-support model, developed by Karasek and Theorell (1990; see section 3.2.4.1) and measures the employee's perception of the psychological and physical job demands, the level of control experienced by the employee as well as the extent of support given by co-workers and supervisors. By now the JCQ has been translated and validated in 23 languages, with good psychometric properties (Choi et al., 2009; Karasek et al., 1998).

In the PSAB, a 22-item version was used: The control dimension is represented by the scale *decision latitude* with altogether 9 items, which aggregates two subscales: *skill discretion* (6 items), which assesses the variety of skills that can be employed on the job, and *decision authority* (3 items). The demand dimension is covered by *psychological demands* (5 items). Finally, the support dimension is represented by two subscales, *co-worker support* (4 items) and *supervisor support* (4 items). Items are answered on a 4-point Likert response scale (strongly disagree, disagree, agree, strongly agree; 1-4).

For building the scales, the items were not simply added up but weighted according to the recommendations in Karasek and Theorell (1990), resulting in a scoring range from 12 to 48 for skill discretion, decision authority, and psychological demands, while the two support scales range from 4 to 16. For easier interpretation, each scale was standardized to reflect the range of the Likert scale used for answering the items, i.e., ranging from 1 to 4.

The three dimensions or their subscales, respectively, can be used as predictors, or a composite score is built, representing overall *job stress*³⁰. For operationalizing job stress,

³⁰ It has to be noted that the expressions *stress* and *strain* are somewhat inaccurately used within research about the demand-control-support model (which is mostly called model of work stress, e.g., McClenahan et al., 2007, but sometimes also job-strain model, e.g., Courvoisier & Perneger, 2010). The D-C-(S) model assumes that psychological strains arise from work environments with high demands and low control (and low support). Accordingly, the hypotheses in this model are called *strain hypothesis* and *iso-strain hypothesis* (including the support dimension), assuming that high demands together with low levels of control (and low levels of support) predict mental strains (like depression or anxiety, Karasek & Theorell, 1990). However, the JCQ, which is based on the D-C-S model, actually measures *job stress*; it thus does not assess *strain* as written by Courvoisier & Perneger, 2010. Explained in more detail, it measures job stress characterized by demands exceeding control (and support) which is assumed to lead to job strain (i.e., the consequences on the individual, indicated for example by impaired health and well-being).

several approaches were proposed in the literature (e.g., Landsbergis, Schnall, Warren, Pickering, & Schwartz, 1994; see also Courvoisier & Perneger, 2010). In this study, the classical quotient method was applied by dividing psychological demands by decision latitude. Beyond that, an additional composite score was built that includes the dimension support into the formula (coined iso-strain or, for the sake of accuracy, iso-stress, see Courvoisier & Perneger, 2010). In both cases, low values represent low job stress/iso-stress, and high values represent high job stress/iso-stress. High iso-stress results from high demands, low decision latitude and the lack of support (i.e., isolation). In addition to the continuous variable for job stress, the quadrant method (e.g., Landsbergis et al., 1994) explained in section 3.2.4.1, was applied as well, to examine the prevalence of the different types of perceived work-environments in the two samples. For this purpose, the participants' scores on the JCQ scales demands and decision latitude were dichotomized at the median of the total sample, and then sorted according to their combination (see Figure 4 in section 3.2.4.1): the active job quadrant (high demands/high control), the high-strain (or more accurately high-stress; see footnote) quadrant (high demands/low control), the passive job quadrant (low demands/low control), and finally the low-strain/stress quadrant (low demands/high control).

Concerning reliability, in the overall sample of this study, internal consistencies for all six scales, respectively subscales were mostly adequate: Cronbach's alpha was .76 for decision latitude (with .67 for skill discretion and .74 decision authority); .68 for psychological demands; and .87 for support (with .79 for co-worker support and .89 supervisor support).

7.2.3.4 Perceived stress

Perceived stress was measured with the *Perceived Stress Questionnaire* (PSQ; 20-item version; Levenstein et al., 1993; German version: Fliege, et al., 2005). The PSQ comprises four subscales with 5 items each, measuring perceived stress exposure (subscale demands) and emotional stress response (subscales worries, tensions, and joy (reversed)).

The instruction refers either to perceived stress in general, covering the last two years or to more recent stress, covering the last month. In this study, the "general form" was used. Items are answered on a 4-point Likert scale (almost never, sometimes, often, usually; 1-4). According to the recommendations of the authors (Fliege et al., 2005), subscale scores and a total score were built by summing up the respective items; afterwards, the scores were linearly transformed to values between 0 and 1.

Internal consistency of the PSQ-20 is good to excellent, with Cronbach's alphas ranging from .85 to .94 for the total scale in the German samples tested by Fliege et al. (2005; N = 2,458); in healthy adults (n = 334), Cronbach's alpha for the total scale was .92, and ranged from .79 to .83 for the subscales. In this study, internal consistency for the total scale was equally excellent, with Cronbach's alpha = .93; reliabilities for the four subscales were good (.81 for worries, .87 for tension, .83 for joy, and .81 for demands).

7.2.3.5 Stress reactivity

For measuring the stress reactivity of the participants, the *Perceived Stress Reactivity Scale* (PSRS; Schlotz et al., 2011; German version: Stress-Reaktivitäts-Skala, SRS; Schulz, Jansen, & Schlotz, 2005) was used (23-item version by Schlotz et al., 2011). The PSRS assesses the extent and the duration of a person's typical affective reaction to different stressful situations and thus targets the underlying trait or disposition, i.e., stress reactivity (which is relatively stable but can be changed, for example, with the help of training; see Angerer et al., 2011). Each item describes a potentially stressful situation and gives three typical responses (0-3) to choose. Scores are summed up across similar stressors resulting in five situation-specific subscales, but also can be summed up to an overall score of stress reactivity, encompassing all 23 items (range 0 to 46). The five subscales are (Schlotz et al., 2011, p. 81):

- Reactivity to work overload (feeling nervous, agitated, irritated in response to high workload; 5 items)
- Reactivity to social conflicts (feeling affected, annoyed, upset in response to social conflict, criticism, rejection; 5 items)
- Reactivity to social evaluation (feeling nervous, losing self-confidence in response to social evaluation; 5 items)
- Reactivity to failure (feeling annoyed, disappointed, down in response to failure; 4 items)
- Prolonged reactivity (difficulty relaxing/unwinding after high workload, 4 items)

Reliability of the PRSR was tested in three samples from Germany, the UK and the USA, with good internal consistencies, ranging from .87 to .91 for the total scale, and mostly adequate for the subscales, ranging from .62 to .82 (Schlotz et al., 2011; N = 2,040). In this study, internal consistency for the total scale was likewise very good, with Cronbach's alpha = .91; reliabilities for the six subscales were mostly adequate, ranging from .69 up to .84 (.84 for reactivity to work overload, .78 for reactivity to social conflicts, .69 for reactivity to social evaluation, .70 for reactivity to failure, and .72 for prolonged reactivity).

7.2.3.6 Coping

Coping styles were measured with the Brief COPE (Carver, 1997) that comprises 14 scales with two items each that are answered on 4-point Likert scale by indicating to what extent the items apply to thinking and acting in past unpleasant or difficult situations (I haven't been doing this at all, I've been doing this a little bit/a medium amount/a lot; 1 to 4). These 14 scales represent conceptually differentiable coping reactions or strategies, some of them adaptive or functional, others potentially problematic or clearly dysfunctional strategies (Carver, 1997): active coping, planning, positive reframing, acceptance, humor, religion, using instrumental support, using emotional support, self-distraction, denial, venting, substance use, behavioral disengagement, and self-blame. As 14 factors are often too many to include in a prediction model, some authors follow the example of Carver, Scheier, and Weintraub (1989) and search for higher-order factors (see overview in Kapsou, Panayiotou, Kokkinos, & Demetriou, 2010, for earlier studies). However, this is no viable option for samples that are not large enough for factor analyses (N = 300 is considered to be a good sample size to provide a stable factor solution; Field, 2013). Other authors group the Brief COPE's 14 coping strategies into theoretically meaningful categories, mostly following a three-dimensional conceptualization that reflect problem-, emotion-, and avoidance-oriented or – more generally speaking – dysfunctional coping (e.g., Coolidge, Segal, Hook, & Stewart, 2000; Cooper, Katona, & Livingston, 2008; Yates, Benson, Harris, & Baron, 2012). Following their example, the 14 Brief COPE scales were grouped in three categories of common coping strategies (see Cooper et al., 2008):

- Problem-focused coping: active coping, planning, and using instrumental support
- Emotion-focused coping: positive reframing, acceptance, humor, religion, and using emotional support
- Dysfunctional coping: self-distraction, denial, venting, substance use, behavioral disengagement, and self-blame

In this study, internal consistencies for the three theory-driven subscales were good, with Cronbach's alpha = .79 for emotion focused coping, .83 for problem focused coping, and finally .79 for dysfunctional coping.

7.2.3.7 Crisis leader self-efficacy

For the subjective assessment of the crisis managers' efficacy, the newly developed *Crisis Leader Efficacy in Assessing and Deciding (C-LEAD) Scale* (Hadley et al., 2011) was used. The C-LEAD Scale was conceptualized for the use in the crisis management field (public

health and safety crises) and measures the perceived self-efficacy of leaders concerning the key elements of effective leader behavior, i.e., information assessment and decision making (Hadley et al., 2011). The 9 items of the final version are to be answered on a 7-point Likert scale (ranging from “strongly disagree” over “neutral” to “strongly agree”). Items were pilot-tested with managers in and outside the crisis management field. For the control group, it was deemed to be more suitable not to include item 8 in the analysis (“I can estimate the potential deaths and injuries that may occur as the result of my decisions or recommendations at work.”), so when comparing the crisis managers with the controls, this item was excluded.

In this study, internal consistency for the C-Lead Scale was good, with Cronbach’s alpha = .78. As item 8 was excluded for analyzing the control group sample, reliabilities were examined according to group as well, which were nearly identical: .79 in both crisis managers (9 items) and the control group (8 items).

7.2.4 Data analysis

All statistical analyses were conducted with IBM SPSS Statistics Version 22. In the context of preliminary analyses, it was examined if it is reasonable to group crisis managers with different nationalities in one joint crisis manager sample. For this purpose, a series of one-way ANOVAs (i.e., analysis of variance) tested if differences in the most important variables of interest (stress, stress reactivity, coping, and health) existed between crisis managers with different nationalities, who filled out different language versions of the survey.

The group comparison between the crisis managers and the managers of the control group was conducted by means of *t* tests for independent samples. Whenever available, both groups were compared to normative values or reference values based on reasonably comparable samples (i.e., healthy adults), using SPSS syntax to compute *t* from means, standard deviations, and sample sizes (following Field, 2013). To adjust for multiple testing, alpha level for almost all analyses was set to $p = .001$ (differences/correlations with $.001 < p < .01$ are in the following referred to as marginally significant). Solely for the preliminary analyses (see above) and the comparison of the crisis manager sample and the control group in terms of the sociodemographic variables, which was conducted to check if the groups were comparable, alpha was set to $p = .05$, in order to minimize the type II error. Effect sizes for between group differences were calculated using Cramer’s *V* (chi-squared test) respectively Hedges’ *g* with a pooled estimate of the standard deviations (*t* tests). Correlation analyses were conducted using Pearson’s correlation coefficients. They are reported in combination with bias-corrected and accelerated (BCa) bootstrap 95% confidence intervals (CI).

To test for potential predictors of mental and somatic symptoms in crisis managers, hierarchical multiple regression analyses were conducted using the forced entry method. In the first step, the considered sociodemographic variables were entered to control for their influence. The predictor variables, derived from the PSAB questionnaires, were entered in a second step to examine the amount of additional variance explained by them. The Durbin-Watson test statistics were used to check if residuals were uncorrelated (values less than 1 or greater than 3 are problematic, whereas values close to 2 are very likely to represent uncorrelated residuals; see Field, 2013). For all conducted regression analyses, the values (1.980-2.365) suggested that it can be acted on the assumption of uncorrelated residuals. Multicollinearity between predictor variables was checked by means of variance inflation factor (VIF) values and tolerance statistics, with tolerances greater than 0.1, average VIF value greater than 1 or any VIF value greater than 10 suggesting multicollinearity. The entered predictors did not show any signs of multicollinearity across all analyses. Finally, outliers and potential influential cases were identified by standardized residuals lower than -3 and greater than 3. To examine the influence of multivariate outliers, Cook's distance was checked and any case with a Cook's distance greater than 1 was excluded from the analysis (according to Stevens, 2002). For this reason, one case was excluded from the regression analysis conducted to predict anxiety symptoms (GAD-7).

Beyond that, moderation analyses were conducted to examine the relationship between stress, health, and chosen individual factors in crisis managers in more detail. Moderation analyses are deemed to be the applicable analysis strategy, if one aims at examining if a variable (the potential moderator, e.g., stress reactivity) influences or is related to the size of another variable's (e.g., stress) effect on an outcome variable (e.g., health) (Hayes, 2013). In other words: A moderation occurs if the effect of one variable on another changes as a function of a third variable (Field, 2013; see Figure 22). The moderation analyses were conducted using the SPSS macro PROCESS (written by A. F. Hayes, copyright 2014), a tool which was specifically created to run moderation and mediation analyses. For moderation analyses, it conducts a regression analysis with the predictor variable, the potential moderator, and the interaction between those two variables as predictors (see Figure 23). Statistically, moderation is shown if the interaction between predictor and moderator significantly predicts the outcome variable.

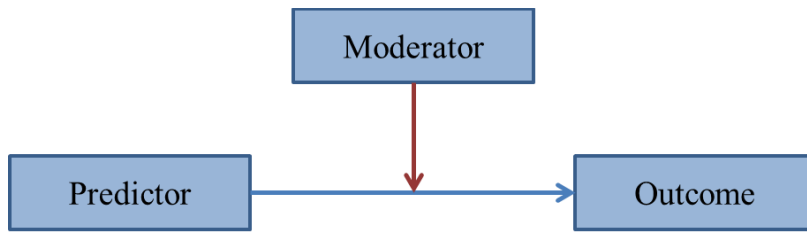


Figure 22. Conceptual moderation model (adapted from Field, 2013, p.396)

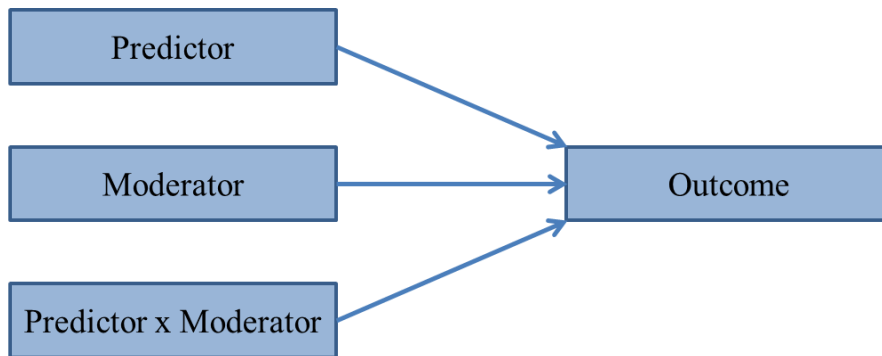


Figure 23. Statistical moderation model (adapted from Field, 2013, p. 398)

Values of the predictor and the moderator are automatically mean centered by PROCESS. Simple slopes analyses were used to examine the nature of the moderation in more detail. For this purpose, PROCESS computes the regression equations for predictor and outcome separately for low, mean, and high levels of the moderator. These regression equations were used to produce simple slope graphs, illustrating the nature of the moderation with the respective regression lines for low, mean, and high levels of the moderator.

7.3 Results

7.3.1 Preliminary analyses

To test if it is reasonable to group crisis managers with different nationalities in one joint sample, the three biggest nationality groups (Spanish: $n = 29$; German: $n = 19$; English: $n = 14$) were examined for differences within the most important variables: Job stress (as calculated by the quotient of the demand and decision latitude subscales of the JCQ), perceived stress (PSQ), depression, anxiety, somatic and posttraumatic stress symptom severity/frequency (PHQ-9, GAD-7, PHQ-15, IES-R), stress reactivity (PSRS) and coping (emotion-focused, problem-focused and dysfunctional subscales of the Brief COPE). To avoid underestimating important differences (i.e., to avoid type II errors), for these comparisons the significance level was set to .05. A series of one-way ANOVAs showed no significant differences between Spanish, German, and English crisis managers regarding the

dependent variables (see Table 6). Beyond that, the data was checked for differences in the variables of interest potentially resulting from the different language versions (Spanish, English, and German) of the PSAB. Again, the ANOVAs with *version* as factor did not yield any significant differences (see Table 6). Against the background of these analyses, it was assumed to be reasonable to treat the crisis managers as one relatively homogenous sample with regard to their psychosocial job characteristics, perceived stress, coping styles, stress reactivity as well as mental and somatic symptoms.

Table 6

Results of ANOVAs with nationality and version as factors

Questionnaire	Subscale	Nationality				Version			
		<i>df1</i>	<i>df2</i>	<i>F</i>	<i>p</i>	<i>df1</i>	<i>df2</i>	<i>F</i>	<i>p</i>
Health (PHQs, GAD-7, IES-R)	Somatic symptoms	2	59	1.458	.241	2	52.70	2.249 ^{a)}	.116
	Depression	2	59	1.140	.327	2	83	1.735	.183
	Anxiety	2	59	.811	.449	2	83	1.635	.201
	Posttraumatic stress	2	59	1.043	.359	2	83	1.049	.355
Coping (Brief COPE)	Problem-focused	2	25.56	.751 ^{a)}	.481	2	49.57	1.302 ^{a)}	.281
	Emotion-focused	2	59	1.997	.145	2	52.76	.288 ^{a)}	.751
	Dysfunctional	2	59	.030	.970	2	83	.045	.956
Stress reactivity (PSRS)	Total score	2	59	.338	.715	2	83	1.087	.342
Perceived stress (PSQ)	Total score	2	59	1.415	.251	2	83	1.570	.214
Job stress (JCQ)	Level of job stress	2	59	2.651	.079	2	83	.730	.485

^{a)} When Levene's test of homogeneity of variances was significant ($p < .05$), Welch's *F* and the corresponding *p*-values are reported with adjusted error degrees of freedom.

7.3.2 Group comparison

The crisis managers and the control group did not differ significantly in the sociodemographic variables gender, family status, education and number of subordinates. Again, for these comparisons the significance level was set to .05 to avoid underestimating important differences (i.e., to avoid type II errors). Using *t* tests and chi-square tests, significant

differences between the two groups were found regarding age, working hours per week, and years of organizational affiliation (see Table 7). On average, the crisis managers were approximately 2 years older, worked approximately 4 hours per week less, and were affiliated with their organization for a noticeable shorter timespan than the managers of the control group. However, the differences in age and working hours per week represented rather small effects ($g_{\text{age}} = 0.31$, $g_{\text{working hours}} = 0.35$). The highest effect occurred in terms of years of organizational affiliation ($g = 0.65$), which can be explained simply by the fact that the managers of the control group are tenured members of their organization.

These non-existing or very small differences in the assessed sociodemographic variables indicated that the two samples are sufficiently similar to be compared with regard to the variables of interest (i.e., it can be assumed that potentially occurring differences between the two groups in the variables of interest are due to the group affiliation itself and not due to differences in sociodemographic variables).

Table 7

Differences in sociodemographic variables between crisis managers and control group

Sociodemographic characteristics	<i>n</i>		<i>%</i>		Test statistics		
	CM	CG	CM	CG	χ^2 (<i>df</i>)	<i>p</i>	Cramer's <i>V</i>
Gender	86	90			.28 (1)	.60	.04
Male			67.4	71.1			
Female			32.6	28.9			
Family status	86	91			.34 (1)	.56	.04
Single			16.3	13.2			
In a relationship			83.7	86.8			
Education	84	89			.16 (1)	.69	.03
Basic			8.3	6.7			
Higher			91.7	93.3			
Number of subordinates	86	91			6.55 (3)	.09	.19
1-10			36.0	34.1			
11-50			36.0	51.6			
51-250			20.9	9.9			
more than 250			7.0	4.4			
			<i>M (SD)</i>		Test statistics		
			CM	CG	<i>t</i> (<i>df</i>)	<i>p</i>	Hedges' <i>g</i>
Age	85	91	49.88 (9.86)	46.99 (8.87)	2.05 (174)	.04	0.31
Working hours per week (incl. voluntary hours)	85	91	45.92 (14.23)	50.12 (9.37)	-2.30 (144)	.02	0.35
Years of organizational affiliation	85	91	15.76 (10.06)	22.48 (10.74)	-4.28 (174)	.00	0.65

In the following, the results of the group comparison between crisis managers and the managers of the control group are presented for the respective PSAB constructs. All relevant numbers and statistical values (means, standard deviations, t-values, degrees of freedom, and effect sizes) are presented in Table 8.

7.3.2.1 Psychosocial work environment (job stress)

With regard to the measure of psychosocial job characteristics indicating job stress, the control group reported significantly more psychological demands such as workload and time pressure than the crisis managers' sample (for numbers and values see Table 8); this difference represented a medium-sized effect ($g = 0.67$). For the other subscales of the Job Content Questionnaire, namely skill discretion and decision authority (building the decision

latitude/control scale) as well as co-worker and supervisor support (building the support scale), no significant differences were found between the groups.

However, concerning the quotient of demands and decision latitude which can be seen as a continuous measure for the level of job stress, a significant difference was found between the two groups, in the sense that the control group reported higher levels of job stress than the crisis manager group. This difference represented a medium-sized effect ($g = 0.54$). Adding the dimension support to the quotient, which is then labelled iso-stress quotient (resulting from high demands, low decision latitude and lacking support/isolation), a difference was found in the sense that the control group reported higher levels of iso-stress than the crisis managers. However, the difference did not reach significance on the conservative alpha level of $p < .001$ and, consistently, the effect of this difference was comparably small ($g = 0.33$).

To examine and compare the prevalence rates of high job stress and high iso-stress in the two groups, the scores of the subscales demands, decision latitude, and support were dichotomized at the median of the total sample and new variables containing information about the combination of the three dimensions were created. As described before, the different patterns of the combination of demands and decision latitude/control at the workplace lead to four different types of work environments: active jobs (high demands, high control), passive jobs (low demands, low control), low-strain/stress jobs (low demands, high control), and high-strain/stress jobs (high demands, low control). The prevalence rates for each of these types within the two samples are given in Figure 24, as is the prevalence of iso-stress (i.e., the number of participants experiencing high demands combined with low decision latitude and low support). Figure 24 shows that the prevalence of high job stress and iso-stress is higher within the control group when compared to the crisis managers; however, the corresponding X^2 tests were only marginally significant (for types of work environment: $X^2(3) = 14.73$, $p = .002$) or not significant, respectively (for iso-stress: $X^2(1) = 4.53$, $p = .033$).

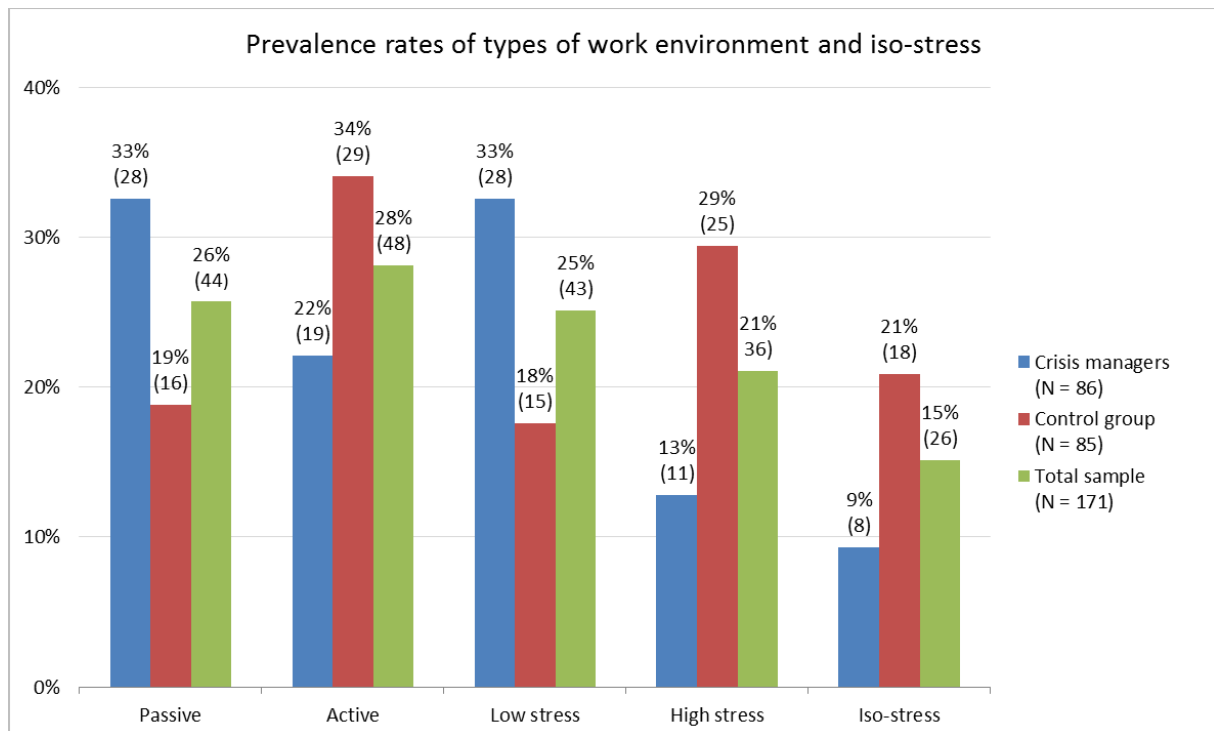


Figure 24. Prevalence rates of types of work environment and iso-stress.

7.3.2.2 Perceived stress

The examination of differences regarding the perceived stress (measured with the PSQ) between the two samples showed that the control group reported more stress than crisis managers, in particular more tension and demands and less joy (for numbers and values, see Table 8). However, these differences did not reach significance on the conservative alpha level of $p = .001$ and, consistently, represented rather small to medium-sized effects ($g = 0.30 - 0.35$). With regard to the subscale worries, no difference was found between the two groups. Compared to reference values of 334 healthy adults (visitors to an institution for public education; 61.6% female, 38.4% male; age 45.3 ± 15.6) examined by Fliege et al. (2005), the crisis managers reported significantly more joy ($t(418) = -4.29, p < .001$) but also more demands ($t(418) = -3.12, p = .002$). These differences represented small to medium-sized effects ($g_{\text{joy}} = 0.52, g_{\text{demands}} = .38$). Regarding worries, tension, and the overall PSQ score, no significant differences between the crisis managers and the reference sample were found ($t_{\text{worries}}(418) = 0.41, p = .68; t_{\text{tension}}(418) = 1.95, p = .05; t_{\text{overall}}(418) = .95, p = .34$). The control group also did not differ significantly from the reference values in terms of worries, tension, and overall PSQ score, but also not in terms of joy ($t_{\text{worries}}(423) = .44, p = .66; t_{\text{tension}}(421) = -1.17, p = .24; t_{\text{overall}}(421) = -1.95, p = .05; t_{\text{joy}}(423) = -1.17, p = .24$). Regarding demands, the control group reported significantly more demands than the reference sample ($t(423) = -6.04, p < .001$) and this difference represented a relatively large effect ($g = 0.71$).

7.3.2.3 Health (depression, anxiety, and somatic symptoms)

To examine differences in somatic, depressive, and anxiety symptom severity, the results of the three PHQ modules (somatic symptoms: PHQ-15; depression: PHQ-9; anxiety: GAD-7) of both groups were compared. As two items of the PHQ-15 were omitted in the PSAB version for the control group (see section 7.2.3.2), these were also excluded from the group comparison. The respective cut-off points for mild, moderate, and severe somatic symptoms were adjusted accordingly. Significant or marginally significant differences between control group and crisis managers were found in all three scales in the sense that the control group reported significantly more (or more frequent) somatic, depression, and anxiety symptoms than the crisis managers (for means, standard deviations, and results of the independent t tests, see Table 8). These differences represented medium-sized effects ($g = 0.43$ to $g = 0.56$). As expected, both the crisis managers' and the control group's mean values within the three scales lay considerably below the cut-off point for moderate symptom severity (10 for PHQ-9 and GAD-7; 8.67 for the 13-item-version of the PHQ-15). With the help of cut-off points for mild, moderate, (moderately severe, only for depression symptoms, PHQ-9) and severe levels of symptoms, categories for the severity of somatic, depression, and anxiety symptoms can be obtained. Figure 25 shows the distribution of the respective categories across the two groups. With altogether 5% prevalence of moderate to severe depression and anxiety symptoms and a 11% prevalence of moderate to severe somatic symptoms, the crisis managers sample were well in line with results from a representative study in the general population ($N = 5,030$; $M_{\text{age}}(\text{SD}) = 48.4 (18.0)$ years, ranging from 14-92; 53.6% female, 46.4% male; Löwe et al., 2008; see also Kocalevent, Hinz, & Brähler, 2013a, b). The control group sample, however, showed elevated prevalences of potentially clinically relevant scores (above the cut-off points of 10, or 8.67, respectively) in all three symptom domains.

For confirming these results, the means of both groups were compared to the respective reference values for all three PHQ scales. Concerning anxiety severity (GAD-7), normative data from the representative study reported by Löwe et al. (2008) was used for the comparison. No significant differences were found between the reference sample and the crisis manager group ($t(5114) = 0.05$, $p = .957$). However, the control group reported significantly higher levels of anxiety severity, $M(\text{SD}) = 4.60 (3.44)$ than the reference sample, $M(\text{SD}) = 2.95 (3.41)$, $t(5117) = -4.52$, $p < .001$. Referring to the normative data table in Löwe et al. (2008), and with a mean between 4 and 5 the control group sample was positioned between the 70th and the 78th percentile of the reference sample, which means, nearly 75% in the general German population reported less anxiety.

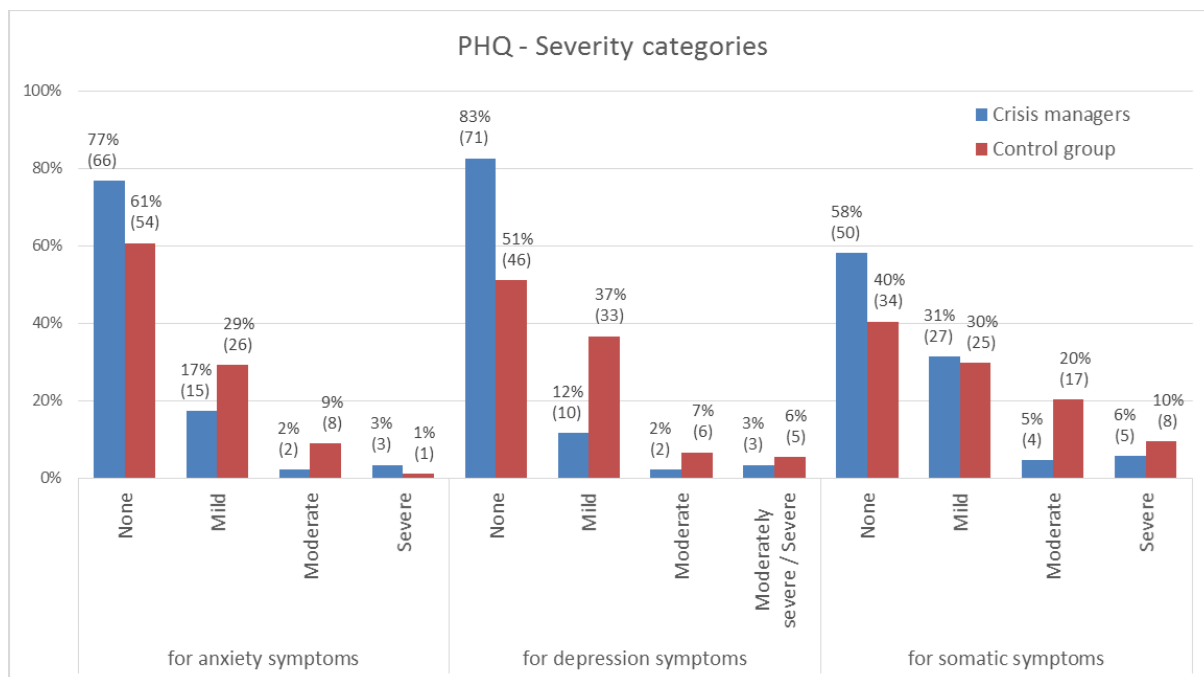


Figure 25. Distribution of severity categories of somatic, anxiety, and depression symptoms across the two groups.

Regarding depression symptoms (PHQ-9), again, the group of crisis managers was not significantly different from the reference sample (Kocalevent et al., 2013a; N = 5,018), with $t(5102) = -0.50$, $p = .621$, while the control group reported significantly higher levels of depression symptom severity, $M (SD) = 5.34 (4.00)$, than the reference sample, $M (SD) = 2.91 (3.52)$, $t(5106) = -6.47$, $p < .001$. Referring to the normative data table in Kocalevent et al. (2013a), with a mean above 5 points (which is the cut-off for mild, non-clinical levels of depression symptoms) the control group sample lay between the 79th and 84th percentile of the reference sample.

Taking a closer look at somatic symptoms, the control group was again more burdened than the general population (Kocalevent et al., 2013b; N = 5,031), showing significantly higher severity scores for somatic symptoms, $M (SD) = 6.38 (4.27)$, than the reference sample, $M (SD) = 3.80 (4.10)$, $t(5113) = -5.72$, $p < .001$. Considering that the PHQ-15 version of the control group contained two items less than the original version, the real difference between the control group and the general population might be even bigger than this estimation suggests. The control group's mean lay above the cut-off for mild somatic symptom severity and placed them roughly at the 80th percentile, referring to the norms in Kocalevent et al. (2013b). For the sake of exactness, in the case of the crisis managers' sample, all items of the PHQ-15 were considered when comparing to general population norms. The mean score of 5 points ($SD = 4.27$) pointed to slightly elevated somatic symptom severity on average, and was

significantly higher than in the reference sample, $t(5115) = -2.69$, $p = .007$, or marginally so, with the applied 0.1%-alpha level.

Taken together, crisis managers showed normal levels of depressive and anxiety symptoms, but somewhat elevated levels of somatic complaints when compared to norms from a large representative sample.

7.3.2.4 Stress reactivity

Regarding perceived stress reactivity measured with the PSRS, a significant difference was found between the two groups in the sense that the control group reported significantly higher overall stress reactivity (i.e., tendency to react to stressors with intense emotional stress reactions) than the crisis managers (for numbers and values, see Table 8). In terms of stress reactivity to different kinds of stressors (failure, social conflicts, work overload, and social evaluation), significant differences were found for all categories of stressors except for work overload. More precisely, the managers of the control group reported significantly higher stress reactivity to failure, social conflict, and social evaluation than the crisis managers. All of these significant differences represented medium-sized effects ($g = 0.52$ to $g = 0.57$). No significant difference was found for the subscale prolonged reactivity, indicating that the groups do not differ in terms of their ability to relax/unwind after stress situations.

Compared to reference values reported by Schlotz et al. (2011; German sample, age cohort: 26-60; $n = 679$), which were used for the psychometric evaluation of the PSRS, both, the crisis managers and the control group, reported lower or almost equal levels of the different kinds of stress reactivity than the reference sample. However, as Schlotz et al. (2011) reported means only separately for the male and female subgroup of the sample without reporting the respective subsample sizes, it was not possible to statistically examine the differences. Figure 26 shows the mean values of the crisis managers, the control group and the male subgroup of the reference sample for each of the PSRS subscales.

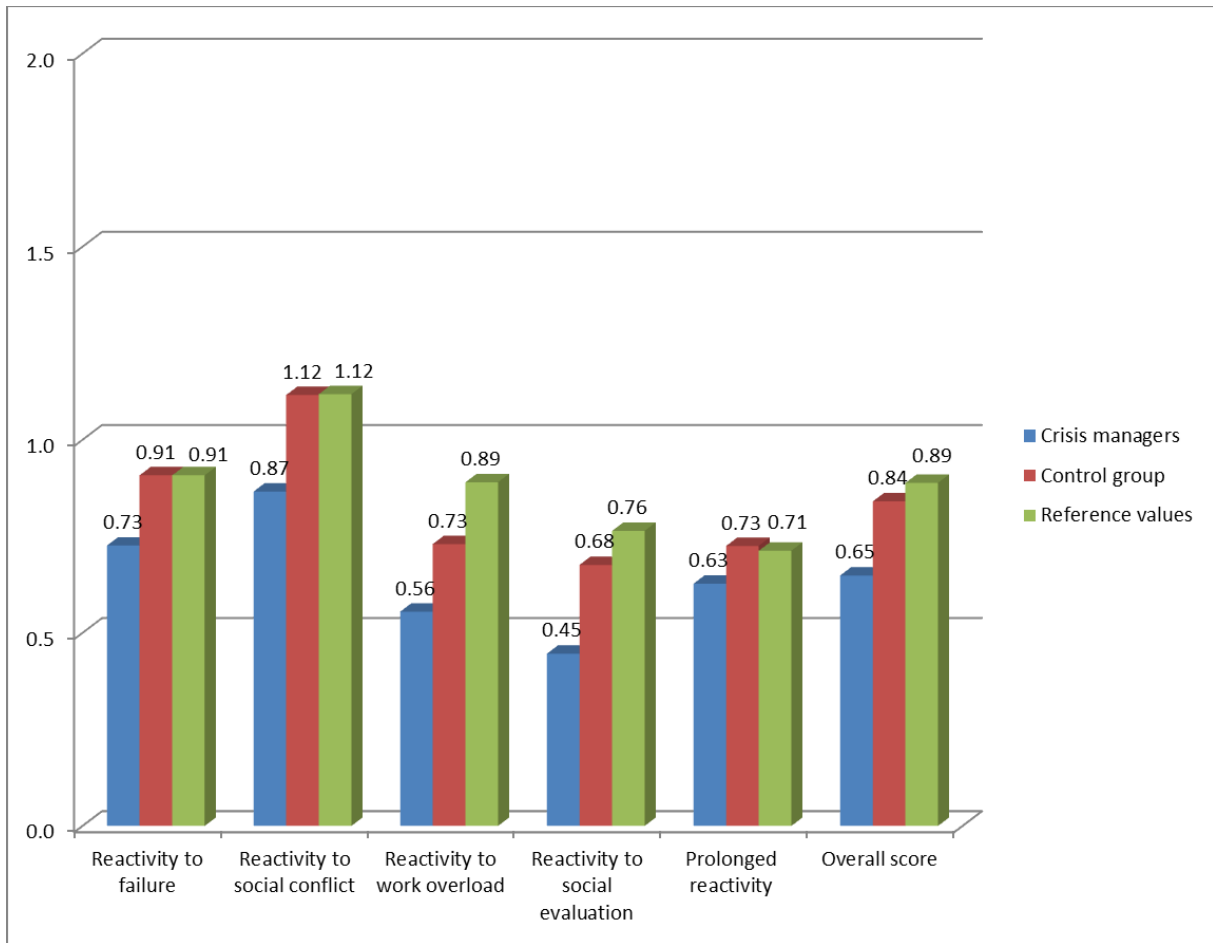


Figure 26. Means of PSRS scale scores in crisis managers, control group and reference sample.

Note: In this figure, values represent the scale sum-score means divided by item number to improve visual comparability between the scales.

7.3.2.5 Coping

With regard to the three common categories of coping styles, emotion-focused, problem-focused and dysfunctional coping, the crisis managers reported to use emotion-focused coping strategies significantly more frequently than the managers of the control group (for numbers and values, see Table 8). This difference represented a medium-sized effect ($g = .52$). No significant differences were found in terms of problem-focused coping strategies as well as in terms of dysfunctional coping strategies, which were used rather less frequently by both groups: linear transformation of values (i.e., rescaling the scoring range, so that it reflects the scoring range on item level) showed that the participants reported to use dysfunctional coping strategies on average between “not at all” and “a little bit”. Concerning differences within the 14 single coping styles of the Brief COPE, the crisis managers reported to use (marginally) significantly more active coping ($t(157) = 2.78, p = .006, g = 0.42$), acceptance ($t(175) = 4.71, p < .001, g = 0.71$), religious coping ($t(161) = 2.73, p = .007, g = 0.41$), and venting

($t(155) = 2.42, p = .014, g = 0.51$), whereas the control group reported significantly more denial ($t(168) = -3.41, p = .001, g = 0.51$). The effects were medium-sized, except for acceptance, where a rather large effect was observed.

7.3.2.6 Crisis leader self-efficacy

The crisis managers and the control group did not differ significantly in terms of their self-reported efficacy to assess information and make decisions in a crisis as measured by the C-LEAD Scale (for numbers and values, see Table 8). Beyond that, no significant differences were found between a reference sample reported by Hadley et al. (2011; $N = 83$; 25.7% male, 74.3% female; $M_{age} = 45$; members of a United States federal agency; data collected in association with an ongoing series of crisis preparation exercises) and both, the crisis managers ($t(167) = -1.18, p = .24$) and the control group ($t(170) = -1.57, p = .12$).

Table 8

Group comparison between crisis managers (CM) and control group (CG)

Questionnaire	Subscales	<i>n</i>		<i>M (SD)</i>		<i>t</i> tests		Effect size
		CM	CG	CM	CG	<i>t (df)</i>	<i>p</i>	Hedges' <i>g</i>
Health (PHQs, GAD-7)	Somatic Symptoms	86	84	4.62 (4.03)	6.38 (4.27)	-2.77 (168)	.001	0.43
	Depression	86	90	3.10 (4.02)	5.34 (4.00)	-3.70 (174)	< .001	0.56
	Anxiety	86	89	2.93 (3.88)	4.60 (3.44)	-3.01 (173)	.003	0.46
Stress reactivity (PSRS)	Prolonged	86	90	2.51 (1.63)	2.90 (1.63)	-1.39 (168)	.168	0.21
	To work overload	86	89	2.22 (2.14)	2.92 (2.39)	-2.04 (173)	.043	0.31
	To social conflicts	86	91	4.33 (2.16)	5.58 (2.26)	-3.78 (175)	< .001	0.57
	To failure	86	89	3.63 (1.46)	4.54 (1.77)	-3.73 (168)	< .001	0.56
	To social evaluation	86	91	2.23 (2.04)	3.38 (2.39)	-3.46 (173)	.001	0.52
	Total score	86	86	14.92 (7.69)	19.33 (8.25)	-3.62 (170)	< .001	0.55
	Perceived stress (PSQ)	Worries	86	91	.25 (.20)	.25 (.17)	.10 (175)	.925
	Tension	86	89	.29 (.22)	.37 (.23)	-2.27 (173)	.024	0.34
	Joy	86	91	.73 (.22)	.65 (.24)	2.36 (175)	.019	0.35
	Demands	86	91	.44 (.22)	.51 (.21)	-2.05 (175)	.042	0.31
	Total score	86	89	.31 (.19)	.37 (.18)	-1.98 (173)	.049	0.30
Coping (Brief COPE)	Emotion-focused	86	91	24.63 (5.96)	21.84 (4.68)	3.46 (161)	.001	0.52
	Problem-focused	86	91	17.30 (3.84)	16.05 (3.38)	2.30 (175)	.023	0.35
	Dysfunctional	86	91	19.72 (5.28)	19.98 (3.80)	-.37 (175)	.710	0.06
Crisis leader self-efficacy (C-LEAD Scale)	Total score	86	89	5.67 (.72)	5.53 (.69)	1.31 (173)	.192	0.20
Psychosocial work environment/job stress (JCQ)	Decision latitude	86	87	3.23 (.46)	3.20 (.42)	.56 (171)	.577	0.09
	Demands	86	88	2.76 (.45)	3.08 (.53)	-4.39 (172)	< .001	0.67
	Support	86	89	2.95 (.51)	2.93 (.58)	.25 (173)	.802	0.04
	Level of job stress	86	85	.87 (.18)	.98 (.22)	-3.55 (169)	.001	0.54
	Level of iso-stress	86	83	.31 (.12)	.36 (.15)	-2.14 (167)	.034	0.33

7.3.3 Results regarding the crisis managers sample

The following analyses were conducted only for the sample of crisis managers, with the aim to identify possible risk factors for stress-related disorders in crisis managers. At first, results of the screening of posttraumatic stress disorder are reported. Furthermore, the results of bivariate correlation analyses of all constructs assessed with the PSAB are reported. In the following section, the results of linear regression analyses, with gender, age, job stress (i.e., the quotient of demands and decision latitude), support, stress reactivity, coping, crisis leader self-efficacy, and perceived stress as predictors (independent variables) and the health variables (somatic, depression, anxiety, and posttraumatic stress symptoms) as outcome (dependent variables), are described.

7.3.3.1 Posttraumatic stress (IES-R)

General mental health outcomes, screened by the PHQ modules were already reported, in comparison to the control group (Table 8). Posttraumatic stress symptoms were exclusively assessed in the PSAB version for crisis managers, by including the IES-R that measures posttraumatic symptoms in the last seven days, targeting the three main symptom clusters of PTSD, intrusion, avoidance, and hyperarousal.

On average, crisis managers showed a total score of $M = 0.67$ ($SD = 0.64$), which is far from the proposed cut-off pointing to possible PTSD (a score of 1.5 or more). Means (SD s) for the subscales were 0.73 (0.73) for intrusion, 0.73 (0.72) for avoidance, and 0.53 (0.67) for hyperarousal. The large standard deviations point to the high variance in the sample, the total score actually ranging from no symptoms at all to a score of 3.27. Eight participants (9.3%) were above the cut-off of 1.5, which means they might suffer from full-blown PTSD. This hints to a higher point prevalence as would be expected in the general population, international estimates ranging from 2% to 5% (Wittchen, Gloster, Beesdo, Schönfeld, & Perkonig, 2009) and perhaps being even lower for Europe (Alonso, Angermeyer, Bernert, et al., 2004).

While gender is a well-known risk factor for PTSD (for an overview see Perrin et al., 2014), in this sample of crisis managers, it was not significantly associated with IES-R scores (see Table 8), even if 6 out of 8 individuals with possible PTSD were female – which was only marginally significant as well, $X^2(1) = 7.23$, $p = .007$.

Unfortunately, so far, there is no data available that is completely suitable for the purpose of comparison to the occupational group of crisis managers. However, to give a lead to the

extent of the posttraumatic stress symptom level in crisis managers participating in this study, the sample was compared to a large sample of firefighters from eight European countries ($N = 1,916$, 96% male, $M_{\text{age}} = 36.12$ years, $SD = 9.54$; Kehl et al., 2015). As these firefighters were, on average, considerably younger and predominantly male, they are a less than optimal choice as a reference. Beyond that, only 38% of them were in an operation leading position. The reported mean IES-R sum score in the firefighters' sample was 11.63 ($SD = 12.36$), compared to 14.84 ($SD = 14.14$) in the crisis managers' sample; this comparison missed out on significance, probably due to the large variance, $t(2000) = -2.34$, $p = .019$.

7.3.3.2 Correlations

To examine, how the constructs measured by the PSAB correlate and if the preparatory considerations concerning the potential predictors and outcomes for the regression analyses could be reasonably implemented, bivariate correlations were calculated. For the latter purpose, aspects and results of the correlation analysis which were relevant for the regression analysis (e.g., for the inclusion/exclusion of predictors) are already discussed in this section.

With regard to continuous sociodemographic variables that were considered to be included in the regression analysis, *years of organizational affiliation* and *weekly working hours* did not correlate significantly with any of the outcome variables or the predictor variables, so they were omitted as predictors (and are not shown in the correlation matrix, Table 10). Only age was marginally significantly related to the severity of somatic symptoms ($p = .005$), but, surprisingly, the correlation was negative and the effect was rather small. The associations of gender with the outcome variables were examined with a series of independent t tests. Women showed higher scores in all outcome variables than men; however, these differences were not significant on the .01%-level, although they represented medium-sized effects in case of somatic and depression symptoms, and posttraumatic stress (see Table 9).

Table 9

Differences in mental health outcomes according to gender

	<i>M (SD)</i>		<i>t tests</i>		
	Men (<i>n</i> = 58)	Women (<i>n</i> = 28)	<i>t (df)</i>	<i>p</i>	Hedges' <i>g</i>
PHQ-15: somatic symptoms	4.22 (3.56)	6.61 (5.12)	-2.50 (84)	.014	0.58
PHQ-9: depression symptoms	2.24 (2.60)	4.89 (5.64)	-2.37 (32.65) ^{a)}	.024	0.69
GAD-7: anxiety symptoms	2.59 (3.54)	3.64 (4.48)	-1.19 (84)	.238	0.27
IES-R: posttraumatic stress	0.59 (0.49)	0.85 (0.87)	-1.50 (35.54) ^{a)}	.142	0.41

^{a)} Unequal variances assumed.

Table 10 shows the correlations between the outcomes and possible predictor variables measured by the PSAB. The outcome variables, somatic (PHQ-15), anxiety (GAD-7), and depression (PHQ-9) symptom severity as well as posttraumatic stress symptoms (IES-R) showed various significant correlations with the intended predictor variables and correlated strongly with each other: The PHQ modules were strongly inter-correlated ($r = .78$ to $r = .83$) and also strongly correlated with posttraumatic stress symptoms, whereby depression symptoms (PHQ-9) and posttraumatic stress symptoms shared the highest amount of variability³¹, namely 48.9% ($R^2 = 0.489$). Even though the PHQ modules were strongly inter-correlated, it was considered reasonable to run separate regression analyses on them as it was aimed to examine the relevance of the different predictors for each syndrome. Apart from the other health variables, somatic symptom severity was significantly positively correlated with perceived stress, stress reactivity and dysfunctional coping (large effects), as well as marginally significantly with job stress, iso-stress, and negatively with crisis leader self-efficacy (small to medium-sized effects). Depression symptom severity showed a similar correlational pattern and correlated most strongly with perceived stress and stress reactivity. The same applied for anxiety severity, which, compared to the other two PHQ modules, showed the highest correlations with each of the mentioned predictor variables (perceived stress, stress reactivity, self-efficacy, dysfunctional coping, job stress, and iso-stress).

³¹ The squared correlation coefficient, R^2 (called *coefficient of determination*) is the measure of the amount of shared variability between two variables

Concerning the correlations between posttraumatic stress symptoms and the predictor variables, posttraumatic stress symptoms were also significantly related to the level of perceived stress and stress reactivity (medium-sized to large effects) and to dysfunctional coping (medium-sized effect), but neither to job stress nor to iso-stress.

The correlational patterns between the predictor variables were very diverse: Firstly, as already mentioned, three of the supposed predictors, namely dysfunctional coping (Brief COPE), stress reactivity (PSRS), and perceived stress (PSQ) correlated most strongly with the outcomes, and in the theoretically assumed positive direction: The more perceived stress, stress reactivity, and dysfunctional coping, the more (mental) health symptoms. Beyond that, all three constructs correlated significantly moderately (perceived stress and dysfunctional coping) or strongly (stress reactivity with the other constructs) with each other, with perceived stress and stress reactivity showing the highest inter-correlation.

As already mentioned, dysfunctional coping showed constantly high, positive correlations with the outcomes, as was to be expected (hence the definition “dysfunctional”). However, it was also significantly positively correlated with problem-focused coping, which, in turn, was strongly positively correlated with emotion-focused coping. Despite from what previous research suggests (see section 3.2.3.4), neither problem-focused nor emotion-focused coping showed any significant correlations with health symptoms, which lead to the assumption that the emotion- and problem-focused coping subscales did not adequately assess the respective constructs. This would be underpinned by the medium-sized and significant positive correlation between problem-focused coping (as an assumingly functional coping style) and dysfunctional coping. Considering these conflicting results, it seemed reasonable to exclude the two initially assumed predictors, emotion- and problem-focused coping from the regression analyses.

The variables pertaining to the psychosocial work environment, job stress and iso-stress (JCQ), were significantly or marginally significantly correlated with the outcomes in the theoretically assumed direction, with higher job stress or iso-stress relating to more reported symptoms. The JCQ scale support (support from colleagues and supervisors combined) did not correlate with any of the outcomes or the other predictors. It was only significantly (negatively) correlated with the other two JCQ variables, sharing the highest amount of variability (59.9%) with iso-stress, which is not surprising considering that the iso-stress quotient contains information of the support variable. With regard to the regression analyses, it was nevertheless decided to include the job stress quotient and, separately the variable

support, as predictors, as the majority of previous studies suggest that job stress and support might have independent effects on health (Van der Doef & Maes, 1999). Regarding job stress and iso-stress, they were significantly (strongly or moderately) positively correlated with perceived stress, as well as with stress reactivity. Only iso-stress was significantly correlated with dysfunctional coping indicating that the higher reported iso-stress, the higher the reported usage of dysfunctional coping strategies.

Finally, crisis leader self-efficacy (C-LEAD) was negatively, marginally significantly associated with two of the outcome variables, namely somatic and anxiety symptoms, meaning that the higher perceived leadership efficacy, the less symptoms were reported. These correlations represented medium-sized effects. Symptoms of depression or posttraumatic stress were not significantly related to scores on the C-LEAD scale, but the correlations were also negative. Beyond that, leadership self-efficacy was uncorrelated to the job stress variables and coping, but showed moderate negative correlations with perceived stress and stress reactivity.

Taken together, it was decided to retain the following variables as predictors: Age and gender, perceived stress, stress reactivity, dysfunctional coping, job stress (i.e., the quotient of demands and decision latitude), support, and crisis leader self-efficacy.

Table 10

Correlations of all constructs measured by the PSAB

	Age	PHQ-15 Somatic sympt.	PHQ-9 Depression sympt.	GAD-7 Anxiety sympt.	PSRS Stress reactivity	PSQ Perceived stress	Brief COPE Emotion- focused	Brief COPE Problem- focused	Brief COPE Dys- functional	C-LEAD Scale Self-efficacy	IES-R PTSD sympt.	JCQ Support	JCQ Job stress	JCQ Iso-stress
Age	1	-.302** [-.483,-.092]	-.146 [-.292,-.013]	-.150 [-.339,.041]	-.194 [-.397,.004]	-.178 [-.389,.030]	-.057 [-.281,.173]	-.107 [-.307,.104]	-.233* [-.427,-.067]	.125 [-.110,.346]	-.113 [-.300,.099]	-.063 [-.275,.154]	-.223* [-.419,-.037]	-.113 [-.297,.053]
PHQ-15 Somatic sympt.	-.302** [-.483,-.092]	1	.802*** [.670,.893]	.777*** [.617,.866]	.597*** [.349,.811]	.547*** [.303,.751]	.074 [-.215,.314]	.070 [-.124,.241]	.565*** [.343,.714]	-.299** [-.544,.021]	.650*** [.365,.814]	-.079 [-.346,.178]	.274* [-.036,.561]	.292** [-.037,.560]
PHQ-9 Depression sympt.	-.146 [-.292,-.013]	.802*** [.670,.893]	1	.834*** [.655,.911]	.610*** [.271,.833]	.563*** [.210,.797]	-.034 [-.299,.261]	.007 [-.199,.192]	.499*** [.239,.723]	-.231* [-.420,.028]	.699*** [.455,.826]	-.165 [-.462,.130]	.312** [-.099,.653]	.383*** [-.062,.703]
GAD-7 Anxiety sympt.	-.150 [-.339,.041]	.777*** [.617,.866]	.834*** [.655,.911]	1	.671*** [.412,.845]	.623*** [.389,.819]	-.088 [-.368,.192]	-.015 [-.202,.132]	.611*** [.325,.773]	-.327** [-.552,-.045]	.571*** [.313,.765]	-.143 [-.480,.208]	.330** [-.045,.618]	.413*** [-.032,.704]
PSRS Stress reactivity	-.194 [-.397,.004]	.597*** [.349,.811]	.610*** [.271,.833]	.671*** [.412,.845]	1	.796*** [.691,.870]	-.295** [-.472,-.075]	-.063 [-.278,.116]	.491*** [.264,.651]	-.379*** [-.574,-.140]	.479*** [.205,.705]	-.235* [-.476,.031]	.479*** [.256,.647]	.474*** [.190,.645]
PSQ Perceived stress	-.178 [-.389,.030]	.547*** [.303,.751]	.563*** [.210,.797]	.623*** [.389,.819]	.796*** [.691,.870]	1	-.198 [-.422,.037]	-.014 [-.276,.215]	.399*** [.203,.551]	-.337** [-.525,-.096]	.531*** [.254,.751]	-.207 [-.383,-.007]	.550*** [.348,.708]	.439*** [.247,.621]
Brief COPE Emotion- focused	-.057 [-.281,.173]	.074 [-.215,.314]	-.034 [-.299,.261]	-.088 [-.368,.192]	-.295** [-.472,-.075]	-.198 [-.422,.037]	1	.602*** [.384,.754]	.246* [-.120,.601]	.108 [-.148,.366]	-.033 [-.272,.188]	.205 [-.036,.419]	-.214* [-.406,-.018]	-.276* [-.462,-.042]
Brief COPE Problem- focused	-.107 [-.307,.104]	.070 [-.124,.241]	.007 [-.199,.192]	-.015 [-.202,.132]	-.063 [-.278,.116]	-.014 [-.276,.215]	.602*** [.384,.754]	1	.383*** [.187,.596]	.029 [-.204,.258]	.046 [-.190,.254]	.034 [-.170,.211]	-.064 [-.287,.165]	-.044 [-.269,.154]
Brief COPE Dysfunctional	-.233* [-.427,-.067]	.565*** [.343,.714]	.499*** [.239,.723]	.611*** [.325,.773]	.491*** [.264,.651]	.399*** [.203,.551]	.246* [-.120,.601]	.383*** [.187,.596]	1	-.081 [-.373,.211]	.321** [.077,.560]	-.203 [-.517,.174]	.247* [-.022,.441]	.420*** [-.030,.680]
C-LEAD Scale Self-efficacy	.125 [-.110,.346]	-.299** [-.544,.021]	-.231* [-.420,.028]	-.327** [-.552,-.045]	-.379*** [-.574,-.140]	-.337** [-.525,-.096]	.108 [-.148,.366]	.029 [-.204,.258]	-.081 [-.373,.211]	1	-.136 [-.354,.087]	.164 [-.068,.398]	-.102 [-.350,.150]	-.094 [-.378,.125]
IES-R PTSD sympt.	-.113 [-.300,.099]	.650*** [.365,.814]	.699*** [.455,.826]	.571*** [.313,.765]	.479*** [.205,.705]	.531*** [.254,.751]	-.033 [-.272,.188]	.046 [-.190,.254]	.321** [.077,.560]	-.136 [-.354,.087]	1	.028 [-.243,.253]	.146 [-.156,.471]	.127 [-.173,.428]
JCQ Support	-.063 [-.275,.154]	-.079 [-.346,.178]	-.165 [-.462,.130]	-.143 [-.480,.208]	-.235* [-.476,.031]	-.207 [-.383,-.007]	.205 [-.036,.419]	.034 [-.170,.211]	-.203 [-.517,.174]	.164 [-.068,.398]	.028 [-.243,.253]	1	-.417*** [-.575,-.233]	-.774*** [-.830,-.714]
JCQ Job stress	-.223* [-.419,-.037]	.274* [-.036,.561]	.312** [-.099,.653]	.330** [-.045,.618]	.479*** [.256,.647]	.550*** [.348,.708]	-.214* [-.406,-.018]	-.064 [-.287,.165]	.247* [-.022,.441]	-.102 [-.350,.150]	.146 [-.156,.471]	-.417*** [-.575,-.233]	1	.805*** [.732,.921]
JCQ Iso-stress	-.113 [-.297,.053]	.292** [-.037,.560]	.383*** [-.062,.703]	.413*** [-.032,.704]	.474*** [.190,.645]	.439*** [.247,.621]	-.276* [-.462,-.042]	-.044 [-.269,.154]	.420*** [-.030,.680]	-.094 [-.378,.125]	.127 [-.173,.428]	-.774*** [-.830,-.714]	.805*** [.732,.921]	1

Note. N = 85. BCa bootstrap 95% CIs reported in brackets

* p < .05, ** p < .01, *** p < .001

7.3.3.3 Regression analyses

For each of the outcomes, namely anxiety symptoms (GAD-7), depression symptoms (PHQ-9), somatic symptoms (PHQ-15), and posttraumatic stress symptoms (IES-R), hierarchical multiple regression analyses were conducted. In the first step, two sociodemographic variables, age and gender, were entered to control for their influence. Other previously considered sociodemographic variables (years of organizational affiliation, weekly working hours, number of subordinates), which did not show any correlations with the outcome variables, were not included in the regression analyses. The predictor variables, perceived stress, stress reactivity, dysfunctional coping, job stress (quotient of demands and decision latitude), support and crisis leader self-efficacy were entered in a second step to examine the amount of additional variance explained by them.

7.3.3.3.1 Prediction of somatic symptoms

The two steps (model 1: sociodemographic variables, model 2: sociodemographic variables + PSAB constructs) explained a total of 54% of the variance in somatic symptoms in this sample and are assumed to explain a total of 49% of variance in the general population of crisis managers (adjusted $R^2 = .486$). The PSAB constructs, which were added to the final model in step two, accounted for an additional 40% of the variance whereas the two sociodemographic variables, age and gender, explained 14% of the variance in somatic symptoms. Both models significantly (or marginally so in the case of the sociodemographic model) improved the ability to predict somatic symptoms in this sample of crisis managers. However, even if the total amount of variance explained by the final model is considerable, out of the single predictors, only dysfunctional coping made a significant contribution to the model. For details and statistical parameters of the regression analysis see Table 11.

Table 11

Regression analysis with somatic symptoms (PHQ-15) as dependent variable

Predictors	PHQ-15			
	ΔR^2	p	β	p
Step 1	.135**	.003		
Age			-.250*	.020
Female			.217*	.043
Step 2	.399***	< .001		
Age			-.078	.376
Female			.180*	.032
Stress reactivity			.212	.136
Perceived stress			.160	.254
Dysfunctional coping			.379***	< .001
Crisis leader self-efficacy			-.136	.128
Support			.098	.285
Job stress			.000	.997

Note. $N = 85$; total $R^2 = .535$; adjusted $R^2 = .486$

* $p < .05$, ** $p < .01$, *** $p < .001$

7.3.3.3.2 Prediction of depression symptoms

The final model with age, gender, and the previously chosen PSAB constructs as predictors accounted for 51% of the variance in depression symptoms in this sample of crisis managers and for assumingly 45% of variance in the general population of crisis managers (adjusted $R^2 = .453$). After controlling for the sociodemographic variables, the PSAB constructs explained an additional 39% of the variance in depression symptoms. Female gender and the usage of dysfunctional coping styles, which increase the level of reported depression symptoms, make a marginally significant contribution to the final model. Both models significantly (or marginally so in the case of the sociodemographic model) improved the ability to predict depression symptoms in this sample of crisis managers. For details and statistical parameters of the regression analysis see Table 12.

Table 12

Regression analysis with depression symptoms (PHQ-9) as dependent variable

Predictors	PHQ-9			
	ΔR^2	p	β	p
Step 1	.112**	.008		
Age			-.072	.503
Female			.311**	.005
Step 2	.392***	< .001		
Age			.087	.338
Female			.267**	.003
Stress reactivity			.278	.059
Perceived stress			.164	.255
Dysfunctional coping			.294**	.003
Crisis leader self-efficacy			-.051	.579
Support			.024	.799
Job stress			.041	.713

Note. $N = 85$; total $R^2 = .505$; adjusted $R^2 = .453$

* $p < .05$, ** $p < .01$, *** $p < .001$

7.3.3.3.3 Prediction of anxiety symptoms

With regard to anxiety symptoms, as measured with the GAD-7 module of the PHQ, the final model consisting of sociodemographic variables and PSAB constructs accounted for 55% of the variance in this sample of crisis managers. Concerning the general population of crisis managers, the final model is assumed to account for 51% of the variance in anxiety symptoms (adjusted $R^2 = .506$). After controlling for age and gender, which accounted for 5% of the variance in anxiety severity, the PSAB constructs explained an additional 50%. Whereas model 1 (i.e., the sociodemographic variables) did not significantly improve the prediction of anxiety symptoms, model 2 with the additionally entered PSAB constructs did. With regard to the single predictors, dysfunctional coping, which was positively related to anxiety symptoms, made a marginally significant contribution to the model. Furthermore, crisis leader self-efficacy contributed marginally significantly to the model, in the sense that as perceived leadership efficacy increases, anxiety severity decreases. For details and statistical parameters of the regression analysis see Table 13.

Table 13

Regression analysis with symptoms of anxiety (GAD-7) as dependent variable

Predictors	GAD-7			
	ΔR^2	p	β	p
Step 1	.052	.113		
Age			-.117	.296
Female			.171	.129
Step 2	.501***	< .001		
Age			.071	.414
Female			.104	.206
Stress reactivity			.158	.251
Perceived stress			.342*	.016
Dysfunctional coping			.239**	.008
Crisis leader self-efficacy			-.245**	.008
Support			.012	.911
Job stress			.172	.052

Note. $N = 84$; total $R^2 = .554$; adjusted $R^2 = .506$

* $p < .05$, ** $p < .01$, *** $p < .001$

7.3.3.3.4 Prediction of posttraumatic stress symptoms

In terms of posttraumatic stress, the final model including age, gender, stress reactivity, perceived stress, dysfunctional coping, crisis leader self-efficacy, support, and job stress as predictors explained 37% of the variance in the crisis managers' sample. For the general population of crisis managers, the amount of presumably explained variance in posttraumatic stress symptoms shrinks to 30% (adjusted $R^2 = .298$). When controlled for age and gender, the PSAB constructs, which were added to the model in step two, accounted for an additional 31% of variance in posttraumatic stress, representing a significant change in explained variance. However, the only predictor making a marginally significant contribution to the final model was perceived stress, which was positively related to posttraumatic stress symptoms. For details and statistical parameters of the regression analysis see Table 14.

Table 14

Regression analysis with posttraumatic stress symptoms (IES-R) as dependent variable

Predictors	IES-R			
	ΔR^2	p	β	p
Step 1	.056	.092		
Age			-.062	.577
Female			.215	.055
Step 2	.309***	< .001		
Age			.027	.793
Female			.137	.160
Stress reactivity			.142	.392
Perceived stress			.482**	.004
Dysfunctional coping			.126	.254
Crisis leader self-efficacy			.056	.589
Support			.112	.293
Job stress			-.159	.207

Note. $N = 85$; total $R^2 = .365$; adjusted $R^2 = .298$

* $p < .05$, ** $p < .01$, *** $p < .001$

7.3.3.4 Moderation analyses

7.3.3.4.1 The relationship between stress, individual factors, and health

To examine how individual factors might influence the relationship between stress and health, moderation analyses with perceived stress as predictor, health variables (depression, anxiety, and somatic symptoms; PTSD) as outcomes, and stress reactivity as potential moderator were conducted. Additional moderation analyses with the same predictor and outcomes, but with coping as potential moderator were conducted as well³². As the correlational analyses (see section 7.3.3.2) indicated that the emotion- and problem-focused coping subscales of the Brief COPE probably do not adequately assess the respective constructs, only dysfunctional coping was included within the moderation analyses. However, no significant interaction was found

³² It has to be noted that moderation is statistically shown if the interaction between two variables significantly predicts the outcome; it does not indicate which one of the two variables is the predictor and which one is the moderator. Commonly, this decision is made before running a moderation analysis based on previous research or logical pre-assumptions, respectively.

between dysfunctional coping and perceived stress in predicting any of the health outcomes. This means that dysfunctional coping did not moderate the relationship between perceived stress and health, i.e., the amount of dysfunctional coping strategies used by the participants did not influence the effect of perceived stress on health symptoms (for statistical data, see Table 15).

Table 15

Regression of health symptoms on perceived stress with dysfunctional coping as moderator

Predictors	<i>b</i>	<i>SE B</i>	<i>t</i>	<i>p</i>
<i>Outcome depression symptoms</i>				
Constant	2.83	0.501	5.64	< .001
Dysfunctional coping (centered)	0.17	0.128	1.37	.175
Perceived stress (centered)	0.15	0.062	2.40	.019
Dysfunctional coping x perceived stress	0.01	0.011	1.00	.320
<i>Outcome somatic symptoms</i>				
Constant	4.93	0.466	10.58	< .001
Dysfunctional coping (centered)	0.31	0.124	2.52	.014
Perceived stress (centered)	0.14	0.042	3.40	.001
Dysfunctional coping x perceived stress	0.00	0.008	0.37	.710
<i>Outcome anxiety symptoms</i>				
Constant	2.70	0.397	6.81	< .001
Dysfunctional coping (centered)	0.26	0.119	2.15	.034
Perceived stress (centered)	0.15	0.038	3.93	< .001
Dysfunctional coping x perceived stress	0.01	0.008	1.15	.253
<i>Outcome posttraumatic stress symptoms</i>				
Constant	14.54	1.721	8.45	< .001
Dysfunctional coping (centered)	0.29	0.446	0.66	.513
Perceived stress (centered)	0.64	0.167	3.84	< .001
Dysfunctional coping x perceived stress	0.01	0.029	0.41	.686

Note. R^2 (PHQ-9) = .45; R^2 (PHQ-15) = .45; R^2 (GAD-7) = .57; R^2 (IES-R) = .35

Stress reactivity, on the other hand, significantly moderated the relationship between perceived stress and depression symptoms as well as between perceived stress and anxiety symptoms (marginally significantly). Statistically spoken, this means that the interaction of perceived stress and stress reactivity significantly predicted the health outcomes depression and anxiety symptoms (see Table 16). In terms of somatic and posttraumatic stress symptoms, no moderation by stress reactivity was found, meaning that the interaction of stress and stress reactivity did not significantly predict these outcomes (see Table 16).

Table 16

Regression of health symptoms on perceived stress with stress reactivity as moderator

Predictors	<i>b</i>	<i>SE B</i>	<i>t</i>	<i>p</i>
<i>Outcome depression symptoms</i>				
Constant	2.17	0.280	7.77	< .001
Stress reactivity (centered)	0.16	0.064	2.45	.016
Perceived stress (centered)	0.03	0.041	0.67	.508
Stress reactivity x perceived stress	0.01	0.002	5.75	.001
<i>Outcome somatic symptoms</i>				
Constant	4.50	0.394	11.41	< .001
Stress reactivity (centered)	0.21	0.074	2.76	.007
Perceived stress (centered)	0.05	0.040	1.17	.247
Stress reactivity x perceived stress	0.01	0.003	2.34	.022
<i>Outcome anxiety symptoms</i>				
Constant	2.56	0.322	7.95	< .001
Stress reactivity (centered)	0.21	0.091	2.32	.023
Perceived stress (centered)	0.06	0.049	1.33	.186
Stress reactivity x perceived stress	0.01	0.002	2.87	.005
<i>Outcome posttraumatic stress symptoms</i>				
Constant	12.89	1.666	7.74	< .001
Stress reactivity (centered)	0.04	0.201	0.19	.846
Perceived stress (centered)	0.50	0.173	2.90	.005
Stress reactivity x perceived stress	0.03	0.024	1.17	.244

Note. R^2 (PHQ-9) = .54; R^2 (PHQ-15) = .42; R^2 (GAD-7) = .51; R^2 (IES-R) = .38

The simple slopes analyses, which are presented in Figure 27 revealed that the strongest relationship between perceived stress and depression symptoms emerged in participants with high (1 SD above mean) levels of stress reactivity ($b = 0.132$, 95% CI [0.058, 0.206]). When levels of stress reactivity were low (1 SD below mean), a smaller, negative relationship between stress and depression symptoms was observed ($b = -0.078$, 95% CI [-0.179, 0.023]). At the mean value of stress reactivity, there was a comparably small, positive relationship between the two variables ($b = 0.027$, 95% CI [-0.054, 0.108]).

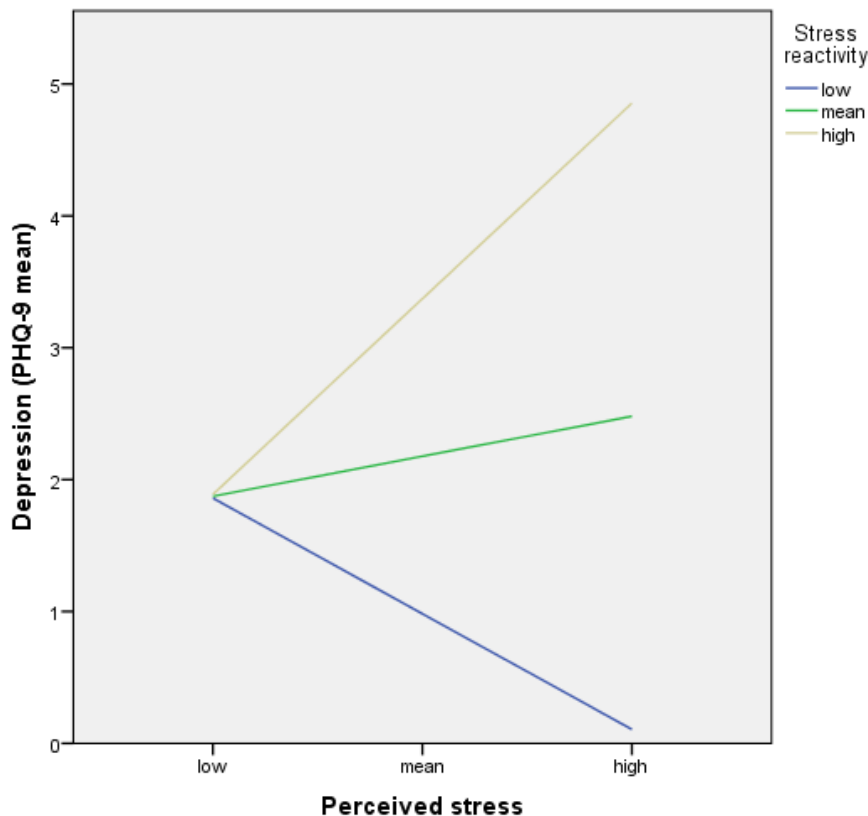


Figure 27. Simple slopes equations of the regression of depression symptoms on perceived stress at three levels of stress reactivity.

Regarding the prediction of anxiety symptoms, the simple slopes analysis (Figure 28) showed positive relationships between perceived stress and anxiety symptoms for each of the three levels of stress reactivity. This relationship got stronger the higher the level of stress reactivity rose. In other words: The higher the stress reactivity of the participants, the stronger the positive relationship between perceived stress and anxiety symptoms (low: $b = 0.023$, 95% CI [-0.089, 0.134]; mean: $b = 0.065$, 95% CI [-0.032, 0.161]; high: $b = 0.107$, 95% CI [0.018, 0.195]).

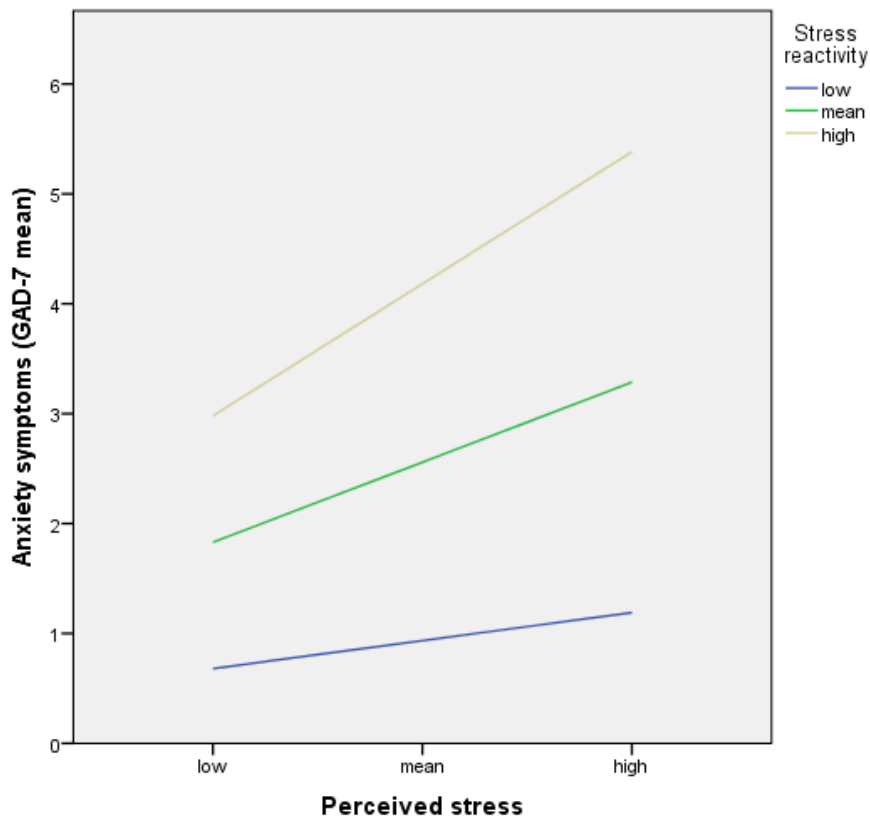


Figure 28. Simple slopes equations of the regression of anxiety symptoms on perceived stress at three levels of stress reactivity.

7.4 Discussion

In this study, the psychosocial work environment, perceived stress, stress reactivity, coping, crisis leader self-efficacy, and health symptoms (somatic, anxiety, depression and posttraumatic stress) were assessed in European crisis managers with the help of a set of questionnaires compiled for this purpose, termed the PsyCris stress assessment battery (PSAB). To put the results of the crisis managers' sample into perspective, they were compared to a control group consisting of German managers in the public sector and (whenever available) to representative samples or normative values.

An additional aim was to identify potential risk factors predicting mental health in crisis managers. Regression analyses were conducted for this purpose. Beyond that, the relationships between perceived stress, health symptoms, and the individual factors dysfunctional coping and stress reactivity were examined in more detail by means of moderation analyses.

The results of these analyses were assumed to provide important information for the stress management training developed in the PsyCris project (see sections 2.2 and 5), with regard to

stress and stressors specifically relevant for crisis managers and influential but potentially modifiable risk factors.

7.4.1 Findings from the group comparison

Compared to the control group comprised of managers working in the public sector, the crisis managers reported significantly less psychological demands³³ associated with their work environment and less job stress (i.e., quotient of demands and decision latitude). No significant differences were found in terms of solely decision latitude or support from co-workers and supervisors. However, both groups reported rather high levels of decision latitude (referred to the response format, answers on average between “agree” and “strongly agree”) and of received support (answers on average “agree”).

When interpreting the results, it has to be noted that the control group was asked to report demands, decision latitude, and support with regard to their current everyday working life whereas crisis managers were asked to report these aspects retrospectively with regard to their work environment in disaster operations. Considering that the extent of perceived stress might differ between current and retrospective ratings, this could have contributed to the result that public sector managers perceive their everyday work environment as more stressful and associated with higher demands than crisis managers perceive theirs in the context of large-scale crises. Another possible explanation would be that public sector managers might experience moderate to high stress levels over long time spans whereas crisis managers are confronted with suddenly occurring but only temporary stress situations. However, these stress situations occurring in the course of disaster operations (different to stress situations in the everyday working life of public sector managers) include critical incident stressors (besides occupational and organizational stressors). If crisis managers have time to cope and relax afterwards, it might be possible that they return to their baseline levels of stress. However, considering the additive effects of these kinds of critical incident stressors as well as the substantially differing time spans between missions, the ability to identify and adapt an effective coping strategy as fast as possible after but also during a (longer-lasting) mission is crucial for crisis managers. Therefore, it is reasonable to enhance their coping flexibility,

³³ Both groups reported rather high demands, referred to the response format, and answered the questions on average with “agree” (control group) or very close to “agree” (crisis managers). Exact numbers are reported in Table 8.

promptness, and skills to mitigate the described additive effects of stressors and to prevent that the stress level is still elevated when another incident/disaster operation happens.

Another aspect to consider, when discussing the results with regard to the psychosocial work environment, is that even though not too many crisis managers fell in the category of high-strain/stress jobs (13%), one third fell in the passive job category (relatively low demands but also low decision latitude). The latter is also assumed to be a disadvantageous work environment, which can easily change into the high-strain/stress category as demands might increase in certain situations whereas decision latitude tends to remain on the same level (Karasek & Theorell, 1990). However, the results of the median split have to be interpreted with caution, as the reference value of this analysis was the median of the total sample, which generally reported considerably high levels of decision latitude and demands (referred to the scoring range of the items).

Regarding perceived stress and the corresponding dimensions demands, worries, tension, and joy, no significant differences were found between crisis managers and managers working in the public sector. Compared to a reference sample of healthy adults (Fliege et al., 2005), both, crisis managers and control group, reported significantly more demands but the crisis managers reported also significantly more joy, which explains why they do not show overall elevated perceived stress levels when compared to the reference sample.

In terms of stress reactivity to different kinds of stressors, the crisis managers reported significantly lower levels of stress reactivity in general as well as stress reactivity to social evaluation, to social conflicts, and to failure compared to the managers of the control group. The previously mentioned higher levels of work-related, psychological demands reported by the control group in combination with the higher overall stress reactivity, might explain the higher number of reported mental health symptoms in the control group (addressed in the following). However, stress reactivity of both groups was in the normal range referring to a reference sample examined by Schlotz et al. (2011).

Concerning the use of problem-focused and dysfunctional coping strategies, the crisis managers showed no notable differences from the managers in the control group. In terms of applied emotion-focused coping strategies, the crisis managers reported a significantly higher level than the control group. Nonetheless, they reported to use all three kinds of coping styles not very frequently (problem- and emotion-focused coping on average between “a little bit” and “to a medium amount” and dysfunctional coping on average between “not at all” and “a

little bit”). In terms of dysfunctional coping, this may be considered healthy, but a more frequent use of the presumably more functional coping styles, problem- and emotion-focused coping is assumed to be beneficial to mental health (Aldwin, 2007), and therefore recommendable. This is an important implication of the study for the development of the stress management training for crisis managers. As argued above, in this training it is crucial to aim at increasing the coping repertoire of the participating crisis managers in terms of emotion- and problem-focused coping strategies, also in order to enhance coping flexibility (see section 6.4.3).

In terms of crisis leader self-efficacy, the crisis managers’ sample did not differ from the control group. It has to be noted that even though the C-LEAD scale assesses leadership self-efficacy with regard to crises, the questionnaire is applicable to managers from other fields as well, as they have to fulfil their leading positions also during crises. However, considering that crisis managers are assumed to be more accustomed to large scale crises and disasters than managers in the public sector, it is somewhat surprising that they do not report higher levels of crisis leader self-efficacy than the managers of the control group. Therefore (and because of the fact that lower crisis leader self-efficacy predicts anxiety symptoms, see section 3.2.4.2), it is reasonable to aim at enhancing the perceived leadership efficacy of crisis managers with the help of the stress management training.

With regard to mental and somatic health, the crisis managers’ sample showed significantly less somatic, anxiety and depression symptoms than the managers of the control group. Consistently, compared to normative values (Kocalevent et al., 2013a; Löwe et al., 2008), the control group showed significantly elevated rates in all symptom domains. On average, the crisis managers reported normal levels of depression and anxiety symptoms, but their reported level of somatic symptoms was considerably higher than in the general population. Looking at the number of persons who reported symptoms in the higher ranges pointing to possible depression, anxiety, or somatoform disorders, however, the assumed prevalence rates were not different from what is to be expected in the general population. An explanation for the elevated levels of somatic symptoms in the crisis managers’ sample could be that somatic complaints might be a less stigmatized way of expressing or admitting burden than addressing burdening emotions related to depression or anxiety, as queried by the PHQ-9 and GAD-7. In the qualitative study (see section 6.4.1), the interviewed crisis managers reported that their professional and societal role implies to be perceived as strong, broad-shouldered and stress-resistant. They also mentioned that this role concept hinders addressing topics of stress and

excessive demands. Beyond that, this role concept has been discussed by researchers and practitioners in relation to the stigmatization of admitting burden and seeking support in crisis management organizations (Pieper & Maercker, 1999). As consequently mentioned in section 6.4.1, the potential stigmatization of admitting burden and seeking help in the occupational field of crisis management has to be carefully considered in the development of the stress management training for crisis managers, also in the sense of a potential barrier to take part.

Nevertheless, regarding clinically relevant levels of posttraumatic stress symptoms, the prevalence rates found in this sample of crisis managers were elevated: Eight individuals (9.3%) were above the cut-off proposed by Creamer et al. (2003) which means they might suffer from full-blown PTSD. This indicates a point prevalence that is higher as would be expected in the general population (2% to 5%; Wittchen et. al, 2009). However, it fits rather well to the also elevated, overall prevalence of current PTSD in rescue workers found in a recent meta-analysis (Berger, Coutinho, Figueira et al., 2012). Nonetheless, when interpreting these results, it should be kept in mind that the IES-R does not diagnose PTSD, but a syndrome of posttraumatic stress, if scores are high. The gate-keeper criterion of any PTSD diagnosis is the presence of a traumatic event, which is not assessed by the IES-R. In theory, crisis managers could have answered in relation to an incident that does not qualify for a traumatic event in the sense of the diagnosis PTSD. However, a score higher than 1.5 is a rather conservative cut-off point and it is reasonable to assume, that individuals reporting that much symptoms show a clinically relevant syndrome. Somewhat alarmingly, 5 out of the 8 individuals who had scores higher than the cut-off, reported not being/never having been in psychiatric/psychotherapeutic treatment (one person did not answer the question). Again, this leads back to the important aspect that admitting emotional burden might still be stigmatized in the field of crisis management which should be carefully taken into consideration in the development of stress management trainings and other psychosocial support and care programs for crisis management personnel.

7.4.2 Findings from correlation, regression, and moderation analysis

To identify potential risk factors predicting (mental) health in crisis managers, regression analyses were conducted. Beyond that, moderation analyses were conducted to examine how individual factors, such as stress reactivity and coping, influence the stress-health-relationship.

Taken together, the constructs assessed with the PSAB (stress reactivity, perceived stress, dysfunctional coping, crisis leader self-efficacy, support, and job stress) that were considered

to predict somatic, depression, anxiety, and posttraumatic stress symptoms, significantly improved the prediction of each health outcome, after controlling for the sociodemographic variables age and gender. The best prediction was achieved for anxiety symptoms (55% of variance explained by the PSAB constructs), whereas the lowest amount of variance was explained for posttraumatic stress symptoms (37%). With regard to the sociodemographic variables, only gender made a significant contribution to predict one of the outcomes, namely depression symptoms.

Regarding the single predictors derived from the PSAB constructs, the usage of dysfunctional coping strategies appeared to be the most influential predictor and contributed substantially to predict somatic, depression, and anxiety symptoms. However, dysfunctional coping did not influence the relationship between stress and any of the health outcomes. This result is not in line with parts of previous research suggesting that coping moderates the relationship between stress and health (e.g., Patterson, 2003). However, it has also been previously assumed that coping has a direct effect on health and does not necessarily buffer (or increase, in the case of dysfunctional coping) the effect of stress on health (see Aldwin, 2007). The same might apply to the occupational group of crisis managers, who, furthermore, reported fairly low levels of dysfunctional coping styles. Another explanation could be the particularities of the PSQ as a measure of perceived stress or – more explicitly said – the different aspects of stress that it measures, a hypothesis that is further elaborated in the course of this section. Nevertheless, the finding of the regression analysis that dysfunctional coping has an impact on depression, anxiety, and somatic symptoms of crisis managers, is of particular relevance for the development of the stress management training. Against this background, it is highly important that the training teaches alternative coping strategies and enhances coping flexibility to prevent the use of (more) dysfunctional coping methods.

With regard to problem-focused and emotion-focused coping, the correlation analysis showed that these two variables correlated strongly with each other. This finding strengthens the assumption that instead of a preference for a single kind of coping strategies, people have an individual level of overall coping flexibility deriving from a repertoire of coping styles (Aldwin, 2007). The finding is also consistent with previous research showing that emotion- and problem focused coping strategies are often simultaneously applied, particularly in the case of complex stress situations (see section 3.2.3.3; Folkman, 1984). However, it should further be noted in this context that problem-focused and emotion-focused coping– contrary to previous research – did not show any significant correlations with the health variables. This

result suggests that the theory-driven division of the Brief COPE (which originally comprised 14 subscales; Carver, 1997) in three factors/subscales (Coolidge et al., 2000) did not assess the problem-focused and emotion-focused coping constructs properly. Therefore, these variables were not included in the regression analysis. Nonetheless, it has to be also noted in this context that problem-focused coping styles can be ineffective in complex, low-control situations like disasters and are therefore assumed to not be as beneficial in these situations as in everyday situations (Patterson, 2003). This assumption might also explain why problem-focused coping in crisis managers did not show the correlations found in previous research (see sections 3.2.3.4 and 4.4).

Concerning the contribution of perceived stress and stress reactivity in predicting the health outcomes, perceived stress contributed notably to predict posttraumatic stress symptoms, whereas stress reactivity did not make any significant contribution in predicting health. Considering the high correlations of perceived stress and stress reactivity with the health outcomes as well as with each other, these two constructs probably share variance in relation to the health outcomes, which makes it difficult to assess their individual importance in predicting health. However, no signs of multicollinearity were found in the regression analysis, which is why it was still justifiable to include both variables as predictors. Nevertheless, due to the relatively high correlation, the actual impact of perceived stress and/or stress reactivity on the assessed health variables might not have been completely uncovered by the regression analyses. Examining the question, if perceived stress and stress reactivity interacted with regard to predicting health, moderation analyses with stress reactivity as potential moderator of the stress-health-relationship were conducted. The results showed that stress reactivity moderated the relationship between perceived stress and depression as well as anxiety symptoms. More explicitly said: When stress reactivity was high, the impact of perceived stress on depression and anxiety symptoms was stronger than for participants with low stress reactivity. These results are in line with results of Schlotz et al. (2011) who showed that stress reactivity moderated the relationship between chronic stress and depression symptoms. The moderation explains parts of the reciprocal effects that perceived stress and stress reactivity seem to have in predicting health.

Hence, it remains a problem that at least parts of the two constructs are similar and their complex interactions cannot be solved completely within the scope of this study. This might be due to the fact that the PSQ as the measure of perceived stress in this study has both, components that assess stressors/stress exposure (subscale demands), but also components

that assess response aspects (subscales tension, worries, and joy). The authors (Fliege et al., 2005) state that assessing a two-factor model of stress with environmental conditions being one factor and the combination of stress appraisal and emotional response being another (as found by Lobel & Dunkel-Schetter, 1990) is assumed to better identify health consequences of stress. But this makes it also difficult to detect the concrete reciprocal effects of stress and stress reactivity, as measured by the PSRS, which also consists of very different components that unfold their influence on varying areas of the stress-health-relationship (e.g., stress reactivity to failure vs. prolonged reactivity/inability to relax afterwards).

Considering this, it could be hypothesized that stress reactivity, as the tendency to react strongly or emotionally in stress situations, moderates the impact of stress exposure (stimulus component) on health, but also that it has an influence on parts of the stress construct itself, more precisely on the response parts such as tension or worries. Further research could examine the more complex hypotheses if stress reactivity moderates the relationship between stress exposure and health symptoms, but predicts stress responses, which in turn might mediate (i.e., explain) the relationship between stress reactivity and health.

For future research, it might be interesting to examine the relationship between stress and stress reactivity for crisis managers in more detail with the help of more distinct and precise measures of the different stress aspects. However it might be difficult to find an isolated measure of stress exposure that is entirely applicable to crisis managers; the Trier Inventory for the Assessment of Chronic Stress (TICS; Schulz, Schlotz, & Becker, 2004), for example, which was used in the above mentioned study of Schlotz et al. (2011; short version), measures chronic stress which is probably not suitable for the stress related to the management of disasters.

Nevertheless, this moderation of the relationship between perceived stress and depression as well as anxiety symptoms by stress reactivity points to the importance of individual factors (that can be influenced by trainings, e.g., Angerer et al., 2011) in the stress-health-relationship, as it is assumed in relational stress models (e.g., Lazarus, 2006; see section 3.2.3).

With regard to the remaining predictors, crisis leader self-efficacy (which was negatively correlated with health symptoms) contributed considerably to predict anxiety symptoms. The finding is particularly interesting as it refers to the importance of this special kind of self-efficacy relevant in crisis management which should be addressed and strengthened in stress

management trainings for crisis managers. Beyond that, the finding concurs with previous research suggesting that general self-efficacy positively affects health (via health behavior; see the review of O'Leary, 1985; Bandura, 1998).

Finally, neither job stress (the quotient of demands and control/decision latitude) nor support turned out to be worthwhile predictors of the health outcomes. Considering that support was repeatedly shown to be a moderator of the impact of stress on health or to be an influential stressor itself when lacking (for an overview see Cohen & Wills, 1985; Thoits, 2011), this finding is particularly surprising. It is also not in line with the findings of the qualitative study where the interviewed crisis managers reported that support from co-workers and supervisors played a key role in dealing with their stress. One possible explanation could be that the support assessed by the JCQ is rather instrumental support (e.g., supervisor/co-workers are helpful in getting the job done) whereas the support addressed by the interviewees comprised above all emotional support (backing, empathy, trust etc.).

With regard to the dimensions demand, control, and support as specified in the D-C-S model (Karasek & Theorell, 1990), the question has already been addressed in this manuscript (see section 4.3) if the corresponding Job content questionnaire (JCQ) is completely applicable to the occupational group of crisis managers. One main issue is that the dimension control in the context of disasters is probably not well operationalized in the sense of decision latitude (as measured by the JCQ). The idea of the influence of control stated by Karasek and Theorell (1990) was that it is important for a person to have enough options for actions to handle arising demands. This is consistent with the stress concept, that a person experiences stress if he/she faces important demands that exceed his/her perceived possibilities for actions or resources, respectively (Kaluza, 2015; Lazarus, 2006). In the context of disasters (differing from an everyday work environment), occupational decision latitude might not be a sufficient indicator for control, as the ambiguous and rapidly changing character of a disaster limits possibilities for control remarkably. Another point that was considered in the discussion of the applicability of the JCQ to crisis managers is that decision latitude in crisis/disaster management comes with a large responsibility for decisions and a pressure to make decisions under time and information constraints. Therefore, decision latitude might not be as beneficial (with regards to well-being and health) in the context of disasters (Hering et al., 2011) as proposed by the demand-control-support model. This assumption is also reflected by the fact that job stress operationalized as the quotient of demands and decision latitude did not have a relevant influence in predicting health symptoms within the regression analyses. However, an

alternative explanation for the very small impact of the proportion of demands and decision latitude might be that its relationship with health could be mediated by perceived stress or moderated by other predictors included in the regression analysis. This hypothesis could be examined in further studies.

However, the finding that job stress, operationalized as proportion of demands and decision latitude, apparently does not have a direct impact on crisis managers' health should not lead to the interpretation that the stressors experienced by crisis managers during the management of crises/disasters do not have to be considered as critical or hurtful anymore. The crisis managers participating in this online survey reported relatively high amounts of stressful demands (measured by the PSQ) compared to reference values and the interviewed crisis managers also reported various, influential sources of stress within the scope of the first study (see section 6.4.1). Therefore, crisis management organizations should still aim at mitigating (potentially avoidable) stressors for crisis managers as well as to provide them with possibilities for actions and for support to deal with the inevitable stressors. However, as some stressors may lie in the very nature of disaster management, it should be also an important aim of stress management trainings for crisis managers to strengthen personal factors such as coping skills or self-efficacy. The results of this study point to the importance of this aim:

It can be concluded that, in this study, perceived stress as a measure of stress exposure and personal perceptions/responses, as well as the individual factors dysfunctional coping, stress reactivity, and crisis leader self-efficacy played a more important role in predicting health in crisis managers than isolated job stress exposure.

7.4.3 Summary

The second study of this dissertation project examined perceived stress in 86 European crisis managers, stressors related to their psychosocial work environment (i.e., job stress), individual factors such as coping, stress reactivity, and self-efficacy, as well as health symptoms by means of an online survey. To put the results into perspective, the crisis managers' sample was compared to a control group of 91 managers from the public sector and, whenever available, to normative values or reference samples, which were previously examined and reported in existing literature. Beyond that, it was aimed to identify potential risk factors for somatic and mental health in crisis managers by means of regression analyses.

In summary, the crisis managers in this study showed average levels of anxiety and depression symptoms as well as relatively low up to average stress reactivity and average stress levels. They reported high work-related demands, but also joy as well as high levels of decision latitude and support by supervisors and co-workers. It surely is interesting that the crisis managers reported fewer somatic, anxiety, and depression symptoms than the control group, considering their highly challenging positions in the management of disasters. However, both groups reported comparably high demands, but the crisis managers additionally reported lower levels of stress reactivity than the managers of the control group, which might explain why the control group is more burdened by somatic and mental health symptoms.

Nonetheless, compared to the general population the crisis managers expressed more somatic symptoms and they reported elevated levels of posttraumatic stress, with 9.3% of the sample showing clinically relevant symptom severity.

With regard to potential risk factors for mental health in crisis managers, dysfunctional coping was the most influential predictor and contributed considerably to predict somatic, depression, and anxiety symptoms. While perceived stress made a considerable contribution to predict PTSD symptoms, crisis leader self-efficacy was the most influential, single predictor of anxiety symptoms. Perceived stress reactivity was found to moderate the relationship of perceived stress and mental health symptoms (depression and anxiety).

Against the background of the development of the stress management training tailored to the needs of crisis managers (which is envisioned by the PsyCris project), these findings indicate that, besides a certain mitigation of the high work-related demands, such trainings should provide and train alternative coping strategies to prevent the usage of dysfunctional coping. Furthermore, they should aim at decreasing individual risk factors such as stress reactivity and strive to enhance potential protective factors such as crisis leader self-efficacy. Further recommendations regarding the development of stress management trainings for crisis managers are addressed in the overall summary and conclusion (see section 8).

7.5 Limitations

When considering the results of this study, one limitation that should be taken into account is the question of generalizability of the results. The participating crisis managers were approached by all conceivable means: flyers at conferences, crisis management exercises and workshops; by asking stakeholders to spread the word and distribute the survey's web link via

the main stakeholder organizations, by reaching out to crisis management organizations via phone and e-mail; and finally via news post and twitter posts. All of the PsyCris project's contributing partners took part in the recruiting process. The participants came from altogether 14 countries, all kinds of crisis management organizations, and were rather evenly distributed between operational and strategic positions during their last mission. Still, it could not be checked if they were representative for the population of European crisis managers in general, because this online survey was the first of its kind. In addition, no response rate could be estimated, as there are no reliable statistics concerning the numbers of crisis managers according to the PsyCris project's definition (i.e., having responsibility for staff and decision making and having practical experience in crisis management, see section 2.3). As a consequence, it could only be speculated whether some kind of selection took place in the sample's composition. However, the following clue supported the representativeness of the survey for crisis managers in Europe: the basic demographics of this study's sample were surprisingly well in accordance with the ones observed in the crisis managers' sample of study 1. In the qualitative study, the average age was 50.9 years ($SD = 8.32$), while in this study it was 49.88 years ($SD = 9.86$). Moreover, in both studies, the proportion of exclusively voluntary working crisis managers was very similar, 16% in the interview study and 15% in the online survey. However, the proportion of crisis managers exclusively working in a paid position was bigger in the interview study, with 74% vs. 52% in the online survey, where more participants reported to work regularly and additionally on a voluntary basis in crisis management. Furthermore, the proportion of women in the online survey was larger, with exactly one third being female vs. only 19% in the interview study. Taken together, one might relatively safely assume that crisis management leaders are predominately male and in their fifties. The demographics in the two studies are similar enough to point to the possibility that both are sufficiently representative to the community of European crisis managers.

Still, the sample of this quantitative study was not so large, altogether, and results should be corroborated with a larger sample. This limitation applies to the results on mental health in crisis managers that should be seen as preliminary, especially as they rely exclusively on self-report. Beyond that, as this study was quite exploratory due to its hence scarcely researched target group, many analyses and multiple testing were conducted which always bears the risk of type I error inflation; however, this risk was downsized by means of a conservative alpha level. An additional limitation was that the international sample of crisis managers was compared to a German control group. However, the results of a series of ANOVAs (see

section 7.3.1) indicated that the European crisis managers were sufficiently similar with regard to the health variables and potential risk factors to group them within one joint sample.

All in all, crisis managers presumably are a rather heterogeneous group, with various educational backgrounds, working in different organizations, and probably having been confronted with different experiences and disaster types during their work. Nevertheless, in other respects, they seem to be more similar than one might expect, even across different countries in Europe. Nonetheless, as matching the crisis manager sample and the control group with regard to the proportion of nationalities was effort- and time-wise as well as logistically not feasible to realize, this still has to be considered one of the biggest limitations regarding the group comparison.

8 Overall Summary and Conclusion

The two studies of this dissertation served the purpose to comprehensively examine the perceived stress of (European) crisis managers, stressors related to their psychosocial work environment (i.e., job stress), and stress management/coping strategies applied by them. Study 2 additionally examined the individual factors stress reactivity and crisis leader self-efficacy as well as mental and somatic health symptoms in this occupational (sub)group.

Both studies aimed at deriving recommendations for the stress management training for crisis managers developed within the scope of the EU-funded research project PsyCris (see section 2.1). Planned to build the empirical basis for the developmental process, the studies strived to provide concrete directions and to identify well-founded starting points for the stress management training.

For this purpose, study 1, which employed an exploratory, qualitative approach, additionally examined (based on reported stress levels, stressors, and applied coping strategies) the requirements that crisis managers have with regard to stress management in disaster operations and to corresponding trainings. In order to detect stressors of crisis managers and their requirements regarding stress management, semi-structured, guideline-based interviews with 31 crisis managers from Austria, Germany, Lithuania, Luxembourg, and Spain were conducted and analyzed with the qualitative text analysis method GABEK.

Study 2 examined stress in crisis managers with the help of a set of well-established and validated questionnaires in the form of an online survey. It aimed at identifying risk factors for mental health in this occupational group, again to find potential starting points relevant for the development of the stress management training. Beyond that, one of the study's aims was the assessment of the (mental) health status of crisis managers (in comparison to managers from another occupational field and to the general population). For this purpose, survey data from 86 European crisis managers was compared to data of 91 managers from the public sector and, whenever available, to normative data or reference samples.

In both studies it became evident, that crisis managers experience various stressors. In study 1, the interviewed crisis managers reported stressors that are experienced by first responders as well, such as specific aspects of the missions and difficult conditions on-site (e.g., high number of affected persons, dealing with victims and their families, or missions of a large scale and long duration). In addition, the crisis managers addressed stressors related to their

leading positions, for example having to communicate with press and media, having to explain themselves for potential failures, and bearing the overall responsibility for population and staff, while having to make far-reaching decisions under time pressure. Thus, in addition to event-specific and potentially traumatic stressors, the crisis managers reported to experience influential occupational and organizational stressors inherent to their management positions. Beyond that, they described their psychosocial work environment as being high in demands, limited in control, and varying in support. However, they experienced support from their organizations, supervisors, and co-workers as a very important resource in dealing with mission-related stress. Within the online survey of study 2, crisis managers similarly reported considerably high levels of demands (based on two measuring instruments), but also high levels of received support. In contrast to study 1, the crisis managers reported comparably high levels of control (operationalized as decision latitude). However, it was previously discussed that organizational decision latitude does not completely reflect possibilities for control in the work environment during disasters (see section 4.3). All three kinds of psychosocial job characteristics, demands, control, and support, showed no considerable effect in predicting health in the context of study 2. This finding is surprising, particularly with regard to support, which has been shown to be an influential factor in the stress-health-relationship in previous studies (see Thoits, 2011) and was addressed as an important resource in study 1. However, the kind of support assessed in study 2 (rather instrumental) differed from the kind reported in study 1 (rather emotional support such as backing, empathy, and trust). These findings indicate that particularly emotional support might play an important role in dealing with mission-related stress, an aspect which should be considered in developing preventive and support measures for crisis managers.

High levels of perceived stress were reported by the crisis managers, interviewed within the scope of study 1, in relation to the management of large-scale crises/disasters. Levels of perceived stress were reported to vary between the different disaster phases, with highest levels of stress elicited during the beginning of disaster operations. Within study 2, the crisis managers reported higher levels of stress-related demands as a reference sample of healthy adults but also more joy, which is why the two groups did not differ in terms of overall perceived stress. Nonetheless, perceived stress was shown to be an influential predictor of PTSD symptoms within the crisis managers' sample. Against the background of this relationship between perceived stress and PTSD and considering the elevated prevalence rate of potential PTSD found in this sample (see below), the implementation of stress management training programs, which are tailored to the needs of crisis managers, is deemed necessary.

Regarding the high levels of potentially stressful demands, it seems necessary to mitigate these demands wherever possible and, beyond that, strengthen crisis managers ability to cope with them by means of stress management training.

With regard to emotional burden and (somatic and mental) health, the interviewed crisis managers in study 1 addressed the experience of emotional burden/strain related to disaster operations and reported barriers to seek help or participate in preventive measures (such as stress management trainings). For example, they referred to their role concept, which implies to be strong, resistant, and broad-shouldered and to the related stigmatization of seeking help and admitting burdening emotions. These aspects should be considered in the development of stress management trainings for crisis managers, also in the sense of a potential barrier to attend such training. Within study 2, the crisis managers showed no elevated risk for somatic and mental health symptoms when compared with the control group of public sector managers, who actually reported more symptoms (regarding somatic, anxiety, and depression symptoms). Nonetheless, the crisis managers reported more somatic symptoms and showed an elevated PTSD prevalence rate (9.3%) compared to the general population, which indicates that they are at a somewhat elevated risk regarding stress-related health consequences.

A variety of applied coping strategies was reported by the interviewed crisis managers in study 1. Therein, all three kinds of coping strategies were addressed, emotion-focused coping (e.g., by means of seeking emotional support), problem-focused coping (e.g., by means of seeking technical advice), and avoidance-oriented coping (e.g., by means of distracting activities). The crisis managers stated the importance of functional stress management/coping strategies in the context of being able to effectively manage a crisis. They also emphasized that they had not or rarely received corresponding training that aimed at enhancing coping skills. Within study 2, dysfunctional coping³⁴ was the most influential predictor of crisis managers' health and was found to predict somatic, anxiety, and depression symptoms. This finding points to the need to enhance the coping repertoire and thereby the coping flexibility of crisis managers, to prevent the usage of dysfunctional coping strategies and their demonstrated negative effect on mental health.

³⁴ It has to be noted that emotion- and problem-focused coping were not included in the regression analyses, as they were not correlated with the health outcomes, which strengthened the assumption that these two constructs were not adequately assessed by the applied questionnaire (see sections 7.3.3.2 and 7.4.2).

Concerning the individual factors stress reactivity and crisis leader self-efficacy, which were additionally assessed in study 2, both were found to have an influence on the crisis managers' health. Stress reactivity was found to influence the relationship of stress and health symptoms (more precisely: depression and anxiety symptoms). Taking into consideration that stress reactivity can be reduced via training (Angerer et al., 2011), it should be considered in the development of the stress management training for crisis managers.

Self-efficacy in assessing information and making decisions in the context of crises, or more precisely a lack thereof, was shown to predict anxiety symptoms in crisis managers. Considering this finding against the background of the development of the stress management training for crisis managers, it seems reasonable to include training modules that aim at enhancing leadership skills and, thereby, self-efficacy of crisis leaders. In light of the previously stated assumption that preventive programs for crisis management personnel might not focus sufficiently on protective factors (Kleim & Westphal, 2011), enhancing the self-efficacy of crisis leaders via stress management trainings tailored to the need of this target group can function as an important step into this direction.

Considering all of the above, both studies lead to the conclusion that the mitigation of potentially avoidable stressors or stress-related demands, respectively, (e.g., via the amelioration of regulations for breaks and replacement, functioning communication structures, provision of essential information; see section 6.4) should be one of the first steps to support crisis managers. Beyond that, stress management trainings for this occupational (sub)group should aim at enhancing awareness for inevitable stressors in crisis management. In this context, they should provide and train a variety of applicable (emotion- and problem-focused) strategies to deal with these stressors, in order to prevent the usage of dysfunctional coping strategies. It is important that the provided strategies are adaptable to different individual and situational constraints (i.e., in the sense that participants have the opportunity to find out what works for them in what situation). This approach is assumed to broaden the coping repertoire and enhance coping flexibility. Stress management trainings for crisis managers should also address leadership skills, considering that a lack thereof can constitute a stressor and reduce crisis leader self-efficacy. These leadership skills should not only comprise "technical" skills, but also soft skills such as recognizing signs of stress (also of one's own to apply effective coping strategies in time), choosing adequate ways to address emotional burden, and providing adequate support to subordinates and co-workers. These

skills are deemed as important to comply with the high responsibility (and the functioning as role model) that comes with leadership positions in crisis management.

Taking these recommendations into consideration, it is assumed that the implementation of stress management trainings for crisis management leaders can achieve more than “just” preventing physical and mental harm of this high-risk occupational subgroup: it probably can also improve crisis management effectiveness and performance, be a resource for crisis management personnel in non-leading positions, and potentially even result in a change of culture in crisis management organizations.

All in all, these two studies make a considerable contribution to better understand the perceived stress, stressors related to the psychosocial work environment, coping strategies, and health consequences in the understudied group of crisis managers and to detect their requirements with regard to stress management trainings and other kinds of preventive support measures.

References

- Adams, J. B., Dust, S. B., & Piccolo, R. F. (2013). Approaches to minimize choking under pressure. In A. J. DuBrin (Ed.), *Handbook of Research on Crisis Leadership in Organizations* (pp. 23-47). Northampton: Edward Elgar Publishing.
- Adkins, J. W., Weathers, F. W., McDevitt-Murphy, M., & Daniels, J. B. (2008). Psychometric properties of seven self-report measures of posttraumatic stress disorder in college students with mixed civilian trauma exposure. *Journal of Anxiety Disorders*, 22(8), 1393-1402. doi:10.1016/j.janxdis.2008.02.002
- Adler, T. (2011). *Psycho-social Support in Crisis Management. Description of Work. Seventh Framework Programme FP7-SEC-2012-1*. Unpublished description of work, Department of Psychology, Ludwig-Maximilians-University, Munich.
- Adler, C. & Haus, M. (2013). Responsible Decision Making Processes under Stress. GABEK WinRelan Analysis within the Framework of Patient Triage. In J. Zelger (Ed.), *GABEK VI* (pp. 341-359). Innsbruck: Studienverlag.
- Adler, C., Haus, M., Jakob, L., Erfurt, L., & Krüsmann, M. (2012). *GABEK WinRelan - a Qualitative Method for Crisis Research Engaging Crisis Management Personnel*. Proceedings of the 9th International ISCRAM Conference, Vancouver. Retrieved from <http://www.iscramlive.org/ISCRAM2012/proceedings/254.pdf>
- Adler, C., Sauter, W., Meyer, J., Hagl, M., & Raich, M. (2015). *First Steps in the Development of an Internet-based Learning Platform for Strategic Crisis Managers*. Paper presented at the ISCRAM 2015 Conference, Kristiansand. Retrieved from <http://iscram2015.uia.no/wp-content/uploads/2015/05/9-1.pdf>
- Aldwin, C. M. (2007). *Stress, coping, and development: An integrative perspective*. New York, NY: Guilford Press.
- Alexander, J. K., Hillier, A., Smith, R. M., Tivarus, M. E., & Beversdorf, D. Q. (2007). Beta-adrenergic modulation of cognitive flexibility during stress. *Journal of Cognitive Neuroscience*, 19(3), 468-478. doi:10.1162/jocn.2007.19.3.468
- Alexander, D. A., & Klein, S. (2001). Ambulance personnel and critical incidents: Impact of accident and emergency work on mental health and emotional well-being. *The British Journal of Psychiatry*, 178(1), 76–81. doi:10.1192/bjp.178.1.76
- Alonso, J., Angermeyer, M. C., Bernert, S., Bruffaerts, R., Brugha, T. S., Bryson, H., . . . Vollebergh, W. A. M. (2004). Prevalence of mental disorders in Europe: Results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatrica Scandinavica*, 109(420), 21-27. doi:10.1111/j.1600-0047.2004.00327.x
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (5th ed.). Arlington: American Psychiatric Publishing.

- Anderson, L. P. (1991). Acculturative stress: A theory of relevance to black Americans. *Clinical Psychology Review, 11*, 685-702.
- Angerer, P., Rothermund, E., Limm, H., Heinmüller, M., Marten-Mittag, B., Nater U. M., & Gündel, H. (2011). Stressbewältigungsintervention am Arbeitsplatz: Ergebnisse einer randomisierten, kontrollierten Studie. *Psychotherapeut, 56*, 34-39. doi:10.1007/s00278-010-0795-y
- Antonovsky, A. (1987). *Unraveling the mystery of health: How people manage stress and stay well*. San Francisco: Jossey-Bass.
- Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology and Health, 13*, 623-649. doi:10.1080/08870449808407422
- Bamberg, E., Keller, M., Wohlert, C., & Zeh, A. (2007). *BGW-Stresskonzept – Das arbeitspsychologische Stressmodell*. Hamburg: Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrtspflege – BGW.
- Barnes, J. B., Nickerson, A., Suvak, M., Adler, A., & Litz, B. (2013). Perceived military organizational support and peacekeeper stress: A longitudinal investigation. *Psychological Services, 10*, 177-185. doi:10.1037/a0032607
- Beaton, R., Johnson, L. C., Infield, S., Ollis, T., & Bond, G. (2001). Outcomes of a leadership intervention for a metropolitan fire department. *Psychological Reports, 88*(3c), 1049-1066.
- Beaton, R., Murphy, S. A., Pike, K., & Jarrett, J. (1995). Stress-Symptom Factors in Firefighters and Paramedics. In S. Sauter & L. R. Murphy (Eds.), *Organizational risk factors for job stress* (pp. 227-245). Washington: American Psychological Association.
- Beerlage, I., Arndt, D., Hering, T., & Springer, S. (2008). *Arbeitsbedingungen und Organisationsprofile als Determinanten von Gesundheit, Einsatzfähigkeit sowie von haupt- und ehrenamtlichem Engagement bei Einsatzkräften in Einsatzorganisationen des Bevölkerungsschutzes: 3. Zwischenbericht zum Jahresverwendungsnachweis 2008*. Hochschule Magdeburg-Stendal.
- Benedek, D. M., Fullerton, C., & Ursano, R. J. (2007). First Responders: Mental Health Consequences of Natural and Human-Made Disasters for Public Health and Public Safety Workers. *Annual Review of Psychology, 28*, 55-68. doi:10.1146/annurev.publhealth.28.021406.144037
- Bengel, J., & Heinrichs, M. (2004). Psychische Belastungen des Rettungspersonals. In J. Bengel (Ed.), *Psychologie in Notfallmedizin und Rettungsdienst* (2nd ed., pp. 25-43). Berlin: Springer.
- Bennett, P., Williams, Y., Page, N., Hood, K., & Woollard, M. (2004). Levels of mental health problems among UK emergency ambulance workers. *Emergency Medicine Journal, 21*(2), 235-236. doi:10.1136/emj.2003.005645

- Berger, W., Coutinho, E. S. F., Figueira, I., Marques-Portella, C., Luz, M. P., Neylan, T. C., . . . Mendlowicz, M. V. (2012). Rescuers at risk: A systematic review and meta-regression analysis of the worldwide current prevalence and correlates of PTSD in rescue workers. *Social Psychiatry and Psychiatric Epidemiology*, 47(6), 1001-1011. doi:10.1007/s00127-011-0408-2
- Bodenmann, G., & Gmelch, S. (2009). Stressbewältigung. In: J. Margraf & S. Schneider (Eds.), *Lehrbuch der Verhaltenstherapie: Band 2* (2nd ed., pp 618-629). Berlin: Springer.
- Boren, J. P. (2014). The relationships between co-rumination, social support, stress, and burnout among working adults. *Management Communication Quarterly*, 28(1). 3-25. doi:10.1177/0893318913509283
- Boudreaux, E., Mandry, C., & Brantley, P. J. (1997). Stress, job satisfaction, coping, and psychological distress among emergency medical technicians. *Prehospital & Disaster Medicine*, 12(4), 242-249.
- Bourne Jr., L. E. & Yaroush, R. A., (2003). Final Report: *Stress and Cognition: a Cognitive Psychological Perspective*. (Grant Number NAG2-1561). Washington: National Aeronautics and Space Administration.
- Britt, T. W., Greene, T. M., Castro, C. A., & Hoge, C. W. (2006). *The stigma of psychological problems in the military*. Paper presented at the APA/NIOSH Work, Stress, and Health Conference, Miami.
- Britten N. (2006). Qualitative interviews. In C. Pope & N. Mays (Eds.), *Qualitative research in health care* (3rd ed. pp 11–19). Oxford: BMJ Books.
- Brown, J. M., & Campbell, E. A. (1990). Sources of occupational stress in the police. *Work & Stress: An International Journal of Work, Health & Organisations*, 4(4), 305-318.
- Brown, J. M. & Campbell, E. A. (1994). *Stress and Policing: Sources and Strategies*. Chichester: John Wiley and Sons.
- Brown, J., Mulhern, G., & Joseph, S. (2002). Incident-related stressors, locus of control, coping, and psychological distress among firefighters in Northern Ireland. *Journal of traumatic stress*, 15(2), 161-168. doi:10.1023/A:1014816309959
- Bryant R. A. & Harvey, A. G. (1996). Posttraumatic Stress Reactions in Volunteer Firefighters. *Journal of Traumatic Stress*, 9(1), 51-62.
- Buber, R., & Kraler, C. (2000). How GABEK and WinRelan support qualitative research. In: R. Buber & J. Zelger (Eds.), *GABEK II. Zur qualitativen Forschung* (p. 111-139). Innsbruck: StudienVerlag.
- Bundesamt für Bevölkerungsschutz und Katastrophenhilfe (2012). *Psychosoziale Notfallversorgung: Qualitätsstandards und Leitlinien Teil I und II*. Retrieved from http://www.bbk.bund.de/SharedDocs/Downloads/BBK/DE/Publikationen/Praxis_Bevoelkerungsschutz/Band_7_Praxis_BS_PSNV_Qualit_stand_Leitlinien_Teil_1_2.pdf?__blob=publicationFile

- Busse, A., Plaumann, M., & Walter, U. (2006). Grundlagen zu Stress. In: KKH Kaufmännische Krankenkasse (Eds.), *Weißbuch Prävention 2005/2006: Stress? Ursachen, Erklärungsmodelle und präventive Ansätze* (pp. 3-9). Heidelberg: Springer.
- Cannon W. B. (1929). *Bodily changes in pain, hunger, fear, and rage* (2nd ed.). New York: Appleton.
- Cannon-Bowers, J. A., & Salas, E. (1998). Individual and team decision making under stress: Theoretical underpinnings. In J. A. Cannon-Bowers & E. Salas (Eds.), *Making decisions under stress: Implications for individual and team training* (pp. 17–38). Washington: American Psychological Association.
- Caplan, R. D. (1983). Person-Environment Fit. Past, Present, and Future. In C. L. Cooper (Ed.), *Stress Research* (pp. 35-78). Chichester: Wiley.
- Caplan, R. D. & Harrison, R. van (1993). Person-Environment Fit Theory. Some History, Recent Developments, and Future Directions. *Journal of Social Issues*, 49, 253-275.
- Carver, C. S. (1997). You want to measure coping but your protocol's too long: consider the brief COPE. *International Journal of Behavioral Medicine*, 4(1), 92-100. doi:10.1207/s15327558ijbm0401_6
- Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*, 56(2), 267-283. doi:10.1037/0022-3514.56.2.267
- Cheng, C., & Cheung, M. L. (2005). Cognitive processes underlying coping flexibility: Differentiation and integration. *Journal of Personality*, 73(4), 859-886. doi:10.1111/j.1467-6494.2005.00331.x
- Choi, B., Bjorner, J. B., Ostergren, P.-O., Clays, E., Houtman, I., Punnett, L., . . . Karasek, R. (2009). Cross-language differential item functioning of the Job Content Questionnaire among European countries: The JACE Study. *International Journal of Behavioral Medicine*, 16(2), 136-147. doi:10.1007/s12529-009-9048-2
- Clohessy, S., & Ehlers, A. (1999). PTSD symptoms, response to intrusive memories and coping in ambulance service workers. *British Journal of Clinical Psychology*, 38(3), 251-265. doi:10.1348/014466599162836
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98(2), 310.
- Corneil, W., Beaton, R., Murphy, S., Johnson, C., & Pike, K. (1999). Exposure to traumatic incidents and prevalence of posttraumatic stress symptomatology in urban firefighters in two countries. *Journal of Occupational Health Psychology*, 4(2), 131-141. doi:10.1037/1076-8998.4.2.131
- Coolidge, F. L., Segal, D. L., Hook, J. N., & Stewart, S. (2000). Personality disorders and coping among anxious older adults. *Journal of Anxiety Disorders*, 14(2), 157-172. doi:10.1016/S0887-6185(99)00046-8

- Cooper, C., Katona, C., & Livingston, G. (2008). Validity and reliability of the brief COPE in carers of people with dementia: the LASER-AD Study. *The Journal Of Nervous And Mental Disease*, 196(11), 838-843. doi:10.1097/NMD.0b013e31818b504c.
- Cooper, C. L., & Quick, J. C. (2003). *Stress and Strain* (2nd ed.). Oxford: Health Press.
- Courvoisier, D. S., & Perneger, T. V. (2010). Validation of alternative formulations of job strain. *Journal of Occupational Health*, 52(1), 5-13.
- Cox, T. & Rial-González, E. (2002). Work-related stress: the European picture. In European Agency for Safety and Health at Work (Ed.), *Working on stress* (pp. 4-6). Retrieved from <https://osha.europa.eu/en/tools-and-publications/publications/magazine/5>
- Creamer, M., Bell, R., & Failla, S. (2003). Psychometric properties of the Impact of Event Scale: Revised. *Behaviour Research & Therapy*, 41(12), 1489-1496. doi:10.1016/j.brat.2003.07.010
- Davison, G. C., & Neale, J. M. (1998). *Klinische Psychologie*. Weinheim: Beltz Psychologie Verlags Union.
- DeWolde, A., Groenendaal, J., Helsloot, I., & Schmidt, A. (2014). An explorative study on the relationship between ethical leadership, prototypicality and organizational misbehavior in a Dutch Fire Service. *International Journal of Leadership Studies*, 8(2), 18-43.
- DIN 13050. (2009). *Rettungswesen – Begriffe*. Berlin: Beuth.
- Dinenberg, R. E., McCaslin, S. E., Bates, M. N., & Cohen, B. E. (2014). Social Support May Protect Against Development of Posttraumatic Stress Disorder: Findings From the Heart and Soul Study. *American Journal of Health Promotion*, 28(5), 294-297.
- Doron, J., Trouillet, R., Gana, K., Boiché, J., Neveu, D., & Ninot, G. (2014). Examination of the hierarchical structure of the brief COPE in a French sample: empirical and theoretical convergences. *Journal Of Personality Assessment*, 96(5), 567-575. doi:10.1080/00223891.2014.886255
- Driskell, J. E., & Salas, E. (Eds.) (1996). *Series in applied psychology. Stress and human performance*. Mahwah: Lawrence Erlbaum Associates.
- DuBrin, A. J. (2013). *Handbook of Research on Crisis Leadership in Organizations*. Northampton: Edward Elgar Publishing.
- Endler, N. S., & Parker, J. D. A. (1990). Multidimensional assessment of coping: a critical evaluation. *Journal of Personality and Social Psychology*, 58, 844-854. doi:10.1037/0022-3514.58.5.844
- EU-OSHA. (2014). *Calculating the cost of work-related stress and psychosocial risks: a literature review*. European Agency for Savety and Health at Work. Retrieved from https://osha.europa.eu/en/tools-and-publications/publications/literature_reviews/calculating-the-cost-of-work-related-stress-and-psychosocial-risks

- Field, A. (2013). *Discovering statistics using IBM SPSS Statistics* (4th ed.). Los Angeles: Sage.
- Filipp, S. H. (1995). Lebensereignisforschung: eine Bilanz. In S. H. Filipp (Ed.), *Kritische Lebensereignisse* (3rd ed., pp. 293-327). Weinheim: Beltz.
- Fisher, P. M. (2002). *When Working Hurts: Stress, Burnout And Trauma in Human, Emergency And Health Services*. Victoria: Spectrum Press.
- Fisher, P. M., & Abrahamson, K. (2002). *The Manager's Guide to Stress, Burnout & Trauma in Human, Emergency & Health Services*, Victoria: Fisher & Associates Solutions.
- Fisher, P. M., & Etches, B. (2003). A Comprehensive Approach to Workplace Stress & Trauma in Fire-Fighting: A Review Document Prepared for The International Association of Firefighters 17th Redmond Symposium. *Proceedings of the 17th Redmond Symposium*, 5-9.
- Fliege, H., Rose, M., Arck, P., Walter, O. B., Kocalevent, R.-D., Weber, C., & Klapp, B. F. (2005). The Perceived Stress Questionnaire (PSQ) Reconsidered: Validation and Reference Values From Different Clinical and Healthy Adult Samples. *Psychosomatic Medicine*, 67(1), 78-88. doi:10.1097/01.psy.0000151491.80178.78
- Folkman, S. (1984). Personal Control and Stress and Coping Processes: A Theoretical Analysis. *Journal of Personality and Social Psychology*, 46(4), 839-852.
- Fullerton, C. S., McCarroll, J. E., Ursano, R. J., & Wright, K. M. (1992). Psychological responses of rescue workers: fire fighters and trauma. *American Journal of Orthopsychiatry*, 62(3), 371-378.
- Fullerton, C. S., Ursano, R. J., Leming Wang, M. (2004). Acute Stress Disorder, Posttraumatic Stress Disorder, and Depression in Disaster or Rescue Workers. *American Journal of Psychiatry*, 161(8), 1370-1376. doi:10.1176/appi.ajp.161.8.1370
- Fullerton, C. S., Ursano, R. J., Reeves, J., Shigemura, J., & Grieger, T. (2006) Perceived safety in disaster workers following 9/11. *Journal of Nervous and Mental Disease*, 194(1), 61-63. doi:10.1097/01.nmd.0000195307.28743.b2
- Hadley, C. N., Pittinsky, T. L., Sommer, S. A., & Zhu, W. (2011). Measuring the efficacy of leaders to assess information and make decisions in a crisis: The C-LEAD scale. *The Leadership Quarterly*, 22(4), 633-648. doi:10.1016/j.leaqua.2011.05.005
- Halpern, J., Gurevich, M., Schwartz, B., & Brazeau, P. (2009). Interventions for critical incident stress in emergency medical services: a qualitative study. *Stress and health*, 25(2), 139-149. doi:10.1002/smi.1230
- Hancock, P. A., & Szalma, J. L. (2008). *Performance under stress: Human factors in defence*. Aldershot: Ashgate Pub.
- Harris, W. C., Hancock, P. A., & Harris, S. C. (2005). Information Processing Changes Following Extended Stress. *Military Psychology*, 17(2), 115-128.

- Hayes, A. F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A regression-Based Approach*. New York: Guilford Press.
- Hayes, A. F. (2014). PROCESS [SPSS macro]. Retrieved from: <http://www.afhayes.com>
- Hering, T., & Beerlage, I. (2004). *Retten als Arbeit zwischen Routine und Katastrophe: Gesundheit, Belastungen und Burnout im Rettungsdienst*. München: Profilverlag.
- Hering, T., Beerlage, I., & Kleiber, D. (2011). Arbeitsanforderungen und Ressourcen im Rettungsdienst. Welche Merkmale der Organisation können Belastungen abpuffern? *Zeitschrift für Gesundheitspsychologie*, 19(4), 159-172. doi:10.1026/0943-8149/a000051
- Hobfoll, S. E. (1998). *The ecology of stress*. New York: Hemisphere.
- Holahan, C. J., Moos, R. H., & Schaefer, J. A. (1996). Coping, stress resistance and growth: Conceptualizing adaptive functioning. In M. Zeidner & N. Endler (Eds.), *Handbook of coping: theory, research and application* (pp. 24-43). New York: Wiley.
- Holmes, T., & Rahe, R. (1967). The Social Readjustment Rating Scale. *Journal of Psychosomatic Research*, 11, 213-218. doi:10.1016/0022-3999(67)90010-4
- Jensen, P. R. & Wrisberg, C. A. (2014). Performance under acute stress: a qualitative study of soldiers' experience of hand-to-hand combat. *International Journal of Stress Management*, 21(4), 406-423. doi: 10.1037/a0037998
- Johnson, J. V., Hall, E. M., & Theorell, T. (1989). Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. *Scandinavian Journal of Work, Environment & Health*, 15(4), 271-279. doi:10.5271/sjweh.1852
- Johnson, S., Cooper, C., Cartwright, S., Donald, I., Taylor, P., & Millet, C. (2005). The experience of work-related stress across occupations. *Journal of Managerial Psychology*, 20(2), 178-187. doi:10.1108/02683940510579803
- ISO 10075:1991. (2000). *Ergonomic principles related to mental workload - Part 1: General concepts, terms and definitions*. Berlin: Beuth.
- Kaluza, G. (2015). *Gelassen und sicher im Stress. Das Stresskompetenz-Buch: Stress erkennen, verstehen, bewältigen* (6th ed.). Berlin, Heidelberg: Springer.
- Kapsou, M., Panayiotou, G., Kokkinos, C. M., & Demetriou, A. G. (2010). Dimensionality of coping: an empirical contribution to the construct validation of the brief-COPE with a Greek-speaking sample. *Journal Of Health Psychology*, 15(2), 215-229. doi:10.1177/1359105309346516
- Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: implications for job redesign. *Administrative Science Quarterly*, 24, 285-307.
- Karasek, R. A., Brisson, C., Kawakami, N., Houtman, I., Bongers, P., & Amick, B. (1998). The Job Content Questionnaire (JCQ): An instrument for internationally comparative

- assessments of psychosocial job characteristics. *Journal of Occupational Health Psychology*, 3(4), 322-355. doi:10.1037/1076-8998.3.4.322
- Karasek, R. A., & Theorell, T. (1990). *Healthy work: Stress, productivity, and the reconstruction of working life*. New York: Basic Books.
- Karasek, R. A., Theorell, T., Schwartz, J. E., Schnall, P. L., Pieper, C. F. & Michela, J. L. (1988). Job Characteristics in Relation to the Prevalence of Myocardial Infarction in the US Health Examination Survey (HES) and the Health and Nutrition Examination Survey (HANES). *American Journal of Public Health*, 78(8), 910-918.
- Kehl, D., Knuth, D., Hulse, L., & Schmidt, S. (2015). Predictors of postevent distress and growth among firefighters after work-related emergencies—A cross-national study. *Psychological Trauma: Theory, Research, Practice, and Policy*, 7(3), 203-211. doi:10.1037/a0037954
- Kelley, C. L., Britt, T. W., Adler, A. B., & Bliese, P. D. (2014). Perceived Organizational Support, Posttraumatic Stress Disorder Symptoms, and Stigma in Soldiers Returning From Combat. *Psychological Services*, 11(2), 229-234. doi:10.1037/a0034892
- King, N. & Horrocks C. (2010). *Interviews in qualitative research*. London: SAGE Publications Ltd.
- Kippel, U. & Walter, U. (2006). Stress im internationalen Vergleich. In: KKH Kaufmännische Krankenkasse (Eds.), *Weißbuch Prävention 2005/2006. Stress? Ursachen, Erklärungsmodelle und präventive Ansätze* (pp. 13-27). Heidelberg: Springer.
- Kirkcaldy, B., Brown, J., & Cooper, C. L. (1998). The demographics of occupational stress among police superintendents. *Journal of Managerial Psychology*, 13(1/2), 90-101. doi:10.1108/02683949810369156
- Kleim, B. & Westphal, M. (2011). Mental Health in First Responders: A Review and Recommendation for Prevention and Intervention Strategies. *Traumatology*, 17(4), 17-24. doi: 10.1177/1534765611429079
- Kocalevent, R.-D., Hinz, A., & Brähler, E. (2013a). Standardization of the depression screener Patient Health Questionnaire (PHQ-9) in the general population. *General Hospital Psychiatry*, 35(5), 551-555. doi:10.1016/j.genhosppsych.2013.04.006
- Kocalevent, R.-D., Hinz, A., & Brähler, E. (2013b). Standardization of a screening instrument (PHQ-15) for somatization syndromes in the general population. *BMC Psychiatry*, 13. doi:10.1186/1471-244X-13-91
- Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: a new depression diagnostic and severity measure. *Psychiatric Annals*, 32, 509-521.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606-613. doi:10.1046/j.1525-1497.2001.016009606.x

- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2002). The PHQ-15: Validity of a new measure for evaluating the severity of somatic symptoms. *Psychosomatic Medicine*, 64(2), 258-266.
- Kroenke, K., Spitzer, R. L., Williams, J. B. W., & Löwe, B. (2010). The Patient Health Questionnaire somatic, anxiety, and depressive symptom scales: A systematic review. *General Hospital Psychiatry*, 32(4), 345-359. doi:10.1016/j.genhosppsych.2010.03.006
- Krüsmann, M. (2003). Prävention posttraumatischer Störungen im Einsatzwesen. In W. Butollo & M. Hagl (Eds.) *Trauma, Selbst und Therapie. Konzepte und Kontroversen in der Psychotraumatologie* (pp. 147-161). Bern: Hans Huber.
- Krüsmann, M., & Butollo, W. (2006). *Primäre Prävention im Einsatzwesen. Abschlussbericht für das Forschungsprojekt*. Unpublished manuscript, Department of Psychology, Ludwig-Maximilians-University, Munich.
- Krüsmann, M., Karl, R., & Butollo W. (2006). *Sekundäre Prävention: Abschlussbericht für das Forschungsprojekt: Untersuchung bestehender Maßnahmen zur sekundären Prävention und Entwicklung einsatzbedingter Belastungsreaktionen und -störungen. Teil 1 und 2*. Unpublished manuscript, Department of Psychology, Ludwig-Maximilians-University, Munich.
- LaFauci Schutt, J. M., & Marotta, S. A. (2011). Personal and environmental predictors of posttraumatic stress in emergency management professionals. *Psychological Trauma: Theory, Research, Practice, and Policy*, 3(1), 8-15.
- Landsbergis, P. A., Schnall, P. L., Warren, K., Pickering, T. G., & Schwartz, J. E. (1994). Association between ambulatory blood pressure and alternative formulations of job strain. *Scandinavian Journal Of Work, Environment & Health*, 20(5), 349-363. doi:10.5271/sjweh.1386
- Lazarus, R.S. (1993). From Psychological Stress to Emotions: A History of Changing Outlooks. *Annual Review of Psychology*, 44, 1-21.
- Lazarus, R. S. (2006). *Stress and emotion: Springer paperback*. New York: Springer.
- Lazarus, R. S., & Folkman, S. (Eds.) (1984). *Stress, appraisal, and coping*. New York: Springer.
- Lazarus, R. S., & Launier, R. (1981). Streßbezogene Transaktionen zwischen Person und Umwelt. In J. R. Nitsch (Ed.), *Stress* (pp. 213-258). Bern: Huber.
- LeBlanc, V. R., Regehr, C., Birze, A., King, K., Scott, A. K., MacDonald, R., & Tavares, W. (2011). The Association Between Posttraumatic Stress, Coping, and Acute Stress Responses in Paramedics. *Traumatology*, 17(4), 10-16. doi:10.1177/1534765611429078
- LeBlanc, V. R., Regehr, C., Jolley, R. B., & Barath, I. (2008). The relationship between coping styles, performance, and responses to stressful scenarios in police recruits. *International Journal of Stress Management*, 15(1), 76-93. doi:10.1037/KIT2-5245.15.1.76

- LeBlanc, V. R., Regehr, C., Tavares, W., Scott, A. K., MacDonald, R., & King, K. (2012). The impact of stress on paramedic performance during simulated critical events. *Prehospital and Disaster Medicine, 27*(4),1-6. doi:10.1017/S1049023X12001021
- Leiter, M. P., & Maslach, C. (2000). *Preventing burnout and building engagement: A complete program for organizational renewal*. San Francisco: Jossey Bass.
- Levenstein, S., Prantera, C., Varvo, V., Scribano, M. L., Berto, E., Luzzi, C., & Andreoli, A. (1993). Development of the Perceived Stress Questionnaire: a new tool for psychosomatic research. *Journal of Psychosomatic Research, 37*, 19-32. doi:10.1016/0022-3999(93)90120-5
- Lieberman, A. M., Best, S. R., Metzler, T. J., Fagan, J. A., Weiss, D. S., & Marmar, C. R. (2002). Routine occupational stress and psychological distress in police. *Policing: An International Journal of Police Strategies & Management, 25*(2), 421-439. doi:10.1108/13639510210429446
- Lieberman, H. R., Bathalon, G. P., Falco, C. M., Morgan III, C. A., Niro, P. J., & Tharion, W. J. (2005). The Fog of War: Decrements in Cognitive Performance and Mood Associated with Combat-Like Stress. *Aviation, Space, and Environmental Medicine, 76*(7), 7-14.
- Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y. (2008). Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Medical Care, 46*(3), 266-274. doi:10.1097/MLR.0b013e318160d093
- Löwe, B., Spitzer, R. L., Zipfel, S., & Herzog, W. (2002). *Gesundheitsfragebogen für Patienten. Manual: Komplettversion und Kurzform*. Karlsruhe: Pfizer.
- Marmar, C. R., McCaslin, S. E., Metzler, T. J., Best, S., Weiss, D. S., Fagan, J., Liberman, A., Pole, N., Otte, C., Yehuda, R., Mohr, D., & Neylan, T. (2006). Predictors of posttraumatic stress in police and other first responders. *Annals of the New York Academy of Sciences, 1071*(1), 1-18. doi:10.1196/annals.1364.001
- Maslach, C., Jackson, S. E., & Leiter, M. (1996). *Maslach Burnout Inventory – Manual (3rd ed.)*. Palo Alto: Consulting Psychologists Press.
- Mason, J. W., Maher, J. T., Hartley, L. H., Mougey, E., Perlow, M. J., Jones, L. G. (1976). Selectivity of corticosteroid and catecholamine response to various natural stimuli. In G. Serban (Ed). *Psychopathology of Human Adaptation* (pp. 147-171). New York: Plenum.
- Matthews, G. & Campbell, S. E. (2009). Sustained performance under overload: Personality and individual differences in stress and coping. *Theoretical issues in Ergonomics Science, 10*, 417-442. doi:10.1080/14639220903106395
- McClenahan, C. A., Giles, M. L., & Mallett, J. (2007). The importance of context specificity in work stress research: A test of the Demand-Control-Support model in academics. *Work & Stress, 21*(1), 85-95. doi:10.1080/02678370701264552

- McNeil, J. A., & Morgan III, C. A. (2010). Cognition and Decision Making in Extreme Environments. In C. H. Kennedy & J. L. Moore (Eds.), *Military Neuropsychology* (pp. 361-382). New York: Springer Pub.
- Miller, S. M. (1987). Monitoring and blunting: Validation of a questionnaire to assess styles of information seeking under threat. *Journal of Personality and Social Psychology*, *52*, 345-353.
- Mitroff, I. I. (2007). Best Practices in Leading under Crisis: Bottom-Up Leadership, or How to Be a Crisis Champion. In J. A. Conger & R. R. Riggio (Eds.), *The practice of leadership: Developing the next generation of leaders* (pp. 263-276). San Francisco: Jossey-Bass.
- Monroe, J. R. (2009). *Clinical and organizational predictors of burnout and Secondary Traumatic Stress in emergency management professionals* (Doctoral dissertation). Retrieved from <http://search.proquest.com/docview/304994585>
- Morina, N., Ehring, T., & Priebe, S. (2013). Diagnostic Utility of the Impact of Event Scale-Revised in Two Samples of Survivors of War. *PLoS ONE*, *8*(12), 1-8. doi:10.1371/journal.pone.0083916
- Murphy, S. A., Beaton, R. D., Pike, K. C., & Johnson, L. C. (1999). Occupational stressors, stress responses, and alcohol consumption among professional firefighters: a prospective, longitudinal analysis. *International Journal of Stress Management*, *6*(3), 179-196. doi:10.1023/A:1021934725246
- Nitsch, J. R. (Ed.). (1981). *Stress*. Bern: Huber.
- Nuechterlein, K. H. (1987). Vulnerability Models for Schizophrenia, State of the Art. In H. Häfner, W. Gattaz, & W. Janzarik (Eds.), *Search for the Causes of Schizophrenia* (pp. 297-316). New York: Springer.
- O'Leary, A. (1985). Self-efficacy and health. *Behavior Research and Therapy*, *23*(4), 437-451. doi:10.1007/BF01173490
- Patterson, G. T. (2003). Examining the effects of coping and social support on work and life stress among police officers. *Journal of Criminal Justice*, *31*, 215-226. doi:10.1016/S0047-2352(03)00003-5
- Patterson, G. T., Chung, I. W., & Swan, P. G. (2012). The effects of stress management interventions among police officers and recruits. *Campbell Systematic Reviews*, *7*, 1-53. doi:10.4073/csr.2012.7
- Pearson, C. M., & Clair, J. A. (1998). Reframing crisis management. *Academy of Management Review*, *23*(1), 59-76.
- Perrin, M. A., DiGrande, L., Wheeler, K., Thorpe, L., Farfel, M., Brackbill, R. (2007). Differences in PTSD Prevalence and Associated Risk Factors Among World Trade Center Disaster Rescue and Recovery Workers. *American Journal of Psychiatry*, *164*(9), 1385-1394. doi:10.1176/appi.ajp.2007.06101645

- Perrin, M. A., Vandeleur, C. L., Castelao, E., Rothen, S., Glaus, J., Vollenweider, P., & Preisig, M. (2014). Determinants of the development of post-traumatic stress disorder, in the general population. *Social Psychiatry and Psychiatric Epidemiology*, *49*(3), 447-457. doi:10.1007/s00127-013-0762-3
- Peter, R. (2002). Berufliche Gratifikationskrisen und Gesundheit. *Psychotherapeut*, *47*, 386-398. doi:10.1007/s00278-002-0267-0
- Peter, R. & Siegrist, J. (1999). Chronic Psychosocial Stress at Work and Cardiovascular Disease: The Role of Effort-Reward Imbalance. *International Journal of Law and Psychiatry*, *22*(5-6), 441-449.
- Pieper, G., & Maercker, A. (1999). Männlichkeit und Verleugnung von Hilfsbedürftigkeit nach berufsbedingten Traumata. *Verhaltenstherapie*, *9*, 222-229. doi:10.1159/000030712
- Pillai, R. (2013). Transformational leadership for crisis management. In A. J. DuBrin (Ed.), *Handbook of Research on Crisis Leadership in Organizations* (pp. 47-66). Northampton: Edward Elgar Publishing.
- Pillai, R., & Williams, E. A. (2004). Transformational leadership, self-efficacy, group cohesiveness, commitment, and performance. *Journal of organizational change management*, *17*(2), 144-159. doi:10.1108/09534810410530584
- Plaumann, M., Busse, A., & Walter, U. (2006). Grundlagen zu Stress. In KKH Kaufmännische Krankenkasse (Eds.), *Weißbuch Prävention 2005/2006. Stress? Ursachen, Erklärungsmodelle und präventive Ansätze* (pp. 3-13). Heidelberg: Springer.
- Prati, G., Pietrantonio, L., & Cicognani, E. (2011). Coping strategies and collective efficacy as mediators between stress appraisal and quality of life among rescue workers. *International Journal of Stress Management*, *18*(2), 181-195. doi:10.1037/a0021298
- Polusny, M. A., Erbes, C. R., Murdoch, M. M., Arbisi, P. A., Thuras, P. P., & Rath, M. B. (2011). Prospective risk factors for new-onset posttraumatic stress disorder in National Guard soldiers deployed to Iraq. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences*, *41*, 687-698. doi:10.1017/S0033291710002047
- Porter, S., & Johnson, A. (2008). Increasing Paramedic Students' Resiliency to Stress: Assessing correlates and the impact of intervention. *College Quarterly*, *11*(3), 1-13.
- Prati, G., Pietrantonio, L., & Cicognani, E. (2011). Coping Strategies and Collective Efficacy as Mediators Between Stress Appraisal and Quality of Life Among Rescue Workers. *International Journal of Stress Management*, *18*(2), 181-195. doi:10.1037/a0021298
- Regehr, C., & Bober, T. (2005). *In the line of fire*. New York: Oxford University Press.
- Regehr, C., & Millar, D. (2007). Situation Critical: High Demand, Low Control, and Low Support in Paramedic Organizations. *Traumatology*, *13*(1), 49-58. doi:10.1177/1534765607299912

- Reinhard, F., & Maercker, A. (2004). Sekundäre Traumatisierung, Posttraumatische Belastungsstörung, Burnout und Soziale Unterstützung bei medizinischem Rettungspersonal. *Zeitschrift für Medizinische Psychologie*, *13*(1), 29-36.
- Renner, K. H., & Beversdorf, P. Q. (2010). Effects of naturalistic stressors on cognitive flexibility and working memory task performance. *Neurocase*, *16*(4), 293-300. doi:10.1080/13554790903463601
- Reynolds, C. A., & Wagner, S. L. (2007). Stress and First Responders: The Need for a Multidimensional Approach to Stress Management. *International Journal of Disability Management*, *2*(2), 27-36. doi:10.1375/jdmr.2.2.27
- Rhoades, L., & Eisenberger, R. (2002). Perceived organizational support: a review of the literature. *Journal of applied psychology*, *87*(4), 698-714. doi:10.1037//0021-9010.87.4.698
- Robinson, S. J., Leach, J., Owen-Lyn, P. J., & Sünram-Lea, S. I. (2013). Stress Reactivity and Cognitive Performance in a Simulated Firefighting Emergency. *Aviation, Space, and Environmental Medicine*, *84*(6), 592-599. doi:10.3357/ASEM.3391.2013
- Rutenfranz, J. (1981). Arbeitsmedizinische Aspekte des Streßproblems. In J. R. Nitsch (Ed.), *Stress* (pp. 379–390). Bern, Stuttgart, Wien: Huber.
- Salas, E., Driskell, J. E., & Hughes, S. (1996). Introduction: The Study of Stress and Human Performance. In J. E. Driskell & E. Salas (Eds.), *Series in applied psychology. Stress and human performance* (pp. 1-47). Mahwah: Lawrence Erlbaum Associates.
- Schandry, R. (2006). *Biologische Psychologie* (2nd ed.). Weinheim: Beltz Verlag.
- Schlotz, W., Yim, I. S., Zoccola, P. M., Jansen, L., & Schulz, P. (2011). The Perceived Stress Reactivity Scale: Measurement invariance, stability, and validity in three countries. *Psychological Assessment*, *23*(1), 80-94. doi:10.1037/a0021148
- Schulz, P., Jansen, L. J., & Schlotz, W. (2005). Stressreaktivität: Theoretisches Konzept und Messung. *Diagnostica*, *51*(3), 124-133. doi:10.1026/0012-1924.51.3.124
- Schulz, P., Schlotz, W., & Becker, P. (2004). *Das Trierer Inventar zum chronischen Stress (TICS) – Manual*. Göttingen: Hogrefe.
- Schwarzer, R. & Knoll, N. (2003). Positive coping: Mastering demands and searching for meaning. In S. J. Lopez & C. R. Snyder (Eds.), *Positive psychological assessment: A handbook of models and measures* (pp. 393-409). Washington: American Psychological Association.
- Selye, H. (1956). *The stress of life*. New York: McGraw-Hill.
- Selye, H. (Ed.). (1957). *Stress beherrscht unser Leben*. Düsseldorf: Econ.
- Selye, H. (1974). *Stress without Distress*. Philadelphia: Lippincott.
- Selye, H. (Ed.). (1979). *The stress of my life: a scientist's memoirs* (2nd ed.). New York: Van Nostrand Reinhold.

- Selye, H. (1981). Geschichte und Grundzüge des Stresskonzepts. In J. R. Nitsch (Ed.), *Stress* (pp. 163-184). Bern, Stuttgart, Wien: Huber.
- Siegrist, J. (1996). *Soziale Krisen und Gesundheit*. Göttingen: Hogrefe.
- Siegrist, J. (2010). Effort-Reward Imbalance at Work and Cardiovascular Diseases. *International Journal of Occupational Medicine and Environmental Health*, 23(3), 279-285. doi:10.2478/v10001-010-0013-8
- Solomon, Z., Mikulincer, M., & Benbenishty, R. (1989). Locus of control and combat-related posttraumatic stress disorder: The intervening role of battle intensity, threat appraisal and coping. *British Journal of Clinical Psychology*, 28, 131-144.
- Somerfield, M. R., & McCrae, R. R. (2000). Stress and Coping Research. Methodological challenges, Theoretical Advances, and clinical Applications. *American Psychologist*, 55(6), 620-625. doi:10.1037//003-66X.55.6.620
- Sonntag, K., Frieling, E., & Stegmaier, R. (2012). *Lehrbuch Arbeitspsychologie* (3rd ed.). Bern: Huber.
- Spitzer, R. L., Kroenke, K., & Williams, J. B. W. (1999). Validation and utility of a self-report version of PRIME-MD: The PHQ Primary Care Study. *JAMA: Journal of the American Medical Association*, 282(18), 1737-1744. doi:10.1001/jama.282.18.1737
- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, 166(10), 1092-1097. doi:10.1001/archinte.166.10.1092
- Staal, M. A. (2004). *Stress, Cognition, and Human Performance: A Literature Review and Conceptual Framework* (Report No. NASA/TM—2004–212824). California: National Aeronautics and Space Administration.
- Staal, M. A., Bolton, A. E., Yaroush, R. A., & Bourne, L. R., Jr. (2008). Cognitive performance and resilience to stress. In B. J. Luckey & V. Tepe (Eds.), *Biobehavioral resilience to stress* (pp. 259-300). Boca Raton: CRC Press.
- Stephens, C. (1997). Debriefing, social support and PTSD in the New Zealand police: Testing a multidimensional model of organisational traumatic stress. Retrieved from <http://www.massey.ac.nz/~trauma/issues/1997-1/cvs1.htm>
- Stephens, C., & Long, N. (1999). Posttraumatic stress disorder in the New Zealand police: The moderating role of social support following traumatic stress. *Anxiety, Stress & Coping: An International Journal*, 12(3), 247-164.
- Stephens, C., Long, N., Miller, I., (1997). The impact of trauma and social support on posttraumatic stress disorder: A study of New Zealand police officers. *Journal of Criminal Justice*, 25(4), 303-314. doi:10.1016/S0047-2352(97)00015-9
- Sterud, T., Ekeberg, Ø., & Hem, E. (2006). Health status in the ambulance services: a systemic review. *BMC Health Services Research*, 6(82), 1-10. doi:10.1186/1472-6963/6/82

- Stevens, J. P. (2002). *Applied multivariate statistics for the social science* (4th ed.). Hillsdale: Erlbaum.
- Thoits, P. A. (2011). Mechanisms linking social ties and support to physical and mental health. *Journal Of Health And Social Behavior*, 52(2), 145-161. doi:10.1177/0022146510395592
- Thompson, J. (1992). Stress Theory and Therapeutic Practice. *Stress Medicine*, 8, 147-150.
- Thompson, S. C. (1981). Will It Hurt Less If I Can Control It? A Complex Answer to a Simple Question. *Psychological Bulletin*, 90(1), 89-101. doi:10.1037/0033-2909.90.1.89
- Udris, I. (1981). Streß in arbeitspsychologischer Sicht. In J. R. Nitsch (Ed.), *Stress* (pp. 391-498). Bern: Huber.
- Ungerer, D., & Morgenroth, U. (2001). Analyse des menschlichen Fehlverhaltens in Gefahrensituationen: Empfehlungen für die Ausbildung. In Bundesverwaltungsamt – Zentralstelle für Zivilschutz (Series Ed.), *Zivilschutzforschung: Vol. 43*.
- Upadhyay, A., & Singh, A. P. (2014). The role of social support and coping strategies in stress and health relationship. *Indian Journal Of Community Psychology*, 10(1), 73-87.
- Van der Doef, M., & Maes, S. (1999). The Job Demand-Control (-Support) model and psychological well-being: A review of 20 years of empirical research. *Work & Stress*, 13(2), 87-114. doi:10.1080/026783799296084
- Van der Ploeg, E., & Kleber, R. (2003). Acute and chronic job stressors among ambulance personnel: predictors of health symptoms. *Occupational and Environmental Medicine*, 60, i40-i46. doi:10.1136/oem.60.suppl_1.i40
- Varker, T., & Devilly, G. J. (2012). An analogue trial of inoculation/resilience training for emergency services personnel: Proof of concept. *Journal of Anxiety Disorders*, 26(6), 696–701. doi:10.1016/j.janxdis.2012.01.009
- Wagner, D., Heinrichs, M., Kerber, U., Wingenfeld, K., Hellhammer, D. H., & Ehlert, U. (2001). Wirkfaktoren der Prävention sekundärer posttraumatischer Belastungsstörungen bei Hochrisikopopulationen. In A. Maercker & U. Ehlert (Eds.), *Jahrbuch der medizinischen Psychologie: Vol. 20. Psychotraumatologie* (pp. 201-225). Göttingen: Hogrefe.
- Wagner-Link, A. (2010). *Verhaltenstraining zur Stressbewältigung: Arbeitsbuch für Therapeuten und Trainer*. Stuttgart: Klett-Cotta.
- Weiss, D. S. (2004). The Impact of Event Scale-Revised. In J. P. Wilson, T. M. Keane, J. P. Wilson, & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (2nd ed.). (pp. 168-189). New York: Guilford Press.
- Weiss, D. S., & Marmar, C. R. (1997). The Impact of Event Scale-Revised. In J. P. Wilson & T. M. Keane (Eds.), *Assessing Psychological Trauma and PTSD: A Practitioner's Handbook* (pp. 399-411). New York: Guilford Press.

- Wittchen, H.-U., Gloster, A., Beesdo, K., Schönfeld, S., & Perkonig, A. (2009). Posttraumatic stress disorder: Diagnostic and epidemiological perspectives. *CNS Spectrums*, 14(1, Suppl. 1), 5-12.
- World Health Organization. (1992). *The ICD-10 classification of mental and behavioural disorders: Clinical descriptions and diagnostic guidelines*. Geneva: World Health Organization.
- Yates, P. J., Benson, E. V., Harris, A., & Baron, R. (2012). An investigation of factors supporting the psychological health of staff in a UK emergency department. *Emergency Medicine Journal: EMJ*, 29(7), 533-535. doi:10.1136/emj.2010.099630
- Yerkes, R., & Dodson, J. (1908). The relation of strength of stimulus to rapidity of habit-formation. *Journal of Comparative Neurology and Psychology*, 18, 459-482.
- Young, P. M., Partington, S., Wetherell, M. A., St Clair Gibson, A., & Partington, E. (2014). Stressors and coping strategies of UK firefighters during on-duty incidents. *Stress and Health*, 30, 366-376. doi:10.1002/smi.2616
- Zelger, J. (2000). Zur Geschichte von GABEK. In R. Buber & J. Zelger (Eds.), *GABEK II. Zur Qualitativen Forschung* (pp. 13-21). Innsbruck: StudienVerlag.
- Zelger, J. (2002). *GABEK. Handbuch zum Verfahren GABEK® - WinRelan®. Bd. I: Von der Problemstellung zum Zwischenbericht*. Innsbruck: StudienVerlag.
- Zelger, J. (2008). *GABEK III: Organisationen und ihre Wissensnetze*. Innsbruck: StudienVerlag.
- Zelger, J. (2014). WinRelan (Version 5.16) [computer software]. Innsbruck: Zelger.
- Zimbardo, P. G., & Gerrig, R. J. (2004). *Psychologie* (16th ed.). München: Pearson Studium.
- Zubin, J. & Spring, B. (1977). Vulnerability – A new view of schizophrenia. *Journal of Abnormal Psychology*, 86, 103-126. doi:10.1037/0021-843X.86.2.103

Interview Guidelines

These guidelines form the basis for semi-structured interviews conducted in WP1 and WP4. Interviews need to be translated into English. All transcripts and reports need to be uploaded in projectplace according to the respective due-dates of each WPlleader.

***Important: This applicable guideline is a flexible list of questions.** The questions cover the topics that should be addressed during the interview. The order of the topics is not relevant, rather let the interviewee choose the direction (“go with the flow”) and see what questions he or she already answers. Any remaining questions can be asked at the end.*

*The crisis manager (interviewee) **chooses one of the three scenarios** that best fits his/her work/experiences (activating the experiences) before being asked to watch the power point presentation. The following topics should be addressed during the interview:*

1. Evaluation screenplays
 1. What is your first impression regarding this scenario?
 2. Which of the shown aspects are similar to your own experience/ work in crisis situations?
 3. What aspects are different from your own experiences? What aspects didn't you encounter so far?
 4. What aspects would you add from your perspective and experience?
 5. Could such scenarios be useful to prepare for crisis situations?

2. Status analysis „Psycho-social support, intervention methods, concepts, responsible persons in crisis management“
 1. How is psycho-social prevention and aftercare organized in your country/county/district/area?
 2. Which measures, procedures, schedules, screenings, interventions, etc. are implemented as part of psycho-social prevention and aftercare?
 3. Who is responsible for planning, organization and realization on a general crisis management level and for psycho-social prevention and aftercare in particular?
 4. How are volunteers, especially ‘walk-in-volunteers’, integrated in the psycho-social prevention and aftercare?

3. Own experiences in crisis management of an actual disaster situation (e.g. flood) (could also be addressed together with point 4)
 1. What roles and responsibilities do you have in the crisis management system and in your institution/organization?
 2. How did you experience the measures/actions taken by the crisis management in this particular disaster/incident?
 3. Who was involved and responsible for psycho-social support and what was done (measures, intervention methods etc.)?
 4. With which sectors in the crisis management system was psycho-social support affiliated? (drawing encouraged)



4. Stressors and stress management

1. What specific demands did the management of this crisis place on you?
2. Which aspects did you find challenging and difficult? Which aspects were easier?
3. How did you cope with arising difficulties? (*for the interviewer: on the operational as well as on the emotional level*)
4. Which aspects or individuals did you experience as being supportive?

Background of the questions: Important to ask further, especially in the cases of the underlined expressions.

Question 1 („demands“): components of the question

- How would you describe your stress level/strain/pressure during the management of this particular incident? (please refer to the different time phases: beginning phase, peak)

Question 2 („stressors“): components of the question

- What were the most stressful aspects during the management of the crisis??
- How much control over the situation did you have?
- In your opinion, what did you do really well? Where did you have difficulties?

Question 3 („stress management“): components of the question

- Which techniques or strategies did you use to deal with your stress or remain calm?
- Where did you learn these techniques?
- What would you recommend for younger colleagues to consider in coping with crises?

Question 4 („support“): components of the question

- Where would you have needed more support?
- How supporting did you experience your organization?
- What should have been done differently in your opinion? What would have helped you?

5. Requirements

1. Please describe your expectations of psycho-social support in crisis management.
2. What types of psycho-social support and general support (e.g. technic, infrastructure...) would be helpful for your work, also considering the chronological course of a catastrophe?
3. What would you still like to learn about psycho-social support in regards to crisis management?
4. Would you generally be interested entering into an open exchange with international colleagues? What would you imagine to be helpful for such conversations?
5. What format would you prefer for such an exchange?

At the end:

Is there anything else you would like to add? Is there anything else you think should be considered or talked about?

Thank you for the interview!

22.11.2013