Supporting civilians and professionals after crises
Implications for psychosocial care

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Supporting civilians and professionals after crises
Implications for psychosocial care

Het ondersteunen van burgers en professionals na crises
Implicaties voor psychosociale hulp
(met een samenvatting in het Nederlands)

Proefschrift

ter verkrijging van de graad van doctor aan de Universiteit Utrecht op gezag van de rector magnificus, prof. dr. H.R.B.M. Kummeling, ingevolge het besluit van het college voor promoties in het openbaar te verdedigen op vrijdag 16 november 2018 des middags te 4.15 uur

door Juul Gouweloos-Trines

geboren op 8 mei 1986
te Amsterdam

Promotoren: Prof. dr. R.J. Kleber
Prof. dr. P.A. Boelen
Copromotor: Dr. J.H.M. te Brake

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Chapter 1

Introduction

1.1 General introduction

In the busy traffic of Monday morning, two trains collide into each other at full speed. Twenty people lose their lives at the scene and over 100 people become severely injured. Many survivors are suddenly overwhelmed with intense feelings of fear and horror and confronted with the suffering of others. In the weeks and months following the crash, many victims exhibit stress reactions, ranging from nightmares and flashback of the event to sorrow and grief over the loss of beloved ones. The railway company and local community healthcare service feel responsible for the wellbeing of the victims and offer support: Online information is provided about 'normal' psychological reactions to the event and when to seek psychological treatment. After a year, a survey is set out to examine whether victims are suffering from posttraumatic mental health problems. Over a quarter of the victims appear to suffer from symptoms of Post-Traumatic Stress Disorder, anxiety, depression or complicated grief. Moreover, not all of them receive appropriate psychological treatment. The railway company and health care service are uncertain about what to do next: should they contact each victim individually and, when needed, support them in finding care? Or should they trust people's ability to ultimately find the care they need?

Mike works as a paramedic for over 10 years. Driving from one incident to another, he is frequently confronted with severely sick, injured or dead people, including children. The past few years, Mike experiences his work as increasingly burdensome. Due to societal changes, violence against paramedics increases and the use of smartphones by bystanders to film accidents makes it more difficult to provide medical first aid. He also has difficulties with a new team supervisor, who, in his opinion, does not fully understand the work of a paramedic and implements policies that are unhelpful and bureaucratic. One day, he has to provide first aid to a young girl who resembles his own daughter. This shocks him: for a moment he believes his own daughter has been severely injured. After the incident, there is little time to rest, and he has to drive to a reanimation. In the following days, he continuously feels sad, anxious and physically tense. He has difficulty concentrating and experiences nightmares in which he sees his own daughter getting injured. He calls in sick. He hears nothing from work until, after a week, his supervisor calls him to ask when he could return to work.

These examples illustrate the impact of stressful life events, such as large scale crises or critical incidents at the workplace, on the wellbeing of those affected.

They also illustrate the importance of providing support to people at risk of long-term disturbances and addressing their psychological and social needs. In the past decades, guidelines have been developed in an effort to support policy makers, organizations and (public) healthcare organizations in providing psychosocial support (also referred to as psychosocial care) to civilians and professionals exposed to disasters or critical incidents (Bisson et al., 2010; Creamer et al., 2012; Suzuki, Fukasawa, Nakajima, Narisawa, & Kim, 2012; Te Brake & Dückers, 2013; Witteveen et al., 2012). The essence of these guidelines boils down to fostering resilience and easing natural recovery by facilitating general support and providing necessary recourses that address the victims' needs (e.g., shelter, contact with beloved ones, availability of social support). Key is also to detect people with high levels of distress to provide a timely referral to (specialized) mental health care.

Current psychosocial support guidelines for disaster victims and high-risk professionals are based on a combination of existing empirical evidence and systematically obtained expert consensus (Bisson et al., 2010; Creamer et al., 2012; Suzuki et al., 2012; Te Brake & Dückers, 2013). More research is especially needed on practical and social support and methods to identify those at risk of mental health problems (World Health Organization, 2013). It is for example still uncertain how outreaching these interventions should be towards those affected and in what form and frequency they should be implemented. This dissertation aims to contribute to the knowledge on psychosocial support after disasters and critical incidents by expanding on these issues as they are not yet fully understood. It specifically focusses on the detection and support of civilians and high-risk professonals affected by crises. High-risk professionals are professionals such as police officers, trauma therapists, or paramedics, who are frequently confronted with critical incidents during work, such as witnessing severely injured people after a car accident or hearing stories of sexual abuse. Although disaster victims and high-risk professionals are exposed to very different events in very different contexts, existing guidelines on psychosocial support target these groups specifically as they are part of a community at risk of posttraumatic mental health problems. As a result, organizations, governments, and health-care institutions have a role and responsibility in fostering their wellbeing and are in need of guidance on how to best address their needs.

In this introductory chapter, we first briefly describe the mental health consequences for civilians and high-risk professionals exposed to disasters and critical incidents (paragraph 1.2). Next, we focus on psychosocial support as a preventive intervention for mental health problems after crises (paragraph 1.3). Thereafter, existing gaps in research and practice regarding the provision of

psychosocial support are discussed (paragraph 1.4). This chapter concludes with the purpose and outline of this dissertation (paragraphs 1.5 and 1.6).

1.2 Mental health effects of potentially traumatic events

People all over the world may be confronted with events that are threatening to the lives or physical integrity of themselves or others, such as disasters, crises, severe accidents, sexual abuse or critical incidents at work. These sudden, uncontrollable, events are "potentially traumatic events". They turn the lives of those exposed upside down and shatter their assumptions of the world as a safe, predictable and benevolent place (Janoff-Bulman, 1992). They often lead to a perceived loss of control, perhaps even to a sense of powerlessness, inefficacy, or helplessness (Bandura, 1982; Folkman, 1984; Kleber & Brom, 1992). Many people experience stress reactions or disturbances in the adaptation to these stressful events, such as sleep problems, irritability, heightened arousal, concentration problems, somatic symptoms, flashbacks or nightmares. These reactions are a normal part of the coping process after exposure to potentially traumatic events and often subside naturally in the days, weeks and months after the event (Kleber & Brom, 1992). This remarkable ability of people to manage to keep functioning effectively and recover naturally, even despite initial high levels of distress, has been called resilience (e.g., Bonanno, 2005).

For a minority of affected people, these major life events are associated with a substantial long-term psychological burden (Bonanno, Brewin, Kaniasty, & La Greca, 2010; Neria, Gales, & Norris, 2009; Norris et al., 2002a; Norris, Friedman, & Watson, 2002b). Whether someone develops long term disturbances is influenced by multiple risk and protective factors before, during, and after the event (Table 1 provides an overview of social and psychological factors). The proportion of disaster victims that eventually suffer from severe psychological problems, including Post-Traumatic Stress Disorder (PTSD), depression, anxiety, complicated grief or substance abuse is around 10% to 30% (Boelen & Smid, 2017; Bonanno et al., 2010; Neria et al., 2009; Norris et al., 2002a). PTSD is the most extensively studied mental health consequence after potentially traumatic events because of its direct link with the event (i.e., the diagnosis requests being exposed to a traumatic event). PTSD is characterized by involuntary intrusive thoughts of the event, avoidance, negative alterations in cognition and mood, and heightened arousal (American Psychiatric Association, 2013). Among high-risk professionals responding to disasters (e.g., policeman, firefighters and ambulance personnel) a PTSD prevalence rate of approximately 10% has been reported, which is higher compared to its occurrence

in the general population but lower compared to other disaster victims (Berger et al., 2012; Pietrzak et al., 2014; Lowell et al., 2017). Other psychological problems of professionals, such as performance deterioration, sick leave, enduring stress at work or burnout, have deserved less attention in research but could also manifest after critical incidents (Kleber & Van der Velden, 2003; McFarlane & Bryant, 2007).

Table 1. Risk and protective factors for mental health problems following trauma

Timepoint	Risk factors	Protective factors
Before the event	• Psychiatric history • Childhood abuse • Family psychiatric history • Earlier stressful life events • Prior (repeated) exposure to critical incidents at work	• Training and preparation to deal with threats or dangers • Pre-existing personality characteristics such as low neuroticism, hardiness
During the event	• Level of exposure • Experienced life threat • Physical injury • Disasters caused by a malicious intent/ human failure • Peri-traumatic dissociation	• Coping strategies such as problem-solving and keeping a professional distance towards critical incidents
After the event	• Continued media exposure • Legal procedures • Routine work environment stress	• Perceived support from family, friends, colleagues • Received support

Based on: Alexander & Klein, 2009; Bonanno et al., 2010; Breslau, 1998; Brewin, Andrews, & Valentine, 2000; Heinrichs, Wagner, Schoch, Soravia, Hellhammer, & Ehlert, 2005; Iversen et al., 2008; Kleber & Van der Velden, 2003; Lowell et al., 2017; Marmar et al., 2006; McFarlane & Bryant, 2007; Ozer, Best, Lipsey, & Weiss, 2003; Pietrzak et al., 2014; Van der Ploeg, & Kleber, 2003; Wagner, Schoch, Soravia, Hellhammer, & Ehlert, 2005; Weisaeth & Tonnesson, 2003.

1.3 Psychosocial support

In the past decades, various interventions have been developed to prevent mental health problems and to foster resilience among individuals exposed to potentially traumatic events. As a method designed to mitigate distress and detect the emergence of posttraumatic psychopathology, these interventions can be viewed as a form of secondary prevention (i.e., primary prevention of posttraumatic problems entails taking steps to reduce the frequency of traumatic events, while tertiary prevention aims to soften the impact of existing psychopathology) (Brom & Kleber, 1989; McNally, Bryant, & Ehlers, 2003). Over time, there have been different viewpoints on how active these interventions should be in supporting individuals at risk of mental health problems. Interventions ranged from community interventions targeting all of those affected by a disturbing event (e.g., Mitchell, 1983; Mouthaan et al., 2013)

to more passive strategies that trusted on the resilience and self-efficacy of victims to find the care one needs (e.g., Van der Velden, Van Loon, IJzermans, & Kleber, 2006).

Until now, there is little evidence for the effectiveness of community interventions that focus on preventing the emergence of psychopathology among all of those affected by crises, such as psychological debriefing[1], interventions based on principles of Cognitive Behavioral Therapy (CBT), or education about posttraumatic stress (National Collaborating Centre for Mental Health, 2008; McNally et al., 2003; Mouthaan et al., 2013; Rose, Bisson, Churchill, & Wessely, 2002). Early interventions such as Trauma-Focused CBT (TF-CBT) have only been found effective when offered to the selection of people affected by crises who do not recover naturally and suffer from acute stress disorder or PTSD the first weeks or months after the disaster (Roberts, Kitchiner, Kenardy, & Bisson, 2009).

Although it is not recommended to offer the same, curative intervention to *all* of those affected, being too passive and offering nothing seems also not wise, primarily because of the negative consequences of lack of social support on victims' wellbeing (Bonanno et al., 2010; Brewin et al., 2000; Ozer et al., 2003). It has indeed been consistently shown that social factors play an important role in recovering from disasters and critical incidents. Especially perceived support from the social network (family, friends, colleagues) has been positively associated with post-event adjustment (Brewin et al., 2000; Ozer et al., 2003). Approaches such as 'stepped care' or 'watchfull waiting' try to find a balance between active and passive by initially trusting self-recovery skills of individuals and allowing time to pass before – following a stepped care approach – more advanced psychological services are provided, with the purpose of avoiding overtreatment (e.g., Bisson et al., 2010; Kleber & Brom, 1986; Van der Velden et al., 2006). Still, interventions that follow these methods differ in whether and how active they stimulate self-recovery (i.e., ranging from offering formal peer support to all professionals exposed to critical incidents to providing leaflets with information on psychosocial stress reactions after crises).

Current guidelines on early interventions after crises recommend offering psychosocial support (or psychosocial care or psychological first aid). Psychosocial support has been defined as all the support and care directed at the psychological wellbeing and health of people affected during and after an event, targeted at

1 Debriefing aims to prevent PTSD by, among others, encouraging victims to disclose thought and feelings regarding the event in a group setting guided by a mental health professional (Mitchell, 1993; Mitchell & Everly, 1995). Psychological debriefing did not proof effective and can even impede natural recovery processes (McNally et al., 2003; Rose, Bisson, Churchill, & Wessely, 2002). Apparently, disclosure of thought and feelings shortly after potentially traumatic events is not beneficial for all survivors: victims differ in their preferred coping strategies and needs to ventilate emotions (Kleber & Mittendorf, 2000; McNally et al., 2003).

communities as well as individuals. In a consensus based article, Hobfoll et al. (2007) proposed five key areas that psychosocial support should focus on in the post-disaster context, namely promoting a) a sense of safety, b) calming, c) a sense of self and collective efficacy, d) connectedness, and e) hope. These principles have been incorporated in various international guidelines for health care professionals, policy makers, and organizations responsible for responding to disasters and critical incidents (Bisson et al., 2010; Suzuki et al., 2012; Te Brake & Dückers, 2013). These guidelines entail recommendations ranging from the preparation for disturbing events and its consequences, offering support to the community at large after the incident, timely identifying individuals at risk of posttraumatic disorders, to the treatment of post-event mental health disorders. Additionally, guidelines for high-risk professionals explicitly stress that organizations should pay attention to the consequences of critical incidents for their employees and to the possibilities of supportive assistance afterwards, for example by formal peer support (Creamer et al., 2012; Kleber & Van der Velden, 2003; Impact, 2012). An overview of principal recommendations from various guidelines is presented in Appendix 1.

1.4 Gaps in research on psychosocial support

The strength of the scientific evidence for the recommendations in guidelines on psychosocial support varies. Supported by research evidence are recommendations on curative, evidence-based treatments for mental health disorders (i.e., Eye Movement Desensitization and Reprocessing or TF-CBT; American Psychological Association, 2017; World Health Organization, 2013). Recommendations on preparation for crises, for example by creating multi-agency psychosocial care planning groups are also well documented (Dückers, Witteveen, Bisson, & Olff, 2017; Witteveen et al., 2012). However, knowledge gaps still remain regarding the provision of general support to all of those affected by crises or critical incidents and the detection of those at risk of mental health problems.

Providing support to the community at large

First, recommendations about community interventions to support those at risk, such as 'providing practical and social support' and 'identifying the correct supportive resources' are primarily based on expert consensus, informed by research findings about the protective influence of social support (Bisson et al., 2010; Suzuki et al., 2012; Te Brake & Dückers, 2013). Although these recommendations are widely supported and make intuitive sense, they are also formulated quite broad and vague and, subsequently, leave room for all kind of

interpretations. For example, for an organization of high-risk professionals, it remains unclear what type of activities are perceived as supportive by an employee who has been confronted with a critical incident. Is informal support from a supervisor crucial after a critical incident or it is more important that certain policies are in place, such as formal peer support systems or receiving some time off to restore emotionally from a disturbing event?

The organizational context for high-risk professionals

Second, guidelines on support after crises and critical incidents have mainly included the perspective of clinical psychology and psychiatry, focusing on preventing psychopathology. Especially when studying high-risk professionals facing adversities, it appears relevant to also address knowledge from the field of organizational health psychology: exposure to critical incidents takes place, and cannot be isolated from, an organizational context with its own organizational demands. For example, the Job-Demands Resources model provides a useful framework to understand how work environment factors determine wellbeing (Bakker & Demerouti, 2007). Resources at work (e.g., autonomy, opportunities for professional development) and personal resources (i.e., coping strategies and personal characteristics such as optimism) are associated with work engagement, performance and decreased risk of burnout among various occupational groups (Bakker, Demerouti, & Verbeke, 2004; Bakker, Schaufeli, Leiter, & Taris, 2008; Te Brake, Bouman, Gorter, Hoogstraten, & Eijkman, 2007; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007). Since resources are potentially malleable factors that can be influenced by organizations and professionals before or after critical incidents (Hobfoll, 2002; Van den Heuvel, Demerouti, Schaufeli, & Bakker, 2010), understanding which resources are important for the wellbeing of high-risk professionals will further guide the support of professionals who face all kinds of job demands (e.g., high-workload, critical incidents).

Determining high-risk groups

Third, although guidelines recommend pinpointing groups at risk of mental health problems to facilitate early identification of individuals with high levels of distress, it is almost never immediately clear which groups are at a heightened risk. Some groups consistently are found to be vulnerable for adverse health outcomes, such as children or people belonging to an ethnic minority (Drogendijk, Van der Velden, Gersons, & Kleber, 2011; Ronan, Alisic, Towers, Johnson, & Johnston, 2015). For other potential high-risk groups less evidence exists. For example, from the general finding that proximity to a disaster is a risk factor (e.g., Bonanno et al., 2010), it

could be assumed that actual physical injury might be a proxy for such proximity and, ergo, provide a proxy for a heightened risk. However, there exists little research on the relationship between physical injury and mental health problems in a disaster setting.

Screening instruments

Fourth, no consensus exists among guidelines on the use of screening instruments to detect individuals at risk for mental health problems. Guidelines by Suzuki et al. (2012) recommend using screening instruments for mental health problems in high-risk groups to detect those at risk, while the TENTS guidelines recommend that screening should not occur due to limited evidence (Bisson et al., 2010). The EUTOPA guidelines choose the middle way and recommend more research on the effectiveness of population wide screening and the usability of screening instruments to identify and refer those in need for treatment (Te Brake & Dückers, 2013). Most instruments for PTSD, such as the Trauma Screening Questionnaire (TSQ) and the PTSD Checklist (PCL), have been found reasonably accurate in clinical and military settings (Brewin, 2005; Wilkins, Lang, & Norman, 2010), but their use has not been tested in disaster settings in which the needs of victims early after a disaster may be very different and in which the logistics of detecting and monitoring survivors is often challenging. It remains however unclear how to detect individuals with a high level of distress without the use of screeners in a post-crisis situation.

Proactive outreach

Fifth, although guidelines recommend the detection of those at risk, different viewpoints exist among scholars on whether special or additional interventions are needed to support and identify individuals at risk. To what extent are victims able to find their own way to mental health care via existing referral channels? To put it another way: how active, or how 'outreaching' should these interventions be? Scholars holding a more passive attitude believe that, as most affected people are self-reliant and recover on their own strength, intervening will be unnecessary and may even be a waste of resources, while others, in contrast, believe that not everyone is able to find the support they need and do not accept the chance that people can be overlooked (Dückers & Thormar, 2015).

Psychosocial care after CBRN events

Sixth, when taking a broader look at guidelines on psychosocial care after crises, current guidelines do not yet differentiate between types of crises. Chemical,

biological, radiological or nuclear (CBRN) disasters or crises put people at a higher risk for mental health problems by increasing public feelings of fear and uncertainty about the health effects of the toxic agents (Hyams, Murphy, & Wessely, 2002; Weisaeth & Tonnesson, 2003). It remains however uncertain whether these psychological effects warrant a different psychosocial approach compared to, for instance, a natural disaster (e.g., earthquakes, floods).

In conclusion, research into psychosocial interventions to identify and support those at risk is scarce, most probably because of the considerable complexities in designing and implementing research studies in the extremely complex field of disasters and critical incidents (Schultz & Forbes, 2014). The effect of an intervention can be easily assessed in controlled settings but is difficult to measure in aftermath of crises situations, in which multiple variables affect wellbeing. It has even been argued that for the majority of recommendations in guidelines, expert consensus is the highest possible evidence (Bisson et al., 2010). However, organizations and governments responsible for the mental healthcare response are in need of a translation of the recommendations on psychosocial support into practice, supported by research and not only resulting from the (untested) view of experts. Research can contribute by elaborating on the practical implementation of the recommendations on psychosocial support, examining factors that constitute a supportive context in the wake of critical incidents, evaluating strategies to detect those at risk, and studying whether different types of disasters warrant different psychosocial responses. This will help to formulate do's and don'ts for appropriate psychosocial aid and care in the wake of critical incidents and disasters and to underpin the 'lessons learned'.

1.5 Purpose of this dissertation

The focus of the studies presented in this dissertation is on groups at risk of mental health problems due to exposure to potentially traumatic events, namely disaster victims and high-risk professionals. To summarize the above, the rationale for this dissertation comes from a) prevalence studies showing that a minority of those affected by disasters or critical incidents is at risk of developing severe mental health problems, b) indications that groups who are exposed to potentially traumatic events, such as high-risk professionals or disasters victims, may benefit from psychosocial support as a secondary preventive intervention, and c) reports that psychosocial support guidelines are evidence-informed and need a more solid scientific basis, fueled by research studies on the support and identification of those

at risk. The key purpose of the work in this dissertation is to enhance knowledge on the support and identification of those at risk for mental health problems within these high-risk settings. By generating this knowledge, we aim to contribute to the refinement of guidelines on psychosocial support after critical incidents and preventive care activities. Although the focus is on groups (i.e., communities and organizations), the supportive interventions described in this thesis are ultimately aimed at protecting and supporting individuals.

1.6 Outline of this dissertation

This dissertation includes multiple research studies clustered around two central themes (Table 2 provides a schematic overview):

1. ***A supportive work environment for professionals within high-risk organizations.*** Among pre-hospital providers (e.g., ambulance personnel) we aimed to identify supportive working conditions, such as availability of peer support systems, that are related to their wellbeing (Chapter 2). Among police officers working on cases of (child) sexual assault, we studied the influence of various job demands, job resources and personal resources on their wellbeing (Chapter 3).
2. ***The support and identification of civilians at risk for mental health problems after a large-scale critical incident***. To identify potential high-risk groups, the relation between physical injuries and mental health problems among survivors of an airplane crash near Amsterdam in 2009 was studied (Chapter 4). We also evaluated the outreaching mental health response after the crash, by measuring the accuracy of screening instruments for PTSD and depression and assessing self-reported unmet treatment needs (Chapter 5). Finally, we studied the extent to which psychosocial support in case of CBRN events differs from the care provided after other types of events and how strong the scientific evidence is for the effectiveness of psychosocial interventions after CBRN events (Chapter 6).

Table 2. Schematic overview of themes, research studies, and chapters

Theme		Research study	Source	Design	Chapter
1	A supportive work environment for professionals within high-risk organizations.	Perceived support at work after critical incidents and its relation to psychological distress	813 international pre-hospital providers	Cross-sectional survey	2
		The relation between job demands, job resources, personal resources and psychological wellbeing	480 police officers investigating child pornography and sexual assault.	Qualitative interviews and cross-sectional survey	3
2	The detection of civilians at risk for mental health problems after a large scale incident.	The risk of PTSD and depression and its potential association with physical injury	121 adult survivors of an airplane crash	Longitudinal study	4
		Evaluating outreach: screening for PTSD and depression and self-reported treatment needs	121 adult survivors of an airplane crash	Longitudinal study	5
	.	Psychosocial support to affected citizens and communities in case of CBRN incidents: a systematic review	39 studies, mostly literature studies, expert opinions and qualitative research	Systematic review	6

References

Alexander, D. A., & Klein, S. (2009). First responders after disasters: a review of stress reactions, at-risk, vulnerability, and resilience factors. Prehospital and Disaster Medicine, 24(2), 87-94.

American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: American Psychiatric Association.

American Psychological Association (2017). Clinical practice guidelines for the treatment of PTSD. Retrieved from http://www.apa.org/ptsd-guideline/ptsd.pdf.

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: state of the art. Journal of Managerial Psychology, 22(3), 309-328.

Bakker, A. B., Demerouti, E., & Verbeke, W. (2004). Using the job demands-resources model to predict burnout and performance. Human Resource Management, 43(1), 83-104.

Bakker, A. B., Schaufeli, W. B., Leiter, M. P., & Taris, T. W. (2008). Work engagement: an emerging concept in occupational health psychology. Work & Stress, 22(3), 187-200.

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37(2), 122.

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.

Bisson, J. I., Tavakoly, B., Witteveen, A. B., Ajdukovic, D., Jehel, L., Johansen, V. J., ... & Sezgin, A. U. (2010). TENTS guidelines: Development of post-disaster psychosocial care guidelines through a Delphi process. The British Journal of Psychiatry, 196(1), 69-74.

Boelen, P. A., & Smid, G. E. (2017). Disturbed grief: Prolonged grief disorder and persistent complex bereavement disorder. BMJ, 357, j2016.

Bonanno, G. A. (2005). Resilience in the face of potential trauma. Current Directions in Psychological Science, 14(3), 135-138.

Bonanno, G. A., Brewin, C. R., Kaniasty, K., & Greca, A. M. L. (2010). Weighing the costs of disaster: Consequences, risks, and resilience in individuals, families, and communities. Psychological Science in the Public Interest, 11(1), 1-49.

Breslau, N. (1998). Epidemiology of trauma and posttraumatic stress disorder. In R. Yehuda (ed.), Psychological trauma (pp. 1-30). Washington, DC: American Psychiatric Press.

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. Journal of Consulting and Clinical Psychology, 68(5), 748-766.

Brom, D., & Kleber, R. J. (1989). Prevention of post-traumatic stress disorders. Journal of Traumatic Stress, 2(3), 335-351.

Creamer, M. C., Varker, T., Bisson, J., Darte, K., Greenberg, N., Lau, W., ... & Watson, P. (2012). Guidelines for peer support in high-risk organizations: An international consensus study using the Delphi method. Journal of Traumatic Stress, 25(2), 134-141.

Drogendijk, A. N., van der Velden, P. G., Gersons, B. P., & Kleber, R. J. (2011). Lack of perceived social support among immigrants after a disaster: comparative study. The British Journal of Psychiatry, 198(4), 317-322.

Dückers, M. L., Witteveen, A. B., Bisson, J. I., & Olff, M. (2017). The association between disaster vulnerability and post-disaster psychosocial service delivery across Europe. Administration and Policy in Mental Health and Mental Health Services Research, 44(4), 470-479.

Dückers, M. L., & Thormar, S. B. (2014). Post-disaster psychosocial support and quality improvement: A conceptual framework for understanding and improving the quality of psychosocial support programs. Nursing & Health Sciences, 17(2), 159-165.

Folkman, S. (1984). Personal control and stress and coping processes: A theoretical analysis. Journal of Personality and Social Psychology, 46(4), 839.

Heinrichs, M., Wagner, D., Schoch, W., Soravia, L. M., Hellhammer, D. H., & Ehlert, U. (2005). Predicting posttraumatic stress symptoms from pretraumatic risk factors: a 2-year prospective follow-up study in firefighters. American Journal of Psychiatry, 162(12), 2276-2286.

Hobfoll, S. E. (2002). Social and psychological resources and adaptation. Review of General Psychology, 6(4), 307.

Hobfoll, S. E., Watson, P., Bell, C. C., Bryant, R. A., Brymer, M. J., Friedman, M. J., ... & Maguen, S. (2007). Five essential elements of immediate and mid–term mass trauma intervention: Empirical evidence. Psychiatry: Interpersonal and Biological Processes, 70(4), 283-315.

Hyams, K. C., Murphy, F. M., & Wessely, S. (2002). Responding to chemical, biological, or nuclear terrorism: the indirect and long-term health effects may present the greatest challenge. Journal of Health Politics, Policy and Law, 27(2), 273-292.

Impact (2012). Richtlijn psychosociale ondersteuning geüniformeerden [Guidelines Psychosocial Support for Uniformed Service Workers]. Diemen: Impact.

Impact (2014). Multidisciplinaire richtlijn psychosociale hulp bij rampen en crisis [Multidisciplinary guidelines psychosocial care concerning crises and disaster]. Diemen: Impact.

Iversen, A. C., Fear, N. T., Ehlers, A., Hughes, J. H., Hull, L., Earnshaw, M., ... & Hotopf, M. (2008). Risk factors for post-traumatic stress disorder among UK Armed Forces personnel. Psychological Medicine, 38(4), 511-522.

Janoff-Bulman, R. (1992). Shattered assumptions: towards a new psychology of trauma. New York: Free Press.

Kleber, R.J., & Brom, D. (1986). Opvang en nazorg van geweldslachtoffers in de organisatie [Psychological care for victims of physical assault within organizations]. Gedrag en Gezondheid, 14, 97-104.

Kleber, R. J., & Brom, D. (1992). Coping with trauma: Theory, prevention and treatment. Lisse: Swets & Zeitlinger Publishers.

Kleber, R. J., & Mittendorf, C. (2000). Opvang na schokkende gebeurtenissen: stand van zaken in het wetenschappelijk onderzoek [Psychological care after stressful life events: current scientific research]. Maandblad Geestelijke Volksgezondheid, 55, 889-904.

Kleber, R.J. & Van der Velden, P.G. (2003). Acute stress at work. In M.J. Schabracq, J.A. Winnubst & C.L. Cooper (Eds.), The handbook of work and health psychology. Hoboken, NJ: John Wiley & Sons.

Lowell, A., Suarez-Jimenez, B., Helpman, L., Zhu, X., Durosky, A., Hilburn, A., ... & Neria, Y. (2017). 9/11-related PTSD among highly exposed populations: a systematic review 15 years after the attack. Psychological Medicine, 1-17.

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. Child Development, 71(3), 543-562.

Marmar, C. R., McCaslin, S. E., Metzler, T. J., Best, S., Weiss, D. S., Fagan, J., ... & Mohr, D. (2006). Predictors of posttraumatic stress in police and other first responders. Annals of the New York Academy of Sciences, 1071(1), 1-18.

National Collaborating Centre for Mental Health (2008). Post-traumatic stress disorder. The management of PTSD in adults and children in primary and secondary care. London: Gaskell and the British Psychological Society.

McFarlane, A. C., & Bryant, R. A. (2007). Post-traumatic stress disorder in occupational settings: anticipating and managing the risk. Occupational Medicine, 57(6), 404-410.

McNally, R. J., Bryant, R. A., & Ehlers, A. (2003). Does early psychological intervention promote recovery from posttraumatic stress?. Psychological Science in the Public Interest, 4(2), 45-79.

Mitchell, J. T. (1983). When disaster strikes: The critical incident stress debriefing process. Journal of Emergency Medical Service, 1, 36-39.

Mitchell, J. T., & Everly, G. S. (1995). Critical incident stress debriefing (CISD) and the prevention of work-related traumatic stress among high risk occupational groups. In: Psychotraumatology (pp. 267-280). Boston, MA: Springer.

Mouthaan, J., Sijbrandij, M., De Vries, G. J., Reitsma, J. B., Van de Schoot, R., Goslings, J. C., ... & Olff, M. (2013). Internet-based early intervention to prevent posttraumatic stress disorder in injury patients: randomized controlled trial. Journal of Medical Internet Research, 15(8), e165.

Neria, Y., Galea, S., & Norris, F. H. (Eds.). (2009). Mental health and disasters. Cambridge: Cambridge University Press.

Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002a). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001. Psychiatry: Interpersonal and Biological Processes, 65(3), 207-239.

Norris, F. H., Friedman, M. J., & Watson, P. J. (2002b). 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. Psychiatry: Interpersonal and Biological Processes, 65(3), 240-260.

Norris, F. H., & Kaniasty, K. (1996). Received and perceived social support in times of stress: A test of the social support deterioration deterrence model. Journal of Personality and Social Psychology, 71(3), 498.

Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: a meta-analysis. Psychological Bulletin, 129(1), 52.

Pietrzak, R. H., Feder, A., Singh, R., Schechter, C. B., Bromet, E. J., Katz, C. L., ... & Harrison, D. (2014). Trajectories of PTSD risk and resilience in World Trade Center responders: an 8-year prospective cohort study. Psychological Medicine, 44(1), 205-219.

Roberts, N. P., Kitchiner, N. J., Kenardy, J., & Bisson, J. I. (2009). Systematic review and meta-analysis of multiple-session early interventions following traumatic events. American Journal of Psychiatry, 166(3), 293-301.

Ronan, K. R., Alisic, E., Towers, B., Johnson, V. A., & Johnston, D. M. (2015). Disaster preparedness for children and families: a critical review. Current Psychiatry Reports, 17(7), 58.

Rose, S. C., Bisson, J., Churchill, R., & Wessely, S. (2002). Psychological debriefing for preventing post traumatic stress disorder (PTSD). The Cochrane Library.

Shultz, J. M., & Forbes, D. (2014). Psychological first aid: Rapid proliferation and the search for evidence. Disaster Health, 2(1), 3-12.

Southwick, S. M., Pietrzak, R. H., Tsai, J., Krystal, J. H., & Charney, D. (2015). Resilience: An update. PTSD Research Quarterly, 25(4), 1050-1835.

Suzuki, Y., Fukasawa, M., Nakajima, S., Narisawa, T., & Kim, Y. (2012). Development of disaster mental health guidelines through the Delphi process in Japan. International Journal of Mental Health Systems, 6(1), 7.

Te Brake, H., Bouman, A. M., Gorter, R., Hoogstraten, J., & Eijkman, M. (2007). Professional burnout and work engagement among dentists. European Journal of Oral Sciences, 115(3), 180-185.

Te Brake, H., & Dückers, M. (2013). Early psychosocial interventions after disasters, terrorism and other shocking events: is there a gap between norms and practice in Europe?. European Journal of Psychotraumatology, 4(1), 19093.

Weisaeth, L., & Tonnessen, A. (2003). Responses of individuals and groups to consequences of technological disasters and radiation exposure. Terrorism and Disaster: Individual and Community Mental Health Interventions, 209-235.

Witteveen, A. B., Bisson, J. I., Ajdukovic, D., Arnberg, F. K., Johannesson, K. B., Bolding, H. B., ... & Nordanger, D. O. (2012). Post-disaster psychosocial services across Europe: The TENTS project. Social Science & Medicine, 75(9), 1708-1714.

World Health Organization (2013). Guidelines on the management of conditions specifically related to stress. Geneva: World Health Organization.

Van den Heuvel, M., Demerouti, E., Bakker, A. B., & Schaufeli, W. B. (2010). Personal resources and work engagement in the face of change. Contemporary Occupational Health Psychology: Global Perspectives on Research and Practice, 1, 124-150.

Van der Ploeg, E., & Kleber, R. J. (2003). Acute and chronic job stressors among ambulance personnel: predictors of health symptoms. Occupational and Environmental Medicine, 60(suppl 1), i40-i46.

Van der Velden, P., Van Loon, P., IJzermans, J., & Kleber, R. J. (2006). Psychosociale zorg direct na een ramp. De Psycholoog, 658-663.

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2007). The role of personal resources in the job demands-resources model. International Journal of Stress Management, 14(2), 121.

Appendix 1

Principal recommendations of psychosocial support guidelines

Topic	Principal recommendations	Guidelines
Preparation	Every area should have a multi-agency psychosocial support planning group that includes mental health professionals with expertise in traumatic stress who have a designated responsibility for psychosocial support following disasters and major incidents. Individuals affected by disasters or major incidents should also be represented.	TENTS[A]; Suzuki et al., 2012
	Every area should have guidelines on the provision of psychosocial support in emergencies (a psychosocial support plan) that are incorporated into the overall disaster/major incident plan and regularly updated.	TENTS; Suzuki et al., 2012
	All care providers should have undergone formal training and receive on-going training, support, and supervision.	TENTS; Suzuki et al., 2012
	Mental health and community health professionals should have an understanding of the role of and legal rationale for their professional activities as described in related laws and administrative guidelines.	Suzuki et al., 2012
Supportive interventions	The response should promote a sense of safety, self and community efficacy/ empowerment, connectedness, calm and hope. Responses should promote natural recovery and the use of natural resources, provide general support, access to social support, physical support, and psychological support.	TENTS; Suzuki et al., 2012, EUTOPA[B]
	Efforts should be made to identify the correct supportive resources (e.g. family, community, school, friends, etc). A supportive context is offered, consisting of (a) offering a listening ear, support and comfort, and being sensible to victims' immediate practical needs (b) offering practical and up-to-date information about the shocking event (c) mobilising support from the victims' own social environment (d) facilitating reunion with their nearest and dearest and keeping families together (e) reassuring victims who are displaying normal stress reactions	TENTS; Suzuki et al., 2012, EUTOPA
	Information is offered to those affected consisting of a reassuring explanation about normal reactions, explaining when to seek help, advising to resume their everyday routine.	TENTS; Suzuki et al., 2012, EUTOPA

	Provision of specific formal interventions such as single-session individual psychological debriefing for everyone affected should not occur.	TENTS; Suzuki et al., 2012, EUTOPA
For professionals	Peer support is provided.	EUTOPA
	The employer should offer support and guidance when a shocking event takes place at work	EUTOPA
	Staff should work by rotation to ensure there is time for rest, a welfare program and time off for recognition of staff 's hard work should be institutionalized, a space for rest and privacy should be secured for staff at offices or shelters.	Suzuki et al., 2012
Detection	Individuals with psychosocial difficulties should be formally assessed by a trained professional with consideration for their physical, psychological and social needs before receiving any specific intervention.	TENTS; Suzuki et al., 2012, EUTOPA
	Victims who need acute psychological help should be identified, and, if necessary, referred to treatment.	EUTOPA
	Screening for mental health problems should be provided for the assessment of high-risk groups, not for only research purposes.	Suzuki et al., 2012
	Relief workers should engage in psychological triage (identification of victims with psychological disorders and/or serious clinical symptoms that need a diagnosis and/or treatment)	Suzuki et al., 2012
Mental Health Treatment	Treatment with Trauma-Focused Cognitive Behavioural Therapy (TF-CBT) should be available for individuals with acute stress disorder or acute post-traumatic stress disorder (PTSD).	TENTS; Suzuki et al., 2012, EUTOPA
	Other treatments with an evidence base for chronic PTSD should be available for individuals with acute PTSD when trauma-focused CBT is not available or is not tolerated.	TENTS; Suzuki et al., 2012, EUTOPA
	Evidence-based interventions for individuals with other mental health difficulties should be available.	TENTS; Suzuki et al., 2012, EUTOPA

[A] Bisson et al., 2010. [B] Te Brake & Dückers, 2013.

Chapter 2

Perceived support at work after critical incidents, and its relation to psychological distress: a survey among pre-hospital providers

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Abstract

Introduction

Pre-hospital providers are at increased risk for psychological distress. Support at work after critical incidents is believed to be important for providers, but current guidelines are in need of more scientific evidence. This study aimed to investigate: 1) to what extent pre-hospital providers experience support at work; 2) whether support at work is directly associated with lower distress, and 3) whether availability of a formal peer support system is related to lower distress via perceived colleague support.

Methods

This cross-sectional study surveyed pre-hospital providers from 8 western industrialized countries between June and November 2014. A supportive work environment was operationalized as perceived management and colleague support (Job Content Questionnaire), availability of a formal peer support system, and having enough time to recover after critical incidents. The outcome variable was psychological distress (Kessler 10). We conducted multiple linear regression analyses and mediation analysis.

Results

Of the 813 respondents, more than half (56.2%) were at moderate to high risk of psychological distress. Participants did not consistently report support at work (e.g., 39.4% were not aware of formal peer support). Perceived management support (b (unstandardized regression coefficient) = -0.01, 95% CI -0.01 to 0.00), having enough time to recover after critical incidents (b = -0.07, 95% CI -0.09 to -0.04) and perceived colleague support (b = -0.01, 95% CI -0.01 to 0.00) were related to lower distress. Availability of formal peer support was indirectly related to lower distress via increased perceived colleague support (β = -0.04, 95% CI: -0.02 to -0.01).

Conclusions

Pre-hospital providers at risk of psychological distress may benefit from support from colleagues and management and from having time to recover after critical incidents. Formal peer support may assist providers by increasing their sense of support from colleagues. These findings need to be verified in a longitudinal design.

Keywords

• social support • Job Demand Resources Model • job stress • paramedics

Acknowledgment of author contributions:
Research design and data collection: Gouweloos-Trines, J., Tyler, M. P., Giummarra, M. J., Kassam-Adams, N., Landolt, M. A., Kleber, R. J., & Alisic, E.
Data analysis: Gouweloos-Trines, J., & Alisic, E.
Paper writing: Gouweloos-Trines, J., Tyler, M. P., Giummarra, M. J., Kassam-Adams, N., Landolt, M. A., Kleber, R. J., & Alisic, E.

What is already known on this subject

Previous studies showed that paramedics and other pre-hospital providers are at increased risk for psychological distress compared to other first responders (e.g., police officers, firefighters) and the general population. Guidelines for psychosocial care of first responders emphasise the importance of a supportive work environment but are predominantly based on expert consensus and further scientific evidence is required.

What this study adds

This survey of prehospital providers from multiple western countries shows concerning levels of distress within this population, and also suggests the importance of understanding support at work after critical incidents. Formal peer support systems, having time to recover after critical incidents, informal management and colleague support appear to be associated with lower distress.

Introduction

Pre-hospital providers are regularly exposed to emotionally charged situations, such as severely injured or critically ill people, the death of a child, violence, and suicide (Bigham et al., 2014; Van der Ploeg & Kleber, 2003). Most of the time they cope with these challenges effectively; however, a significant proportion are at risk of developing psychological problems, including anxiety, depression, burnout, posttraumatic-stress disorder (PTSD), and sleep difficulties (Bentley, Crawford, Wilkins, Fernandez, & Studnek, 2013; Hegg-Deloye, 2014; Van der Ploeg & Kleber, 2003). Among first responders (e.g., police, firefighters, and ambulance personnel) prevalence of PTSD is the highest in pre-hospital providers, possibly due to more frequent exposure to life-threatening incidents (driving from one incident to another, with only brief moments of rest) and few resilience-based selection criteria for employment (Berger et al., 2012).

Evidence-informed guidelines for psychosocial care for first responders involved in critical incidents emphasize the importance of a supportive work environment (Bennett et al., 2005; Burger, 2012; Creamer et al., 2012; Halpern, Maunder, Schwartz, & Gurevich, 2014). This environment entails a work climate in which first responders feel supported by management and colleagues, formal peer support systems (i.e., a formal organizational structure through which trained colleagues offer support after a critical incident) are available, and workers at risk of psychological problems are identified, monitored and referred to professional care when needed. Receiving time off to recover from stressful incidents at work is another supportive intervention that appears to be beneficial for pre-hospital providers' wellbeing (Halpern et al., 2014). Time to recover following a critical incident can be granted formally by management, or occur informally during the normal workday (e.g., having a break between incidents; Halpern et al., 2014), thereby creating an opportunity to foster social support among colleagues.

Previous research showed that frequent exposure to critical incidents, in combination with organizational stress, is an important risk factor for pre-hospital providers' psychological health (Bennett et al., 2005; Sterud, Hem, Ekeberg, & Lau, 2008; Van der Ploeg & Kleber, 2003). In contrast, perceived support at work, such as getting along with colleagues, may have a positive influence on wellbeing (Bennett et al., 2005; Sterud, Hem, Ekeberg, & Lau, 2008; Van der Ploeg & Kleber, 2003). However, whether pre-hospital providers feel supported in the wake of critical incidents specifically, has not yet been studied. In addition, it remains uncertain whether supportive interventions stressed by the guidelines, such as formal peer support structures, have become widely available to pre-hospital providers (Burger,

2012; Creamer et al., 2012; Smith & Roberts, 2003). Moreover, these guidelines are predominantly based on expert consensus and little is known about the protective influence of these supportive interventions (Bisson et al., 2010). In particular, the mechanisms through which formal peer support systems influence distress needs more attention.

The primary aim of this study was to investigate to what extent pre-hospital providers experience a supportive work environment after critical incidents, and whether such an environment is associated with lower distress. Building on previous research, we expected to find a negative relationship between a supportive work environment and distress. Finally, we examined whether availability of a formal peer support system was related to lower distress via increased perception of support from colleagues. In particular, since formal peer support is given by trained colleagues, we expected that the relationship between availability of formal peer support and distress would be mediated by perceived colleague support (Norris & Kaniasty, 1996).

Methods

Study design and settings

This cross-sectional study surveyed pre-hospital providers from 8 western industrialized countries (Australia, Austria, Canada, Germany, New Zealand, Switzerland, the United Kingdom, and the United States). The study was conducted in the context of a multi-national project on delivering psychosocial care to child patients. As part of this project, we sought to find out more about practitioners' general health and own psychosocial support. The study was approved by the Monash Human Research Ethics Committee (CF14/1167 - 2014000519).

Participants

We recruited participants via ambulance organizations, unions, university departments of emergency care, and other professional associations. We contacted these organizations by email and asked them to distribute the questionnaire to pre-hospital providers. Providers were also encouraged to distribute the questionnaire to colleagues. Respondents were excluded if they were no longer working as a pre-hospital provider or submitted an incomplete response. To reduce any barriers to providing a frank account of distress and organizational support, the study design guaranteed complete anonymity for individuals and organizations. For this reason, we were unable to determine response rates. Providers filled out the questionnaire between the end of June 2014 and the beginning of November 2014. Consent was

inferred from full completion of the questionnaire. Respondents could opt to go into a draw for one of five $20 Amazon gift vouchers.

Measures

Online supplementary Appendix 1 provides a copy of the questionnaire. The questionnaire consisted of a recently developed measure regarding provision of psychosocial care to children (see Alisic et al., 2017 for details), validated measures on distress and perceived support, and some purposely generated items regarding practitioners' own psychosocial support. All items were pilot tested with providers, ambulance management staff, and topic experts. The questionnaire was available in English and accessed through the online platform Survey Monkey (www.surveymonkey.com). The measures relevant to this investigation are described below. Participants also had the opportunity to leave comments in seven open-ended questions about pre-hospital providers' experiences providing psychosocial care for injured children.

Outcome: Psychological distress

Psychological distress was measured with the Kessler 10 (K10; Kessler et al., 2002), which is one of the most widely used short scales to screen for distress (Kessler et al., 2002), identifying symptoms of anxiety and depression. This instrument has strong psychometric properties, good power in discriminating psychological problems from non-cases (Cornelius, Groothoff, Van der Klink, & Brouwer, 2013), and had high internal consistency in this study sample (Cronbach's Alpha = 0.92). The K10 comprises of 10 items rated from 'none of the time' (1) to 'all of the time' (5) for how often the item applied to participants in the previous 30 days. Higher scores represent more psychological distress, from medium risk (scores 16-29) to high risk (scores 30-50).

Predictors: support and demographics

Perceived management support (4 items) and perceived colleague support (4 items) were measured with items based on the Job Content Questionnaire (JCQ; Karasek et al., 1998) subscales `Supervisor Support' (4 items) and `Co-worker Support' (4 items). The JCQ has good psychometric properties, has been used with a variety of professions (Pelfrene et al., 2001), and had high internal consistency in this sample with Cronbach's Alpha = 0.83 (colleague support) and 0.94 (management support). Based on feedback from paramedics when field testing the survey, several items were tailored to the context of critical incidents (online supplementary Appendix 2 shows the original and adjusted items). Sum scores ranged from 4 to 16 with

higher scores representing higher perceived support. The items used a 4-option response format: 'totally disagree' (1) to 'totally agree' (4). Two items were measured dichotomously: 'I have enough time to recover from distressing incidents at work' (response options: 'agree' and 'disagree') and 'Does your ambulance service has trained peer support officers?' (response options: 'yes' and 'no').

Demographic characteristics included gender, age, years of work experience, country or region and having children under the age of 17 years old. We also asked about whether the participant had received professional support after critical incidents, such as external or in-company counselling from a social worker, trained peer-supporter, or psychologist, with the following item: 'Have you received any professional support following a critical incident' (response options: 'yes' and 'no').

Statistical Analysis

Data were exported from Survey Monkey into IBM SPSS (version 22). We performed mean imputation for 15 missing values spread uniformly across the data matrix (0.2% of all values). The total scores on the K10 were slightly positively skewed, as is expected with psychological symptom measures in a general population, and had two extreme outliers (scores of 50 and 48). A logit transformation did not improve normality, but resolved the outliers, and was used for univariate analyses and regression analyses. As log-scores are less intuitive to interpret but correspond to the original values of the K10, we also report the non-transformed mean values.

To assess univariate associations between distress and the other variables in the study, we used bivariate correlations (Pearson), independent sample t-tests, and one-way between-subjects ANOVA (with a post hoc Bonferroni test).

We tested six multiple linear regression models to examine which indicators of a supportive work environment predicted distress, using the following covariates: gender, age, years of experience, country/region, having children under 17 years old, and receipt of professional organizational support. A model with the covariates was followed with models with the covariates and 1 predictor (perceived management support, perceived colleague support, having time to recover or availability of a formal peer support system) and a final model that included the covariates and all of the predictors. The variance inflation factor (VIF) and tolerance statistic did not indicate a problem with multicollinearity.

We tested the hypothesized mediation effect of colleague support with PROCESS: an add-on for SPSS for statistical mediation process analysis (Hayes, 2013).

Mediation refers to a situation when the relationship between a predictor (availability of a peer support system) and an outcome variable (distress) can be explained by their relationship to a third variable, the mediator (perceived colleague support). Mediation is said to have occurred if the strength of the relationship between the predictor and outcome variable is reduced by including the mediator. If mediation could not occur because of the absence of a direct effect between the predictor and outcome variable, we tested for an indirect effect in order to fully explore potentially useful mechanisms (Mathieu & Taylor, 2006). An indirect effect exists when predictor and outcome variable are not related directly, but they are indirectly related through significant relationships with a linking mechanism (i.e., colleague support). To test mediation and indirect effects, PROCESS uses bootstrapping: a technique from which the sampling distribution of a statistic is estimated by taking repeated samples of the data set. It assesses the confidence interval (CI) of the indirect effect and the size of the indirect effect (Hayes, 2013). The confidence interval for the unstandardized indirect effect is a BCa (bias corrected and accelerated) bootstrapped CI based on 10,000 samples. If the confidence interval does not contain zero, a significant indirect effect has occurred. The size of the indirect effect is measured with standardized regression coefficients and kappa-squared (κ^2).

Results

In total, 813 pre-hospital providers participated in this study. Most self-identified as paramedics (77.5%) or emergency medical technicians (18.9%); demographic characteristics are presented in Table 1. About half of the participants (48.7%) were at moderate risk of psychological distress and 7.5% were at high risk. With a possible maximum score of 16, participants experienced more support from colleagues (mean = 12.5, SD = 0.08) than from management (mean = 9.7, SD = 0.12): mean difference = 2.8, 95% CI 2.6 to 3.0. For example: 47.6% disagreed with the statement that their management was supportive of staff after critical incidents, while 18.1% disagreed with the statement that their colleagues were supportive. The majority (59.5%) indicated that they had not had enough time to recover after a critical incident. Most participants (60.6%) were aware of a peer support system in their organization and almost half (46.9%) had used some form of professional support after a critical incident (Table 1).

Table 1. Sample characteristics (n=813)

		N	%	Mean	SD
Male gender		555	68.3		
Having children under 17 years old		368	45.3		
Country or region	Canada	261	32.1		
	United States of America	223	27.4		
	Australia	157	19.3		
	Western Europe[A]	95	11.7		
	New Zealand	77	9.5		
Formal peer support system available		493	60.6		
Received professional support		381	46.9		
Having time to recover		329	40.5		
Age				39.3	10.6[B]
Years of experience				13.9	9.4[C]
Perceived management support				9.7	3.7
Perceived colleague support				12.5	2.2
Psychological distress				18.3	6.7
High risk[D]		61	7.5		
Medium risk[E]		396	48.7		

[A] Austria, Germany, Switzerland, United Kingdom [B] range: 18 to 65 years [C] range: no experience (i.e. just started), to 45 years [D] High risk = scores of 30-50 on the K10 [E] medium risk = scores of 16-29 on the K10

Several participants commented on how stress was viewed within their service. For some, experiencing distress was seen as a normal part of the job, something that you have to deal with: "*When we work with injured children it can be stressful, but that stress is part of the job. You either learn to handle it or find another line of work.*"

Others remarked on the culture of not talking about stress: "*I don't know any paramedic that doesn't find child trauma calls the most stressful, but paramedics have a history of not asking for help to deal with it!*"

Regarding the availability of social support, some strong comments were made: *"I can barely take the mental load anymore. Managers are unsupportive and create a negative atmosphere coupled with being surrounded by disaster. How can I offer support [---] when we can't even take care of ourselves?"*

Direct relations between support and distress

Univariate analyses showed that prehospital providers reported less distress with greater perceived management support (r = -0.42, 95% CI -0.48 to -0.36) and perceived colleague support (r = -0.27, 95% CI -0.34 to -0.20). Those who reported not getting enough time to recover after critical incidents (mean = 1.28, SD = 0.15) reported higher distress than those who reported getting enough time

(mean = 1.16, SD = 0.13): mean difference = 0.12, 95% CI 0.12 to 0.15. These mean scores of distress correspond to non-transformed mean scores of 20.5 and 15.1, respectively. Those who reported that they had received professional support also reported higher levels of distress than those who had not received professional support (mean = 1.25, SD = 0.16 vs. mean = 1.22, SD = 0.16; mean difference = 0.03, 95% CI -0.04 to 0.00), corresponding to non-transformed mean scores of 18.8 and 17.9, respectively. Female participants reported higher levels of distress than male participants (mean = 1.25, SD = 0.15 vs. mean = 1.23, SD = 0.16; mean difference = 0.02, 95% CI -0.05 to 0.00), corresponding to non-transformed mean scores of 18.9 and 18.0, respectively. The results of the one-way ANOVA suggest a statistically significant difference in distress between countries and regions ($p <$ .001). A post hoc Bonferroni test indicated that distress was higher in Australia than in the United States of America (mean difference = 0.08, $p <$ .001, 95% CI 0.02 to 0.10), Western Europe (mean difference = 0.11, $p <$ .001, 95% CI 0.04 to 0.15) and New Zealand (mean difference = 0.07, p = .022, 95% CI 0.01 to 0.13). Distress was also higher in Canada compared to the United States of America (mean difference = 0.06, $p <$ .001, 95% CI 0.02 to 0.10) and Western Europe (mean difference = 0.09, $p <$ .001, 95% CI 0.03 to 0.14). Mean scores (including non-transformed values) are presented in Table 2. Formal peer support, having children, age, and years of experience were not associated with distress.

Table 2. Mean scores of psychological distress per country/region

Country/region	N	Mean	SD	Mean (non-transformed)	Number at moderate and high risk of distress	Percentage at moderate and high risk of distress
Australia	157	1.28	.15	20.2	104	66.2
Canada	261	1.26	.15	19.4	171	65.5
New Zealand	77	1.21	.14	17.3	40	52.0
United States of America	223	1.20	.16	17.0	106	47.5
Western Europe	95	1.17	.15	16.1	36	37.9

The results of the regression analyses are detailed in Table 3. Model 1 included only the covariates (e.g., country/region) and explained 6.5% of the individual differences in distress. Models 2A-2D included all covariates and each of the predictors of a supportive work environment added one at a time. Perceived support from colleagues and management and having time to recover after distressing incidents most strongly contributed to lower levels of distress.
Model 3 included all covariates and all predictors, and accounted for approximately one-quarter of the individual differences in distress.

Table 3. Distress predicted by indicators of a supportive work environment and covariates

		Model 1	**Model 2a**	**Model 2b**	**Model 2c**	**Model 2d**	**Model 3**
Variable		b[A] (95% CI)	b (95% CI)	b (95% CI)	b (95% CI)	b (95% CI)	b (95% CI)
Constant		1.22 (1.17, 1.28)	1.22 (1.17, 1.28)	1.48 (1.47, 1.56)	1.42 (1.36, 1.48)	1.29 (1.24, 1.48)	1.47 (1.40, 1.55)
Gender	Female	.02 (-.01, .04)	.02 (-.01, .04)[B]	.02 (.00, .04)	.03 (.01, .05) [B]	.02 (-.01, .04)	.02 (.00, .04)
Having children under 17 years old	Yes	.02 (-.01, .04)	.02 (.00, .04)	.02 (-.01, .04)	.01 (-.01, .03)	.01 (-.01, .03)	.01 (-.02, .02)
Country/region	United States	reference	reference	reference	reference	reference	Reference
	Canada	.06 (.03, .09)[D]	.07 (.04, .10)[D]	.06 (.03, .08)[D]	.03 (.00, .04)	.03 (.00, .06)[B]	.03 (.00, 05)
	Australia	.07 (.04, .12)[D]	.10 (.06, .13)[D]	.08 (.05, .11)[D]	.01 (-.03, .04)	.02 (-.01, .05)	.02 (-.02, .05)
	New Zealand	.01 (-.03, .06)	.04 (.00, .08)	.01 (-.03, .05)	-.01 (-.05, .02)	-.01 (-.04, .03)	-.01 (-.05, .03)
	Western Europe	-.02 (-.06, .01)	.00 (-.04, .04)	-.02 (-.05, .02)	-.03 (-.06, .01)	-.02, (-.06, .02)	-.01 (-.05, .02)
Age		.00 (-.01, .00)	.00 (.00, .00)	.00 (.00, .00)	.00 (.00, .00)	.00 (.00, .00)	.00 (.00, .00)
Years of experience		.00 (.00, .00)	.00 (.00, .00)	.00 (.00, .00)	.00 (-.01, .03)	.00 (.00, .00)	.00 (.00, .00)
Received professional support		.01 (-.01, .03)	.02 (.00, .04)	.02 (.00, .04)	.03 (.01, .05)[B]	.02 (.00, .04)	.03 (.01, .05)[C]
Peer support system available			-.04 (-.06, -.01)[C]				-.01 (-.03, 01)
Perceived colleague support				-.02 (-.03, -.02)[D]			-.01 (-.01, .00)[D]
Perceived management support					-.02 (-.02, -.02)[D]		-.01 (-.01, .00)[c]
Having time to recover						-.12 (-.14, -.10) [D]	-.07 (-.09, -.04)[D]
R^2 %[E]		6.5	7.4	14.3	20.6	18.7	24.5

[A] b values represent unstandardized regression coefficients. They give an indication of the strength of a relationship between a given predictor and the outcome, by representing the change in the outcome associated with a unit change in the predictor [B] $p < .05$ [C] $p < .01$ [D] $p < .001$ [E] R^2 is the proportion of the individual differences in distress that is explained by the variables in the model.

Indirect relation between availability of formal peer support and distress

Availability of formal peer support was not directly related to distress (Table 3, model 3). There was a significant indirect effect (in the absence of a direct effect (Mathieu & Taylor, 2006) of availability of peer support systems on distress through perceived colleague support, although the size of the effect was small (Figure 1).

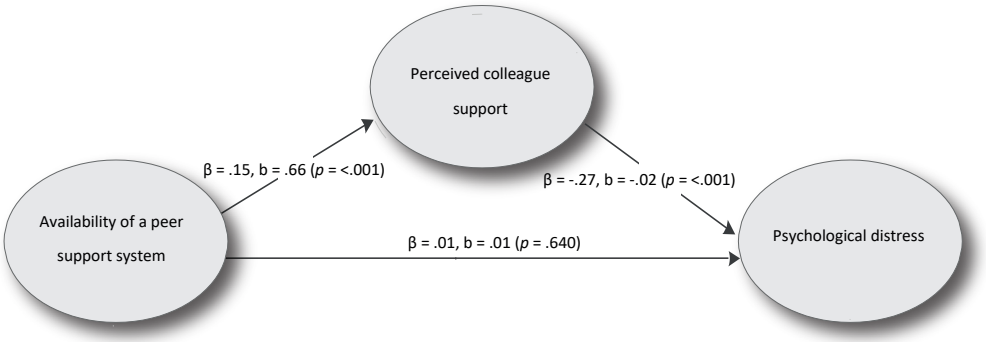

Figure 1. Strength of the relationships between availability of formal peer support, psychological distress and perceived colleague support represented by standardized (β) and unstandardized (b) regression coefficients and p-values. The direct effect between availability of a peer support system and psychological distress, while controlling for perceived colleague support, is presented (indirect effect β = -0.04, 95% BCa CI -0.06 to -0.02). The size of the effect was small (κ^2 = 0.04, 95% BCa CI 0.02 to 0.06). The total, direct effect between availability of a peer support system and psychological distress (without controlling for perceived colleague support) is also non-significant: β = -0.02, b = -0.01, p = .502.

Discussion

This study focused on the association between perceptions of support and distress in pre-hospital providers in the context of critical incidents. We found that perceiving a lack of support from management and colleagues, and not having enough time to recover after critical incidents, were associated with higher distress. Given that more than half of providers were at moderate to high risk of psychological distress, compared to 31% in the general population (Dal Grande, Taylor, & Wilson, 2002), studying support at work remains very important.

While most respondents reported that their organization had a formal peer support system for critical incidents, many pre-hospital providers also indicated that formal peer support systems were not available, and perceived that they had

insufficient recovery time after critical incidents. This finding suggests that not every organization offers the kind of support that pre-hospital providers may need. Alternatively, it may be that the staff surveyed were not aware of supports that may be available to them. In the pre-hospital setting, disclosure of mental health impacts from work and seeking support is often viewed as a sign of weakness (Britt & McFadden, 2012), which was also described by our participants, and may be another explanation of these findings. Nevertheless, in the present study, almost half of the pre-hospital providers had used some form of professional support after a critical incident, such as formal peer support, company counsellor or psychologist. In particular, pre-hospital providers with higher levels of psychological distress were more likely to report having sought professional support, suggesting that only those with higher distress seek out professional support. It may also reflect selection bias such that those who participated may have been more likely to find support an important process, or were less concerned about potential stigma from seeking support, compared to the overall population of pre-hospital providers.

Given the cross-sectional nature of this study, it is likely that perceiving a lack of support from management and colleagues, and not having enough time to recover after critical incidents, are bi-directionally associated with distress and no assumptions about the direction of causality can be made. These findings are, however, in line with guidelines that suggest that support from the organization after critical incidents, and promoting well-being, may help prevent the development of persistent psychological distress (Burger, 2012; Creamer et al., 2012; Smith & Roberts, 2003). Granting staff leave after critical incidents is a simple intervention that improves pre-hospital providers' wellbeing (Halpern et al., 2014). However, experiencing insufficient recovery time may occur in settings that have a high workload, which in itself increases the risk of burnout, absenteeism and high turnover (Schaufeli & Bakker, 2004). In that case, spreading the workload may be the first priority of organizations to prevent distress.

The present findings, together with previous research in clinical and trauma settings, aligns with the social support deterioration deterrence model, such that perceived support (e.g., feeling supported by others) mediates the relationship between actual supportive interventions and distress (Norris & Kaniasty, 1996). In line with this model, the present study showed that availability of formal peer support systems was associated with pre-hospital providers' perceptions of informal colleague support, which in turn was associated with lower distress. This indirect association shows that formal peer support mechanisms may be effective because they help create an environment in which pre-hospital providers feel more generally supported by colleagues after critical incidents. However, since the effect size of

the indirect effect was small, more research is needed to understand the various pathways through which peer support impacts on mental health in this profession. For example, prior studies have found that formal peer support was associated with increased feelings of resilience (Shakespeare-Finch, Wehr, Kaiplinger, & Daley, 2014), and with more positive attitudes towards emotional expression of thoughts and feelings, which have been found to be associated with decreased PTSD symptomatology (Lowery & Stokes, 2005).

Strengths and limitations

This study took a novel, broad approach to examine the prevalence of distress in pre-hospital providers, and the role of perceived work support in psychological wellbeing. Our focus on multiple western industrialized countries and organizations offers insights into wellbeing beyond the limits of individual work environments, which have specific organizational and political structures and pressures that also influence worker wellbeing. This study, however, has some limitations. It had a cross-sectional design, and therefore conclusions about causality cannot be drawn. The sample consisted primarily of western industrialized countries from Europe, the United States and Australia-New Zealand, and English speakers, which limits the generalizability of the findings to other countries. There could have been selection bias in regards to participation, with those more interested in psychosocial care for injured children, or within their profession, being more likely to participate. Finally, we focused on mental health difficulties and did not measure resilience and growth, which may also play an important role in wellbeing in pre-hospital providers (Shakespeare-Finch et al., 2014). Future studies would benefit from a longitudinal design and may also use in-depth qualitative methods to explore which aspects of formal peer support and time off between jobs are vital for pre-hospital providers' wellbeing.

Conclusions

From a survey of just over 800 pre-hospital providers, from 8 different countries, we found moderate to high levels of psychological distress. Regardless of national differences in work conditions, perceiving a supportive work environment after critical incidents (i.e., feeling supported by management and colleagues and having enough time to recover after critical incidents) was found to be related to pre-hospital providers' wellbeing. Moreover, the small indirect effect suggests that availability of formal peer support systems may benefit pre-hospital providers' wellbeing by helping them feel generally more supported by their colleagues.

While these findings should be verified in a longitudinal design, we highlight the importance of ambulance organizations' investment in supportive work culture and programs. It would be valuable to further examine the factors that contribute to a supportive work environment following critical incidents in order to generate more evidence-based strategies to support pre-hospital providers.

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References

Alisic, E., Tyler, M. P., Giummarra, M. J., Kassam-Adams, R., Gouweloos, J., Landolt, M. A., & Kassam-Adams, N. (2017). Trauma-informed care for children in the ambulance: international survey among pre-hospital providers. *European Journal of Psychotraumatology*, *8*(1), 1273587.

Bennett, P., Williams, Y., Page, N., Hood, K., Woollard, M., & Vetter, N. (2005). Associations between organizational and incident factors and emotional distress in emergency ambulance personnel. *British Journal of Clinical Psychology*, *44*(2), 215-226.

Bentley, M. A., Crawford, J. M., Wilkins, J. R., Fernandez, A. R., & Studnek, J. R. (2013). An assessment of depression, anxiety, and stress among nationally certified EMS professionals. *Prehospital Emergency Care*, *17*(3), 330-338.

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.

Bigham, B. L., Jensen, J. L., Tavares, W., Drennan, I. R., Saleem, H., Dainty, K. N., & Munro, G. (2014). Paramedic self-reported exposure to violence in the emergency medical services (EMS) workplace: a mixed-methods cross-sectional survey. *Prehospital Emergency Care*, *18*(4), 489-494.

Bisson, J. I., Tavakoly, B., Witteveen, A. B., Ajdukovic, D., Jehel, L., Johansen, V. J., ... & Sezgin, A. U. (2010). TENTS guidelines: development of post-disaster psychosocial care guidelines through a Delphi process. *The British Journal of Psychiatry*, *196*(1), 69-74.

Britt, T. W., & McFadden, A. C. (2012). Understanding Mental Health Treatment-Seeking in High Stress Occupations. *Contemporary Occupational Health Psychology: Global Perspectives on Research and Practice, Volume 2*, 57-73.

Burger, N. (2012). *Guidelines psychosocial support for uniformed workers. Extensive summary and recommendations.* Diemen: Impact.

Cornelius, B. L., Groothoff, J. W., van der Klink, J. J., & Brouwer, S. (2013). The performance of the K10, K6 and GHQ-12 to screen for present state DSM-IV disorders among disability claimants. *BMC Public Health*, *13*(1), 128.

Creamer, M. C., Varker, T., Bisson, J., Darte, K., Greenberg, N., Lau, W., ... & Watson, P. (2012). Guidelines for peer support in high-risk organizations: An international consensus study using the delphi method. *Journal of traumatic stress*, *25*(2), 134-141.

Dal Grande, E., Taylor, A., & Wilson, D (2002). *South Australian Health and Wellbeing Survey.* Adelaide: South Australian Department of Human Services.

Halpern, J., Maunder, R. G., Schwartz, B., & Gurevich, M. (2014). Downtime after critical incidents in emergency medical technicians/paramedics. *BioMed Research International*, *2014*.

Hayes, A.F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* New York: Guilford Press.

Hegg-Deloye, S., Brassard, P., Jauvin, N., Prairie, J., Larouche, D., Poirier, P., ... & Corbeil, P. (2014). Current state of knowledge of post-traumatic stress, sleeping problems, obesity and cardiovascular disease in paramedics. *Emergency Medicine Journal*, *31*(3), 242-247.

Karasek, R., 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.

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L., ... & Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, *32*(6), 959-976.

Lowery, K., & Stokes, M. A. (2005). Role of peer support and emotional expression on posttraumatic stress disorder in student paramedics. *Journal of Traumatic Stress*, *18*(2), 171-179.

Mathieu, J. E., & Taylor, S. R. (2006). Clarifying conditions and decision points for mediational type inferences in organizational behavior. *Journal of Organizational Behavior*, *27*(8), 1031-1056.

Norris, F. H., & Kaniasty, K. (1996). Received and perceived social support in times of stress: A test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology*, *71*(3), 498.

Pelfrene, E., Vlerick, P., Mak, R. P., De Smet, P., Kornitzer, M., & De Backer, G. (2001). Scale reliability and validity of the Karasek'Job Demand-Control-Support'model in the Belstress study. *Work & Stress*, *15*(4), 297-313.

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior*, *25*(3), 293-315.

Shakespeare-Finch, J. E., Wehr, T., Kaiplinger, I., & Daley, E. (2014). Caring for emergency service personnel: Does what we do work?. In *2014 Australian and New Zealand Disaster and Emergency Management Conference: Book of Proceedings-Peer Reviewed* (pp. 1-20). Association for Sustainability in Business Inc.

Smith, A., & Roberts, K. (2003). Interventions for post-traumatic stress disorder and psychological distress in emergency ambulance personnel: a review of the literature. *Emergency Medicine Journal*, *20*(1), 75-78.

Sterud, T., Hem, E., Ekeberg, Ø., & Lau, B. (2008). Occupational stressors and its organizational and individual correlates: a nationwide study of Norwegian ambulance personnel. *BMC Emergency Medicine*, *8*(1), 16.

Van der Ploeg, E., & Kleber, R. J. (2003). Acute and chronic job stressors among ambulance personnel: predictors of health symptoms. *Occupational and Environmental Medicine*, *60*(suppl 1), i40-i46.

Chapter 3

Wellbeing of police officers investigating sexual assault and child pornography: job demands, job resources, and personal resources

Submitted as:
Gouweloos-Trines, J., Te Brake, H., Van der Aa, N., Smit, A., Boelen, P.A., & Kleber, R. J (2018). Wellbeing of police officers investigating sexual assault and child pornography: job demands, job resources, and personal resources.

Abstract

Police officers investigating sexual abuse and child pornography are repeatedly exposed to the intense suffering of others. This study examined the influence of this exposure on the wellbeing of police officers when organisational job demands, job resources, and personal resources are taken into account.

A questionnaire was constructed tailored to the work experience of investigators. Exploratory Factor Analyses revealed various subscales of job demands, job resources, and personal resources. Wellbeing was operationalised as (low) cynicism and exhaustion, overly protective behaviour, a negative worldview, sexual problems, and (high) work engagement. A path model was tested in which the demands and resources were directly related to wellbeing.

This study showed that organisational demands related to all indicators of reduced wellbeing. Confrontation with (child) sexual abuse was related to a negative worldview and sexual problems. Important resources were the content of work (i.e., working with victims) and autonomy, opportunities for professional development, being able to keep a distance from the work and a stable home environment. In conclusion, investigators' wellbeing seemed best supported by creating a work environment which enables them to focus on solving cases of sexual assault and in which negative organisational aspects such as high work pressure are minimised.

Keywords

• police • child pornography • sexual abuse • JD-R Model • burnout • work engagement

Acknowledgment of author contributions:

Research design: Gouweloos-Trines, J., Te Brake, H., Van der Aa, N., Boelen, P.A., & Kleber, R. J

Data collection: Gouweloos-Trines, J., & Te Brake, H.

Data analysis: Gouweloos-Trines, J., Te Brake, H., & Van der Aa, N.

Paper writing: Gouweloos-Trines, J., Te Brake, H., Van der Aa, N., Smit, A., Boelen, P.A., & Kleber, R. J.

Introduction

Police officers investigating sexual assault and child pornography (hereafter referred to as 'investigators') are confronted, often on a daily basis, with graphic stories, images, and videos of -sometimes very young- children and adults being sexually exploited. Although such confrontation would be upsetting to most people, investigators themselves report high levels of life satisfaction and job motivation (Powell & Tomyn, 2011). Nevertheless, a minority of professionals frequently exposed to the suffering of others (e.g., paramedics, therapists, police officers, nurses) experience symptoms of exhaustion and cynicism, reflected in burnout, compassion fatigue or posttraumatic stress disorder (PTSD; Adriaenssens, De Gucht, & Maes, 2015; Bourke & Craun, 2013; Perez, Jones, Englert, & Sachau, 2010; Sodeke-Gregson, Holttum & Billings, 2015; Van der Ploeg & Kleber, 2003). Other adverse health outcomes, specific for investigators, are also reported, such as a negative worldview, diminished sexual desire, and becoming overly protective towards own children (i.e., becoming far more restrictive and constantly on guard; Burns, Morley, Bradshaw, & Domene, 2008; Sollie, Kop, & Euwema, 2014).

Various models are developed to understand the relationship between stress and strain at work (e.g., Karasek, 1979; Siegrist, 1996). The Job Demands-Resources model (JD-R model) distinguishes itself from other models by its applicability in many possible working conditions (Bakker & Demerouti, 2007). This is essential, as resources valued in one context might not be beneficial in another setting (Hobfoll, 2002). Also, the model explicitly focusses on both positive (job resources) and negative (job demands) indicators of employee wellbeing. Job demands are aspects of the job that require sustained physical and/or mental effort and are associated with physiological and/or psychological costs. Examples are dealing with victims of sexual assault and time pressure. Job resources, on the other hand, are functional in achieving work goals, reducing the associated costs of job demands, and/or stimulating personal growth, e.g., career opportunities and support from colleagues. Job demands lead to energy depletion and are the main predictors of health problems such as burnout symptoms, while job resources are the most important predictors of work engagement (see Bakker & Demerouti, 2007). Additionally, the model distinguishes personal resources as the aspects of the self that are linked to resilience and the ability to adapt successfully to life challenges (Hobfoll, 2002).

Knowledge about work characteristics influencing employee wellbeing is essential for organisations to inform health policies. Most studies on the wellbeing of investigators predominantly focused on the negative impact of exposure to sexual assault on mental health, often ignoring resources that positively affect wellbeing

and health outcomes (Bourke & Craun, 2013; Perez et al., 2010; Sollie, 2017). The JD-R model presupposes that such a negative, or risk-oriented, approach does not fully grasp the understanding of what keeps investigators healthy. For example, viewing images of sexual assault is not only a potential stressor but could also be regarded as a strong motivational factor helping investigators contribute to society by protecting children from further harm (Sollie et al., 2014).

In addition to a predominant focus on negative aspects, research also indicated that daily organisational stressors (e.g., reorganisations, high case-loads, shift work) should not be discarded as a major burden (Liberman et al., 2002). In their qualitative study, Powell and colleagues (2014) found that although investigators experience distress from the confrontation with child abuse, the organisational difficulties such as lacking technology and high workload also take a toll.

The present study examined the influence of exposure to images or stories of (child) sexual assault on wellbeing, taking into account organisational job demands, job resources and personal resources. Based on previous research among professionals working with trauma victims, we expected (higher) wellbeing to be manifested in (lower) cynicism, exhaustion, overly protective behaviour towards family members, a negative worldview, sexual problems, and (higher) work engagement (Bourke & Craun, 2013; Burns et al., 2008; Perez et al., 2010). Given the unique work of investigators, part of this study was the construction of a tailor-made questionnaire. In line with the JD-R model and based on previous research among professionals working with trauma victims, we expected that both operational (i.e., exposure to sexual assault and child pornography) and high organisational job demands were negatively related to wellbeing. We also expected that both high job resources and high personal resources were positively related to wellbeing (as depicted in Figure 1).

Materials and methods

This cross-sectional study surveyed Dutch police officers investigating sexual assault and child pornography. The research was approved by the Ethics Committee of the University Medical Centre Utrecht (14-158/C – WAG/om/14/010416).

Participants

In the Netherlands, 765 police officers working in 11 teams are specialised in investigating sexual assault, of which 151 investigators are mainly concerned with investigating child pornography. Supervisors across the country distributed the survey to their team members. Data collection took place in May 2014. To

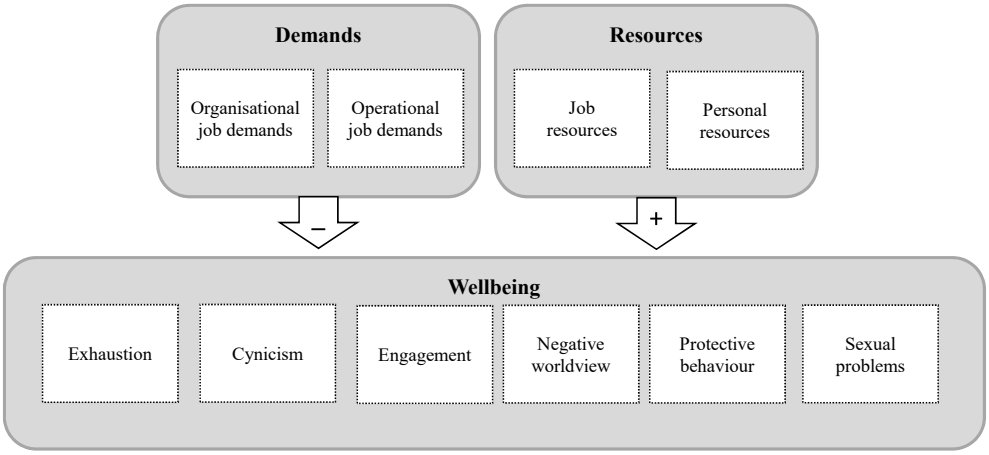

Figure 1. Hypothesised model: organisational and operational demands are expected to influence wellbeing negatively while job resources and personal resources are expected to influence wellbeing positively.

guarantee confidentiality, the survey was anonymous and made available through an independent website. Respondents were included when they were currently working as an investigator. Consent for participating in this research study was inferred by the completion of the questionnaire. In total, 480 investigators participated in this study (response rate: 62.7%), of whom 371 were specialised in investigating sexual assault and 109 in investigating child pornography. Participants were mostly female (57.5%), married/in a domestic partnership (89.6%) and had children (80.6%). On average, they worked 7.9 years (*SD* = 6.2) as an investigator.

Measures

To assess the specific work characteristics of investigators, the survey consisted on the one hand of self-constructed measures gauging job demands, job resources, personal resources and job-specific indicators of wellbeing and, on the other hand, of validated instruments measuring exhaustion, cynicism and work engagement. Development of the survey involved literature review; a qualitative interview study with 70 investigators spread over all 11 teams; drafting the questionnaire items; review of the draft questions by 11 experts in policing, resilience, and mental health; and piloting with five police investigators (see Gouweloos, Lesger, & Te Brake [2014] for details). Supplementary Appendix A includes the survey.
Questions about *job demands* included nine items relating to organisational job

demands ("To what extent did you feel distressed because of high work pressure, poor facilities, etc.?") and two items relating to operational job demands, of which one item was filled in only by officers investigating sexual assault ("To what extent did you feel distressed because of dealing with victims of sexual assault?") and one item was filled in only by officers investigating child pornography ("To what extent did you feel distressed because of confrontation with sound- or video material?"). *Job resources* were measured with nine items relating to work aspects that give investigators energy ("To what extent did you get energy from results from work, team cohesion, etc.?"). *Personal resources* were measured with eight items relating to individual characteristics or conditions that support investigators with their performance at work ("To perform well at work, it is important to keep an emotional distance from work, getting support from family and friends, etc."). *Wellbeing* was measured with three items based on the qualitative study that inquired about overly protective behaviour towards one's own children ("To what extent did you suffer from overly protective behaviour towards family/children?"), a negative worldview ("To what extent did you suffer from a negative worldview?") and sexual problems ("To what extent did you suffer from sexual problems (for example diminished sexual desire)?"). All self-constructed items used a five-point Likert scale (not at all – to a very great extent) and inquired about the past 6 to 8 weeks.

In addition to the self-constructed items, lack of wellbeing was operationalised as exhaustion (five items) and cynicism (four items) measured with the Dutch version (Schutte, Toppinnen, Kalimo, & Schaufeli, 2000) of the Maslach Burnout Inventory–General Survey (MBI-GS; Schaufeli et al., 1996). In this sample, the internal consistency of these scales was good (Cronbach's alphas were .90 and .85 respectively). Work engagement was measured with a shortened version of the Utrecht Work Engagement Scale consisting of three items measuring vigour, absorption and dedication (Schaufeli, Bakker, & Salanova, 2006). This short version showed good reliability on a variety of work settings (alpha's well above .70; Wilmar Schaufeli, personal communication, June 2, 2014). In this sample, the internal consistency of the scale was adequate (Cronbach's Alpha was .73). For both the MBI-GS and UWES, items were scored on a seven-point frequency rating scale ranging from 0 ('never') to 6 ('always'). Scale scores of exhaustion, cynicism and engagement (sum scores divided by the number of items in the scale) could range from 0 (asymptomatic) to 6.

Statistical Analyses

Statistical analyses were conducted using MPlus version 7.3 (Muthén & Muthén, 1998-2012). Three exploratory factors analyses (EFA) were conducted on the total sample (N = 480) to establish the factor structure of the self-constructed items on organisational job demands, job resources, and personal resources. Due to low and zero response frequencies, the two highest response categories of the items regarding organisational job demands and the two lowest response categories of the items regarding job resources and personal resources were merged into one category. Also, the items on job demands were reverse-scored in such a way that, in the analyses, a higher score reflects less distressing job demands. Because the items were categorical and skewed, the data were treated as ordinal and the EFAs were estimated with the weighted least squares means and variance adjusted (WLSMV) estimator. An underlying normal distribution was assumed for each item, where the three response categories were divided by two thresholds which were estimated from the data. For each EFA, several models with different factor solutions were examined. Kaiser criterion (i.e., eigenvalues of the factors >1.0) and model fit statistics CFI, TLI, and RMSEA were used to assess the number of latent factors needed to adequately account for the correlation among items. For CFI and TLI model fit is good when values are close to .95 (Hu & Bentler, 1999). RMSEA is considered adequate when the value is <.08 and good when it is <.06 (Hu & Bentler, 1999). The model with the best balance between model fit, parsimony, and interpretability was selected as the best factor model. We saved the continuous factor scores of the best factor solutions of each model, which were used as scores on the variables organisational job demands, job resources and personal resources in subsequent analyses.

Next, a path model was tested in which all continuous and categorical dependent variables were regressed on the continuous and categorical independent variables (see Figure 2), using the WLSMV estimator. The responses on overly protective behaviour, a negative worldview and sexual problems were not evenly distributed between categories, and therefore merged into three categories ('not at all', 'a little' and 'to some extent - a very great extent'). As the items on operational job demands were skewed (Appendix A) and categorical independent variables with more than two categories cannot be incorporated into a regression model, both variables with regard to operational job demands were dichotomised (the response category 'not at all' encompassed the first category and all other response categories encompassed the second category).

To be able to use the total sample for the estimation of the regression parameters and simultaneously incorporate the group-specific variables representing

operational job demands into the model, multigroup analysis was used in which the sexual assault investigators constituted the first group and child pornography investigators the second. Both group-specific variables on operational job demands were merged into one single variable representing operational job demands. For the group of sexual assault investigators this variable encompassed the scores on the item regarding the demands of working on cases of sexual assault and for the group of child pornography investigators this variable encompassed the scores on the item regarding the demands of working on cases of child pornography. In the multigroup path model, all parameter coefficients were constrained to be equal across both groups, except the regression coefficients regarding the regression of the dependent variables on the operational job demand variable and the variances of the dependent variables, which were freely estimated across both groups.

Because EFA yielded factor models with multiple correlated factors as the best fitting factor solutions and factor scores of each of the extracted factors were used as independent variables in the path model, problems regarding multicollinearity may easily appear. To check for possible multicollinearity problems, the Variation Inflation Factor (VIF) was calculated for each of the independent variables in the path model. A VIF value larger than 2 was considered as an indication for problematic multicollinearity (Vatcheva, Lee, McCormick, & Rahbar, 2016). In this case, one or more variables involved in the multicollinearity was removed from the model.

Results

Exploratory Factor Analysis

Job demands

Models with one and three factors indicated good model fit (Table 1). Eigenvalues of the three factors were larger than 0.904 whereas the eigenvalues of the other six factors ranged between 0.302 and 0.824. Although the three-factor solution came out as the best solution (it had better model fit statistics and was able to distinguish between various clusters of organisational demands), we selected the one-factor solution, as subsequent path analysis revealed that the factor scores of the three-factor model yielded problematic multicollinearity (i.e., the underlying constructs resembled each other too much). The items that clustered around this factor reflect general organisational demands, ranging from high work pressure to poor work facilities.

Job resources

A three-factor solution showed a good fit for the scale (Table 2). Eigenvalues of the three factors were larger than 0.994, while the eigenvalues of the fourth to ninth factor ranged between 0.294 and 0.735. The items that clustered on the same factor suggested that the first factor (items 10, 12, and 13) reflects a supportive team, the second factor (items 11, 14, 15, and 16) work content and autonomy, and the third factor (items 17 and 18) opportunities for professional development and recognition.

Personal resources

A three-factor model indicated good model fit. However, low factor loadings (ranging from - .02 to .29) were observed for item 19 ('I get energy from finding distraction through leisure activities such as sports, friends, music'). Because participants also viewed this item as suggestive (i.e., suggesting that leisure activities are required to feel good), EFA was repeated without this item. The three-factor solution still fitted the data best (Table 3). Eigenvalues of the first three factors where above 0.957 whereas eigenvalues of the fourth to the seventh factor ranged between 0.343 and 0.602. The items that cluster on the same factor suggested that the first factor (items 21 and 22) reflects a stable home environment, the second factor (items 20, 23 and 26) reflects being able to switch easily and keep a distance to work, and the third factor (items 24 and 25) reflects personal characteristics of being social and empathetic in the job setting.

Table 1. Unstandardised Geomin rotated factor loadings and eigenvalues of the1-factor model and 3-factor model of job demands as estimated by EFA

	1-factor model	3-factor model		
	F1	F1	F2	F3
1. work pressure	**.46**	.10	.00	**.55**
2. poor work facilities	**.49**	-.02	**.39**	.28
3. difficulties with colleagues	**.56**	.25	**.38**	.01
4. policies and procedures	**.52**	**.41**	.15	.02
5. difficult relationships with other departments within your own agency	**.78**	**.89**	-.10	.00
6. difficult relationships with external partners (legal. correctional and mental health systems)	**.79**	**.83**	.02	-.04
7. difficult relationship with supervisor	**.57**	.01	**.86**	.12
8. unit/agency reorganisation and/or restructuring	**.55**	.18	**.30**	.22
9. difficulty maintaining a home and work balance	**.41**	.10	.00	**.46**
Eigenvalue	3.576	3.576	1.010	0.904

Note. Factor loadings belonging to a certain factor appear in bold. Model fit 1-factor model: CFI = .944, TLI = .925, RMSEA = .086. Model fit 3-factor model: CFI = .982, TLI = .947, RMSEA = .072.

Table 2. Unstandardised Geomin rotated factor loadings and eigenvalues of the 3-factor model of job resources as estimated by EFA

	F1	F2	F3
10. Support of colleagues	**.67**	.08	-.02
11. Positive results of work	.31	**.43**	.01
12. Humour among colleagues	**.81**	.01	-.14
13. Team cohesion	.83	-.07	.05
14. Challenging area of work	-.00	**.57**	.41
15. Autonomy	.00	**.48**	.21
16. Contact with victims and offenders	.11	**.37**	-.09
17. Opportunities for personal development	.01	.02	**.87**
18. ecognition and appreciation from supervisors. the police organisation. external parties or victims	.21	-.00	**.54**
Eigenvalue	3.664	1.328	0.994

Note. Factor loadings belonging to a certain factor appear in bold. Model fit 1-factor model: CFA = .985, TLI = .956, RMSEA = .066

Table 3. Unstandardised Geomin rotated factor loadings and eigenvalues of the 3-factor model of job demands as estimated by EFA

	F1	F2	F3
20. Keep an emotional distance from work	.19	**.53**	-.06
21. Get support from partner, family or friends	**.79**	-.00	.09
22. Have a stable home environment	**.54**	.31	-.00
23. Be able to switch easily between tasks	.12	**.86**	.02
24. Be social	.13	-.00	**.90**
25. Be empathetic towards victims/ offenders	.00	.05	**.51**
26. Be flexible at work	-.02	**.51**	.29
Eigenvalue	3.001	1.150	0.957

Note. Factor loadings belonging to a certain factor appear in bold. Model fit 1-factor model: CFI=1.000, TLI=1.004, RMSEA=0.000

Univariate analyses

Table 4 presents the bivariate correlations between the independent and dependent continuous variables of this study. Organisational job demands were significantly correlated with reduced engagement and increased cynicism and exhaustion, while personal resources and job resources were significantly negatively correlated with exhaustion and cynicism and positively correlated to engagement. Regarding the operational job demands, perceiving no difficulty with dealing with child exploitation material related negatively to exhaustion (p = .02) and cynicism (p

< .001) and positively to engagement (p = .02). In the same way, perceiving no difficulty with dealing with victims of sexual assault was negatively related to exhaustion (p < .001) and cynicism (p < .001) and positively to engagement (p = .007).

Table 4. Pearson's bivariate correlations between independent and dependent continuous variables

	Exhaustion	Cynicism	Engagement
Organisational demands[A]	-.44	-.39	.24
Job resources 1	-.26	-.30	.41
Job resources 2	-.33	-.50	.56
Job resources 3	-.29	-.41	.39
Personal resources 1	-.16	-.19	.22
Personal resources 2	-.32	-.23	.34
Personal resources 3	-.12	-.14	.23

All correlations were significant at $p \leq .01$; [A] Note that the items on organisational job demands were reverse-scored: a higher score reflects less distressing job demands

Path model

The first path model regressed the dependent variables on the three-factor scores of organisational demands, the items on operational demands, and factor scores on job resources and personal resources (Appendix B presents the regression coefficients of the path model). Inspection of the regression coefficients and comparing them to the results of the univariate associations revealed possible problems regarding multicollinearity (e.g., directions of some relationships were opposite to directions found in univariate analyses). The VIFs revealed that all organisational demand variables and two variables of job resources ('supportive team' and 'work content and autonomy') were above the cut-off of 2 (Appendix C presents the VIF for each independent variable). Because VIF indicated that the factors of the organisational job demands showed a large degree of resemblance, the factor scores of the one-factor model of organisational job demands were used as an indicator of organisational job demands. In addition, one of the job resources factors with a VIF > 2 (i.e., 'supportive team') was removed from the model. The resulting path model (Figure 2) showed good model fit (CFI = .976, TLI = .956, RMSEA = .035) and no problematic multicollinearity (as indicated by the VIFs in Appendix C). We checked its robustness by comparing the model with three separate models for job demands, job resources and personal resources and, as expected, found only minor differences in magnitudes of the regression coefficients, indicating that regression coefficients of the resulting path model are stable.

Table 5 shows that higher levels of perceived organisational job demands were significantly related to reduced wellbeing (i.e., increased exhaustion, cynicism, overly protective behaviour, negative worldview, sexual problems and reduced work engagement). A higher score on operational job demands was significantly related to an increased negative worldview for investigators of child pornography and an increased level of sexual problems for investigators of sexual assault. The job resource 'content of work and autonomy' was significantly associated with lower levels of exhaustion and cynicism and higher levels of engagement. It was the strongest predictor of work engagement indicated by a higher regression coefficient compared to the other dependent variables (b = .52, compared to the other b-values that ranged from .02 to .19). The job resources 'flexibility and the ability to keeping a distance towards work' and 'professional development and appreciation from supervisors' were also significantly related to multiple indicators of increased wellbeing. Having a stable home environment was significantly associated with less sexual problems, while the personal characteristic of being social and empathetic was significantly related to increased exhaustion.

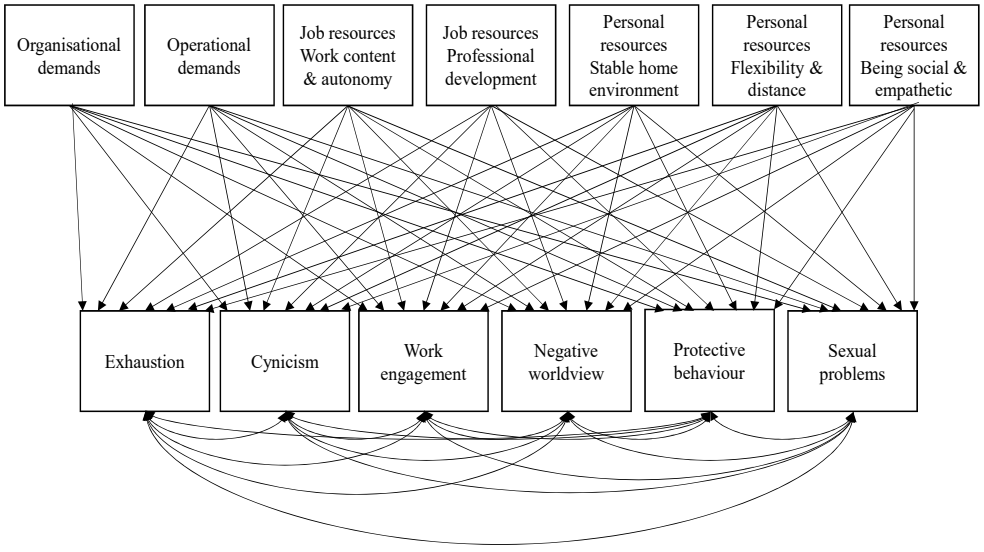

Figure 2. Final path model tailored to the work characteristics of police officers investigating sexual abuse and child pornography in which all dependent variables (exhaustion, cynicism, engagement, negative worldview, overly protective behaviour, sexual problems) were regressed on the independent variables (organisational and operational job demands, job resources and personal resources).

Table 5. Path model

Dependent variables	Predictors		b	SE	*p*
Exhaustion [A]	Organisational demands[G]		-.37	.04	<.001
	Operational demands[G]	Video- or sound material	.03	.17	.876
		Victims of sexual assault	.06	.08	.442
	Job resources	Work content and autonomy	-.16	.05	.003
		Professional development	-.13	.05	.007
	Personal resources	Stable home	.05	.05	.306
		Flexibility and distance	-.34	.06	<.001
		Being social and empathetic	.15	.05	.002
Cynicism [B]	Organisational demands		-.26	.04	<.001
	Operational demands	Video- or sound material	.16	.16	.318
		Victims of sexual assault	.07	.08	.390
	Job resources	Work content and autonomy	-.38	.05	<.001
		Professional development	-.14	.05	.008
	Personal resources	Stable home	-.02	.05	.734
		Flexibility and distance	-.08	.05	.118
		Being social and empathetic	.01	.05	.929
Engagement [C]	Organisational demands		.12	.04	.003
	Operational demands	Video- or sound material	-.16	.16	.327
		Victims of sexual assault	.05	.08	.550
	Job resources	Work content and autonomy	.52	.05	.000
		Professional development	.08	.05	.100
	Personal resources	Stable home	.02	.05	.677
		Flexibility and distance	.19	.06	.001
		Being social and empathetic	.06	.06	.299
Protective behaviour [D]	Organisational demands		-.32	.07	<.001
	Operational demands	Video- or sound material	.19	.24	.432
		Victims of sexual assault	.17	.13	.194
	Job resources	Work content and autonomy	.12	.09	.219
		Professional development	-.16	.08	.056
	Personal resources	Stable home	-.02	.08	.850
		Flexibility and distance	-.182	.09	.041
		Being social and empathetic	.03	.24	.432
Negative worldview [E]	Organisational demands		-.41	.07	<.001
	Operational demands	Video- or sound material	.66	.26	.01
		Victims of sexual assault	-.04	.14	.79
	Job resources	Work content and autonomy	.00	.10	.96
		Professional development	-.08	.09	.333
	Personal resources	Stable home	-.08	.09	.319
		Flexibility and distance	-.25	.09	.009
		Being social and empathetic	.05	.09	.599
Sexual problems [F]	Organisational demands		-.36	.10	<.001
	Operational demands	Video- or sound material	-.02	.36	.952
		Victims of sexual assault	.47	.1	.003
	Job resources	Work content and autonomy	.08	.11	.479
		Professional development	-.22	.12	.039
	Personal resources	Stable home	-.29	.09	.002
		Flexibility and distance	-.31	.11	.007
		Being social and empathetic	.144	.11	.170

[A] CP (child pornography) investigators: R2 = .33, Vice (or sexual abuse) investigators: R^2 = .33. [B] CP investigators: R^2 = .41, Vice investigators R^2 = .37. [C] CP investigators: R^2 = .43, Vice investigators R^2 = .39. [D] CP investigators: R^2 = .13, Vice investigators R^2 = .14. [E] CP investigators: R^2 = .29, Vice investigators R^2 = .19. [F] CP investigators: R^2 = .19, Vice investigators R^2 = .32. [G] Note that the items on operational and organisational job demands were reverse-scored: a higher score reflects less distressing job demands.

Discussion

In earlier studies, exposure to the suffering of others was found to take its toll on professionals (Adriaenssens et al., 2015; Sodeke-Gregson et al., 2015; Van der Ploeg & Kleber, 2003). This study examined the extent to which police officers investigating sexual assault and child pornography were impacted by repeated exposure to the intense suffering of children and adults, taking into account organisational job demands, job resources, and personal resources.

Organisational and operational job demands

We found that high operational demands (i.e., the work with victims of sexual assault) and high organisational demands (i.e., work pressure) were associated with lower levels of wellbeing. However, the adverse effects of organisational demands on wellbeing were strongest: they were related to all indicators of lower wellbeing, while operational demands were only related to a negative worldview for investigators of child pornography and sexual problems for investigators of sexual assault.

The recent edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM–5) explicitly stated that the "repeated or extreme *indirect* exposure to aversive details of trauma, usually in the course of professional duties, such as professionals repeatedly exposed to details of child sexual abuse." Accordingly, we expected significant, positive associations between the confrontation with (child) sexual assault and symptoms of exhaustion and cynicism. Especially since previous cross-sectional studies among investigators suggested that the confrontation with victims of sexual assault puts them at risk of burnout or PTSD (Bourke & Craun, 2013; Perez et al., 2010; Sollie, 2017). Instead, our findings were in line with studies among other groups of police officers which proved that the daily organisational hassles in police work have a stronger impact on symptoms of distress and PTSD than operational aspects of the job (Huddleston, Stephens, & Paton, 2007; Liberman et al., 2002; Van der Velden, Kleber, Grievink, & IJzermans, 2010).

In interviews investigators explained that, although the viewing of child pornography can evoke strong emotional reactions, they were able to deal with the material they were exposed to: it was part of their job and they were trained for it (Sollie et al., 2014; Wright, Powell, & Ridge, 2006). Organisational demands on the other hand (specifically a lack of technological or human recourses, poor social support, role conflict due to poor valuation of investigating child pornography in the police force) were often more difficult to influence, which could explain why they were experienced as most distressing: the lack of a (perceived) sense of control

proved a strong predictor of distress when dealing with adversities (Southwick & Charney, 2012).

Notwithstanding these findings, an alternative explanation should not be discarded. For these investigators, it could be more socially appropriate to report being stressed because of the organisation than because of the actual police work. The masculine culture of police organisations encourages an aura of toughness (Loftus, 2010), making it difficult to disclose distress caused by the nature of police work as it may, for example, provoke feelings of judgment from coworkers and leadership or have a negative impact on one's career (Haugen, McCrillis, Smid, & Nijdam, 2017).

Job resources and personal resources

We also found that working autonomously on cases of sexual assault, opportunities for professional development, keeping a professional distance to work and having a stable home environment were important (job and personal) resources, relating positively to higher levels of wellbeing in investigators. Being able to work autonomously on cases of sexual assault or child pornography was perceived as a strong motivational factor relating to higher work engagement and lower exhaustion and cynicism. This finding is in line with recent studies (Powell et al., 2014; Sollie et al., 2014) revealing that investigating cases of (child) sexual assault, including all (possibly shocking) elements, is often the reason why investigators chose their job. These elements give meaning to their (working) lives.

Providing possibilities for employees to grow professionally has also previously been found to be important for employee wellbeing in various occupational groups (Bakker & Demerouti, 2007). Keeping a distance from work can be viewed as a specifically relevant coping strategy for police investigators to stay emotionally detached and objective (e.g., Powell et al., 2014; Sollie et al., 2014). Various strategies were found that support investigators in keeping that distance, often related to being flexible in, for example, taking a break, having the opportunity to refuse particular cases (for example child rape investigations), turn off the sound of video material and/or watch on a small screen (Gouweloos et al., 2014; Sollie et al., 2014). Nevertheless, emotional detachment could also be viewed as a denial of one's feelings or numbness, implying that one does not care and does not feel. Thus, other coping strategies, such as support from colleagues, remain important for investigators' wellbeing (Friedman & Higson-Smith; 2002).

Remarkably, although being social and empathic in the job setting has been identified as a valuable quality in investigators by Powell et al. (2014), it was related to higher exhaustion in the present study. This could be a reflection of participants'

compassion for victims and motivation to do justice. Especially when one feels very responsible and engaged at work, such compassion can become a heavy load, resulting in fatigue and, paradoxically, a decrease of compassion (cf. Figley, 1996). However, we need to be cautious with interpreting this result, as univariate analyses showed that being social and empathetic was a resource, relating significantly and positively with wellbeing.

Strengths and Limitations

This study focused on an important, unique group of police officers combatting (child) sexual assault and tested a model in which both (operational and organisational) job demands and resources were included. Understanding work characteristics influencing the wellbeing of this group of officers is an increasingly important (international) topic for police organisations (Smit, Slagmolen, & Brepoels, 2015), which was also indicated by the relatively good response rate in this field study.

Limitations of this study are its cross-sectional nature, which precludes conclusions about longitudinal processes. In the analysis, due to problematic multicollinearity, we had to remove the resource capturing team support, which has been found important to the wellbeing of investigators (Wright et al., 2006). A downside of developing and using a questionnaire specifically tailored to the work-experience of investigators is that, although it will closely resemble the actual work experience of investigators, its psychometric properties have not been assessed.

Longitudinal research is warranted by studying the long-term influence of repeated exposure to operational demands in relation to organisational demands and the possible detrimental effects of emotional distance as a coping strategy. Also, it would be interesting to include more objective outcome measures, such as level of absenteeism and turnover rates.

Conclusions

In a unique group of police officers confronted with horrific stories and images of (child) sexual abuse, this cross-sectional study showed the negative impact of organisational stress and positive influence of the actual work itself. Although exposure to sexual abuse was related to adverse effects, working with victims also motivated officers. On the other hand, daily organisational demands were strongly associated with a wide range of psychological complaints. To stimulate the wellbeing of investigators, organisations and team supervisors should, therefore, invest in creating a work environment in which such hassles are minimised.

For investigators, this means creating circumstances in which one can work autonomously on solving cases in which opportunities are created for professional development and which enables investigators to keep a professional distance at work.

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References

Adriaenssens, J., De Gucht, V., & Maes, S. (2015). Determinants and prevalence of burnout in emergency nurses: A systematic review of 25 years of research. *International Journal of Nursing Studies*, *52*(2), 649-661.

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology*, *22*(3), 309-328.

Bourke, M. L., & Craun, S. W. (2014). Secondary traumatic stress among internet crimes against children task force personnel: impact, risk factors, and coping strategies. *Sexual Abuse*, *26*(6), 586-609.

Burns, C.M., Morley, J., Bradshaw, R., Domene, J. (2008). The emotional impact on and coping strategies employed by police teams investigating internet child exploitation. *Traumatology, 14*(2), 20-31.

Figley, C. R. (1995). Compassion fatigue: Toward a new understanding of the costs of caring. In B. H. Stamm (Ed.), *Secondary traumatic stress: Self-care issues for clinicians, researchers, and educators* (pp. 3-28). Baltimore: The Sidran Press.

Friedman, M., & Higson-Smith, C. (2003). Building psychological resilience: learning from the South African police service. In D. Paton, J. M. Violanti, & L. M. Smith (Eds.), *Promoting capabilities to manage posttraumatic stress: perspectives on resilience* (pp. 103–118). Springfield: Charles C. Thomas.

Gouweloos, J., Lesger, D., & Te Brake, H. (2014). *Onderzoeksrapport. Ontwikkeling van een zelfscreener voor medewerkers werkzaam in de opsporing van zedendelicten en kinderpornografie* [Research report. Development of a screening instrument for investigators investigating sexual assault and child pornography]. Stichting Impact: Diemen.

Haugen, P. T., McCrillis, A. M., Smid, G. E., & Nijdam, M. J. (2017). Mental health stigma and barriers to mental health care for first responders: A systematic review and meta-analysis. *Journal of Psychiatric Research*, *94*, 218-229.

Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology*, *6*(4), 307.

Hu, L. & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55.

Huddleston, L., Stephens, C., & Paton, D. (2007). An evaluation of traumatic and organizational experiences on the psychological health of New Zealand police recruits. *Work*, *28*(3), 199-207.

Karasek Jr, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly*, *24*(2), 285-308.

Liberman, 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), 421-441.

Loftus, B. (2010). Police occupational culture: classic themes, altered times. *Policing & Society, 20*(1), 1-20.

Perez, L. M., Jones, J., Englert, D. R., & Sachau, D. (2010). Secondary traumatic stress and burnout among law enforcement investigators exposed to disturbing media images. *Journal of Police and Criminal Psychology*, *25*(2), 113-124.

Powell, M.B., Cassematis, P., Benson, M., Smallbone, S., & Wortley, R. (2014). Police officers' strategies for coping with the stress of investigating Internet child exploitation. *Traumatology*, *20*(1), 32.

Powell, M. B., & Tomyn, A. J. (2011). Life satisfaction amongst police officers working in the area of child abuse investigation. *International Journal of Police Science & Management*, *13*(2), 187-194.

Schaufeli, W.B., Bakker, A.B., & Salanova, M. (2006). The Measurement of Work Engagement With a Short Questionnaire. A Cross-National Study. *Educational and Psychological Measurement, 66*(4), 701-716

Schaufeli, W. B., Leiter, M. P., Maslach, C., & Jackson, S. E. (1996). Maslach Burnout Inventory–General Survey. In C. Maslach, S. E. Jackson, & M. P. Leiter (Eds.), *The Maslach Burnout Inventory: Test manual* (3rd ed., pp. 22–26). Palo Alto, CA: Consulting Psychologists Press.

Schutte, N., Toppinnen, S., Kalimo, R., & Schaufeli, W. B. (2000). The factorial validity of the Maslach Burnout Inventory–General Survey across occupational groups and nations. *Journal of Occupational and Organizational Psychology, 73*, 53–66.

Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology*, *1*(1), 27.

Smit, A., Slagmolen, N., Brepoels, M. (2015). Weerbaarheid onderzocht (2010-2015): Over menselijke processen in het politiewerk [Studying resilience (2010-2015): On human processes in the context of police work]. Den Haag: Boom criminologie.

Sodeke-Gregson, E. A., Holttum, S., & Billings, J. (2013). Compassion satisfaction, burnout, and secondary traumatic stress in UK therapists who work with adult trauma clients. *European Journal of Psychotraumatology*, *4*(1), 21869.

Sollie, H. (2017). Rechercheren in de literatuur: literatuurreview naar mentale weerbaarheid binnen de opsporing [Investigating the literature: a literature review on the mental resilience among police investigators]. In Sollie (Ed.), *Alledaagse magie. Mentale weerbaarheid van kinderporno- en forensisch rechercheurs* [Ordinary Magic. Mental resilience of child pornography investigators and forensic investigators] (pp. 29-60). Den Haag: Boom criminologie.

Sollie, H., Kop, N., & Euwema, M.C. (2014). Kinderpornorechercheurs en hun mentale weerbaarheid: Hoe rechercheurs de impact van kinderpornografiezaken ervaren en ermee omgaan [Child pornography investigators and their mental resilience: How investigators experience the impact of child pornography and cope with it]. *Tijdschrift voor Criminologie, 56(4),* 87-114.

Southwick, S. M., & Charney, D. S. (2012). The science of resilience: implications for the prevention and treatment of depression. *Science*, *338*(6103), 79-82.

Van der Ploeg, E., & Kleber, R. J. (2003). Acute and chronic job stressors among ambulance personnel: predictors of health symptoms. *Occupational and Environmental Medicine, 60*(1), i40-i46.

Van der Velden, P. G., Kleber, R. J., Grievink, L., & IJzermans, J. C. (2010). Confrontations with aggression and mental health problems in police officers: The role of organizational stressors, life-events and previous mental health problems. *Psychological Trauma: Theory, Research, Practice, and Policy*, *2*(2), 135.

Vatcheva, K. P., Lee, M., McCormick, J. B., & Rahbar, M. H. (2016). Multicollinearity in regression analyses conducted in epidemiologic studies. *Epidemiology (Sunnyvale, Calif.)*, *6*(2), 227.

Wright, R., Powell, M. B., & Ridge, D. (2006). Child abuse investigation: An in-depth analysis of how police officers perceive and cope with daily work challenges. *Policing: An International Journal of Police Strategies & Management*, *29*(3), 498-512.

Appendix A. Questionnaire

Job Resources

In the last 6-8 weeks, to what extent did you get energy from…

Item	Mouse-over	*M (SD)*	*Not at all*	*A little*	*To some extent*	*To a great extent*	*To a very great extent*
Support of colleagues	Colleagues have attention for each other and can talk about their experiences at work	2.73 (0.71)	2 (0.4)	135 (3.8)	277 (28.1)	277 (57.1)	48 (10.0)
Results of work	For example, a victims that has been helped or a perpetrator that has been caught	2.75 (0.79)	9 (1.9)	21 (4.4)	108 (22.5)	287 (59.8)	55 (11.5)
Humour among colleagues	For example, making jokes about the content of work (gallows/black humour)	3.05 (0.69)	2 (0.4)	7 (1.5)	68 (14.2)	290 (60.4)	113 (23.5)
Team cohesion		2.98 (0.68)	2 (0.4)	13 (2.7)	64 (13.3)	314 (65.4)	87 (18.1)
Challenging area of work	For example because of the specialisation of the work, social relevance or variation in cases and functions	2.64 (0.78)	6 (1.3)	27 (5.6)	144 (30.0)	258 (53.8)	45 (9.4)
Autonomy	Having a sense of control over work, being able to work independently	2.67 (0.84)	6 (1.3)	33 (6.9)	139 (29.0)	237 (49.4)	65 (913.5)
Contact with victims and offenders		2.33 (0.97)	36 (7.5)	42 (8.8)	152 (31.7)	227 (47.3)	23 (4.8)
Opportunities for personal development	For example through training or exchange of knowledge and skills	2.08 (0.96)	29 (6.0)	97 (20.2)	180 (37.5)	156 (32.5)	18 (3.8)
Recognition and appreciation of supervisors, the police organisation, external partners or victims		2.13 (0.92)	22 (4.6)	95 (9.8)	179 (37.3)	168 (35.0)	16 (3.3)

Job Demands

In the last 6-8 weeks, to what extent did you feel distressed because of…

Item	Mouse-over		Not at all	A little	To some extent	To a great extent	To a very great extent
		M (SD)	***n (%)***	***n (%)***	***n (%)***	***n (%)***	***n (%)***
Work pressure	E.g., because of the workload or time pressure	1.88 (0.92)	31 (6.5)	122 (25.4)	219 (45.6)	90 (18.8)	18 (3.8)
Poor work facilities	E.g., Computer problems, logistical problems or lack of workplaces	1.82 (1.03)	42 (8.8)	149 (31.0)	171 (35.60)	89 (18.5)	29 (6.0)
Difficulties with colleagues		1.36 (0.87)	66 (13.8)	225 (46.9)	151 (31.5)	28 (5.8)	10 (2.1)
Policies and procedures	E.g., because rules are difficult to execute or hamper the work	1.47 (0.90)	60 (12.5)	201 (41.9)	159 (33.1)	52 (10.8)	8 (1.7)
Difficult relationships with other departments within your own agency		1.15 (0.77)	83 (17.3)	264 (55.0)	114 (23.8)	15 (3.1)	4 (0.8)
Difficult relationships with external partners	Legal, correctional and mental health systems	2.10 (0.72)	84 (17.5)	282 (58.8)	98 (20.4)	15 (3.1)	1 (0.2)
Difficult relationship with supervisor		1.20 (0.99)	119 (24.8)	206 (42.9)	110 (22.9)	29 (6.0)	16 (3.3)
Unit/agency reorganisation and/or restructuring	For example due to unclear consequences for the future	1.58 (1.12)	84 (17.5)	158 (32.9)	145 (30.2)	61 (12.7)	32 (6.7)
Difficulty maintaining a home and work balance	For example due to overwork	0.63 (0.74)	244 (50.8)	180 (37.5)	49 (10.2)	5 (1.0)	2 (0.4)
Confrontation with sound- or video material [A]		0.60 (0.70)	56 (11.7)	42 (8.8)	10 (9.2)	1 (0.2)	0 (0.0)
Dealing with victims of sexual assault [B]		0.47 (0.64)	222 (46.3)	126 (26.3)	20 (4.2)	3 (0.6)	0 (0.0)

[A] Question for police officers specialized in investigating child pornography (n = 109). [B] Question for investigators specialized in investigating sexual assault (n = 480).

Personal Resources

Below you'll find characteristics or conditions of yourself that may or may not help you with your performance at work. To what extent do you agree with the following statements: to perform well at work, it is important to…

Item	Mouse-over		Strongly disagree	Disagree	Slightly agree	Agree	Strongly agree
		M (SD)	n (%)	n (%)	n (%)	***n (%)***	***n (%)***
Find distraction through sports, friends, music or other activities		3.00 (0.73)	5 (1.0)	6 (1.3)	80 (16.7	280 (38.3)	109 (22.7)
Keep an emotional distance from work	For example by putting things in perspective and do not get overly involved	3.17 (0.56)	0 (0.0)	1 (0.2)	38 (7.9)	318 (66.3)	123 (25.6)
Get support from partner, family or friends		2.86 (0.86)	4 (0.8)	32 (6.7)	93 (19.4)	247 (51.5)	104 (21.7)
Have stable home environment	No problems at home	3.24 (0.80)	7 (1.5)	6 (1.3)	48 (10.0)	224 (46.7)	195 (40.6)
Be able to switch easily between tasks		3.15 (0.62)	0 (0.0)	4 (0.8)	49 (10.2)	300 (62.5)	127 (26.5)
Be social		3.16 (0.57)	0 (0.0)	3 (0.6)	35 (7.3)	324 (67.50	118 (24.6)
Be empathetic towards victims / offenders		2.86 (0.66)	4 (0.8)	4 (0.8)	109 (22.7)	303 (63.1)	60 (12.5)
Be flexible at work		3.12 (0.62)	0 (0.0)	0 (0.0)	66 (13.80	291 (60.6)	123 (25.6)

Job specific health outcomes

In the last 6-8 weeks, to what extend did you suffer from…

Item	Mouse-over		Not at all	A little	To some extent	To a great extent	To a very great extent
		M (SD)	n (%)	n (%)	n (%)	n (%)	n (%)
Overly protective behaviour towards family/ children		0.73 (0.87)	242 (50.4)	143 (29.8)	79 (16.5)	13 (2.70	3 (0.6)
Negative world view		0.89 (0.89)	198 (41.3)	154 (32.1)	113 (23.5)	13 (2.7)	2 (0.4)
Sexual problems	For example, diminished sexual desire	0.33 (0.61)	354 (73.8)	95 (19.8)	28 (5.8)	3 (0.6)	0 (0.0)

Appendix B. Path model 1

Dependent variables	Predictors		b[A]	SE	p
Exhaustion	*Organisational demands*	Bureaucracy	-.18	.08	.020
		Difficulties within team	.04	.07	.567
		High pressure – low balance	-.35	.08	<.001
	Operational demands	Video- or sound material	.00	.22	.986
		Victims of sexual assault	-.13	.08	.132
	Job resources	Supportive team	-.03	.06	.687
		Work content and autonomy	-.14	.07	.041
		Professional development	-.15	.05	.002
	Personal resources	Stable home	.06	.05	.219
		Flexibility and distance	-.30	.06	<.001
		Being social and empathetic	.14	.05	.005
Cynicism	*Organisational demands*	Bureaucracy	-.14	.07	.046
		Difficulties within team	-.14	.06	.037
		High pressure – low balance	-.03	.07	.706
	Operational demands	Video- or sound material	.21	.20	.285
		Victims of sexual assault	.05	.08	.506
	Job resources	Supportive team	.19	.05	<.001
		Work content and autonomy	-.50	.06	<.001
		Professional development	-.15	.06	.007
	Personal resources	Stable home	-.02	.05	.644
		Flexibility and distance	-.08	.06	.118
		Being social and empathetic	.00	.05	.983
Engagement	*Organisational demands*	Bureaucracy	.17	.07	.016
		Difficulties within team	.04	.06	.549
		High pressure – low balance	-.14	.07	.056
	Operational demands	Video- or sound material	-.25	.17	.158
		Victims of sexual assault	.04	.09	.685
	Job resources	Supportive team	-.01	.06	.875
		Work content and autonomy	.53	.07	<.001
		Professional development	.09	.05	.095
	Personal resources	Stable home	.01	.05	.861
		Flexibility and distance	.21	.06	.001
		Being social and empathetic	.06	.06	.324

Dependent variables	Predictors		b[A]	SE	p
Protective behaviour	*Organisational demands*	Bureaucracy	-.02	.12	.862
		Difficulties within team	-.01	.11	.933
		High pressure – low balance	-.45	.14	.001
	Operational demands	Video- or sound material	.08	.26	.762
		Victims of sexual assault	.04	.09	.685
	Job resources	Supportive team	.09	.09	.331
		Work content and autonomy	.06	.11	.600
		Professional development	-.18	.09	.036
	Personal resources	Stable home	-.01	.08	.894
		Flexibility and distance	-.13	.09	.180
		Being social and empathetic	.01	.09	.901
Negative worldview	*Organisational demands*	Bureaucracy	-.27	.12	.023
		Difficulties within team	.00	.11	.969
		High pressure – low balance	-.17	.13	.177
	Operational demands	Video- or sound material	.91	.31	.003
		Victims of sexual assault	.10	.13	.468
	Job resources	Supportive team	.15	.09	.094
		Work content and autonomy	-.12	.12	.326
		Professional development	-.11	.09	.210
	Personal resources	Stable home	-.07	.09	.400
		Flexibility and distance	-.24	.10	.018
		Being social and empathetic	.01	.10	.922
Sexual problems	*Organisational demands*	Bureaucracy	-.14	.16	.378
		Difficulties within team	-.00	.15	.980
		High pressure – low balance	-.33	.16	.05
	Operational demands	Video- or sound material	-.10	.41	.815
		Victims of sexual assault	.42	.16	.009
	Job resources	Supportive team	.22	.11	.054
		Work content and autonomy	-.04	.15	.773
		Professional development	-.24	.11	.037
	Personal resources	Stable home	-.34	.10	<.001
		Flexibility and distance	-.27	.12	.025
		Being social and empathetic	.15	.12	.190

[A] Unstandardised regression coefficients

Appendix C. Variation Inflation Factors of the dependent variables in the multi-group pathmodels.

Dependent variables		VIF*
Model 1		
Organizational demands	Bureaucracy	3.50
	Difficulties within team	2.54
	High pressure – low balance	2.85
Operational demands		1.39
Job resources	Supportive team	2.03
	Work content and autonomy	2.56
	Professional development	1.64
Personal resources	Stable home	1.31
	Flexibility and distance	1.90
	Being social and empathetic	1.68
Model 2 (definite)		
Organizational demands		1.19
Operational demands		1.19
Job resources	Work content and autonomy	1.69
	Professional development	1.58
Personal resources	Stable home	1.29
	Flexibility and distance	1.81
	Being social and empathetic	1.65

*VIF was calculated with the R^2 of the group investigators examining sexual assault, as this was the largest group. There were only minor differences compared to the group investigators examining Child Pornography.

Chapter 4

The risk of PTSD and depression after an airplane crash and its potential association with physical injury: a longitudinal study

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Abstract

In 2009 a commercial airplane crashed near Amsterdam. This longitudinal study aims to investigate (1) the proportion of survivors of the airplane crash showing a probable posttraumatic stress disorder (PTSD) or depressive disorder, and (2) whether symptoms of PTSD and depression were predicted by trauma characteristics. Identifying these trauma characteristics is crucial for early detection and treatment. Of the 121 adult survivors, 82 participated in this study 2 months after the crash and 76 participated 9 months after the crash. Risk for PTSD and depression was measured with the self-report instruments Trauma Screening Questionnaire and Patient Health Questionnaire-2. Trauma characteristics assessed were Injury Severity Score (ISS), hospitalisation, length of hospital stay, and seating position in the plane. Two months after the crash, 32 participants (of $N = 70$, 46%) were at risk for PTSD and 28 (of $N = 80$, 32%) were at risk for depression. Nine months after the crash, 35 participants (of $N = 75$, 47%) were at risk for PTSD and 24 (of $N = 76$, 35%) were at risk for depression. There was a moderate correlation between length of hospital stay and symptoms of PTSD and depression 9 months after the crash ($r = .33$ and $r = .45$ respectively). There were no differences in seating position between participants at high risk vs. participants at low risk for PTSD or depression. Mixed design ANOVAs showed also no association between the course of symptoms of PTSD and depression 2 and 9 months after the crash and ISS or hospitalisation. This suggests that healthcare providers need to be aware that survivors may be at risk for PTSD or depression, regardless of the objective severity of their physical injuries.

Keywords

• Post-traumatic stress disorder (PTSD) • Depression • Injury severity
• Hospitalisation • Airplane crash • Longitudinal study

Acknowledgment of author contributions:
Research design, data collection and paper writing: Gouweloos, J., Postma, I. L., Te Brake, H., Sijbrandij, M., Kleber, R. J., & Goslings, J. C.
Data analysis: Gouweloos, J., Te Brake, H., Sijbrandij, M., & Kleber, R. J.

Introduction

On 25 February 2009, a Boeing 737-800 crashed near Schiphol airport, Amsterdam. Most occupants (93%) survived the crash. Ninety-five percent of survivors were injured (Postma et al., 2011). Following such an event, survivors are at risk for developing posttraumatic mental disorders, particularly Posttraumatic Stress Disorder (PTSD), major depression and other anxiety disorders, that may cause significant suffering and functional impairment (Breslau et al., 1998; Norris et al., 2002). Studies on PTSD and depression among air crash survivors are rare. In 1995, Gregg et al. (1995) found PTSD prevalence of 40% and depression prevalence of 33%. PTSD is characterised by involuntary intrusive thoughts of the event, avoidance, negative alterations in cognition and mood and heightened arousal (American Psychiatric Association, 2013). Acute PTSD may be diagnosed one month after the traumatic event; chronic PTSD is diagnosed when symptoms persist for over 3 months. Depression may be diagnosed when symptoms of depressed mood and/or loss of interest in life activities last longer than 2 weeks (American Psychiatric Association, 2013).

Early identification of symptoms of PTSD and depression is important to prevent a chronic course of PTSD; acute PTSD may be treated effectively with brief psychotherapy (Roberts, Kitchiner, Kenardy, & Bisson, 2009). Identifying the risk factors in the acute phase following trauma that predict PTSD and depression is crucial to facilitating early identification. Characteristics of the traumatic event may affect the development of symptoms of PTSD and depression following trauma (Bonnano, Brewin, Kaniasty, & La Greca, 2010; Brewin, Andrews, & Valentine, 2000). For instance, trauma severity and proximity to the stressor are associated with an increased risk for symptoms (Bonanno et al., 2010; Brewin et al., 2000). Both concepts refer to the degree to which someone is directly exposed to the traumatic event, for instance by measuring perceived life threat or physical danger. Physical injury is often also considered a possible risk factor (Bonanno et al., 2010), however, research on the relationship between physical injury and mental health problems following trauma demonstrates conflicting results. Most studies carried out in injured trauma patients investigated survivors of motor vehicle accidents and the majority of these studies report no significant relationship between injury severity and incidence of PTSD and/or depression (Delahanty, Raimonde, Spoonster, & Cullado, 2003; Fujita & Nishida, 2008; Sijbrandij et al., 2013). However, since most of these studies were conducted in severely injured trauma patients, it remains possible that patients with severe injuries may be at higher risk for PTSD than patients with no or very mild injuries.

This study examined two research questions: 1) what was the proportion of survivors of the February 2009 airplane crash showing a probable posttraumatic stress disorder (PTSD) or depressive disorder 2 months and 9 months after the crash? and 2) to what extent were symptoms of PTSD and depression associated with trauma characteristics (injury severity, hospitalisation, length of stay in hospital and seating position) among survivors of this airplane crash?

The study population offered several advantages for research into this relationship. The population was homogeneous with respect to the type of trauma, as the index trauma was shared by all participants, and the survivors varied in terms of severity of injury from not injured to severely injured and length of stay in a hospital after the crash. Also, we were able to include medical and psychological data of victims.

The Medical Research Ethics Committee (MREC) of the Academic Medical Centre Amsterdam and the regional MREC of Noord Holland gave approval for this study.

Methods

Study population

On 25 February 2009, a commercial airplane crashed near Amsterdam in the Netherlands. Of the 135 occupants (passengers and crew) of 12 different nationalities, 9 were fatally wounded (Postma et al., 2011). All 126 survivors (including 5 children) were screened and treated for injuries at the emergency departments of several hospitals. Demographic data (age, gender and nationality) and extensive medical data on all survivors were gathered. The regional Community Health Service (CHS) conducted a survey to identify symptoms of PTSD and depression 2 and 9 months after the crash using self-report instruments, administered by telephone. Survivors were invited to participate by letter or phone call. Interviews were conducted in Turkish, Dutch or English.

Figure 1 provides a flow diagram showing survivors of the crash and the participants of this study. The inclusion criterion was age above 14 years. Response rates were 68% at timepoint 1 (at 2 months; n = 82, total adult survivors N = 121) and 63% at timepoint 2 (at 9 months; n = 76). The main reasons given for refusal to participate were that the individual had moved on with his or her life, had already received psychological treatment or did not want to talk about their complaints. These reasons also explain why, especially at timepoint 1, some participants chose to complete only a brief part of the study protocol that consisted of 2 items (PHQ-2).

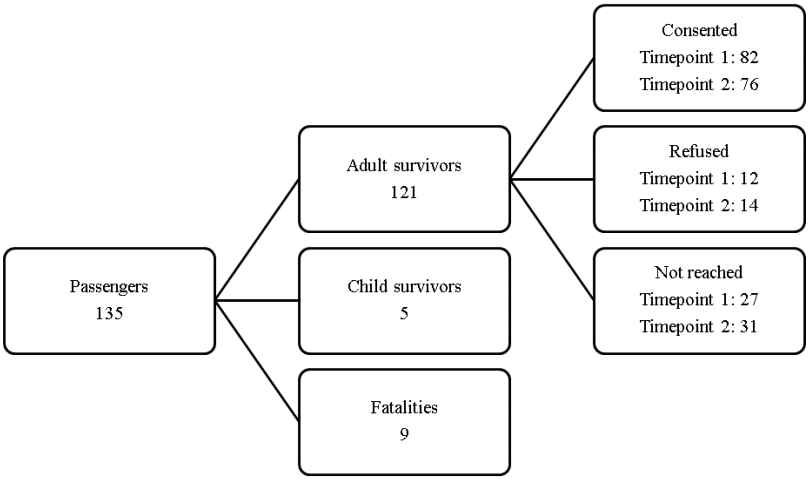

Figure 1. Flow diagram of survivors and participants

Outcome measures

To address our first research question, symptoms of PTSD and depression were measured. Symptoms of PTSD were measured using the Trauma Screening Questionnaire (TSQ), a ten-item questionnaire developed to enable early identification of individuals at risk for PTSD (Brewin et al., 2002; Dekkers, Olff, & Näring, 2010). The TSQ uses a yes/no response format and asks about symptoms during the past week. It consists of five items about re-experiencing and five items about arousal taken from the DSM IV (Diagnostic and Statistical Manual of Mental Disorders, 4th ed.) PTSD criteria (American Psychiatric Association, 2000); scores range from 0 (asymptomatic) to 10. A score ≥6 was considered to indicate that the individual was at risk for PTSD (Brewin, Fuchkan, Huntley, & Scragg, 2010). The TSQ is considered to identify accurately individuals at risk for a PTSD diagnosis using this threshold, when compared with a "gold standard", clinician-administered interview; sensitivities of .76-86 and specificities of .93-.97 have been reported (Brewin et al., 2002).

Symptoms of depression were measured by the Patient Health Questionnaire 2 (PHQ-2), a two-item measure that inquires about the frequency of depressed mood and anhedonia over the past two weeks (Kroenke, Spitzer, & Williams, 2003; Pedersen et al., 2009). The PHQ-2 uses a four-option response format (not at all; several days; more than half the days; nearly every day). Total score ranges from 0 to 6. A cut-off score of 3 was used to identify those at risk for depression (Löwe, Kroenke, & Gräfe, 2005). The PHQ-2 score ≥3 has been found to agree well

with formal diagnosis, sensitivities of .83-.87 and specificities of .78-.92 have been reported (Löwe et al., 2005; Kroenke et al., 2003).

To address our second research question, hospitalisation, length of stay in hospital (LOS), Injury Severity Score (ISS) and seating position in the airplane were measured. Hospitalisation was measured dichotomously and indicated whether a participant had been admitted to a hospital after being treated in the emergency department. Sixty-four victims were hospitalised. LOS was measured in days.

The ISS is based on the Abbreviated Injury Score (AIS) and has been arguably the most used injury severity measure since its development in 1974 (Baker, O'Neill, Haddon, & Long, 1974; Rutledge, Hoyt, Eastman, Sise, & Velky, 1997). The ISS is calculated as the sum of the squares of the highest AIS scores for the three most injured body regions (head or neck, face, chest, abdominal or pelvic contents, extremities or pelvic girdle, and external). The ISS scale ranges from 1-75. To compare survivors with no or minor injuries and moderate to severe injuries, we used a threshold of ISS scores greater than 8 (Hannan, Waller, Farrell, & Rosati, 2004). Higher thresholds may exclude a substantial number of participants with severe trauma (Palmer, 2007).

Information about seating position in the plane was provided by the Dutch Safety Board. We used seating position as a means to gauge the degree of difficulty for victims to reach safety after the crash, calculated by the distance to the nearest exit. Number of seats and rows survivors had to pass before reaching the nearest exit were counted. Survivors used the following exits (Figure 2): two emergency exits above the right wing, one emergency exit above the left wing, tear on the right sight between rows 7 and 8 (caused by the crash), and an opening at the rear after row 28. The rear section of the plane (from row 29) had broken off and become separated from the main fuselage during impact, thereby creating an additional means of escape for passengers. A score of 1 was given to each seat a survivor had to pass in his/her row, and to each additional row he/she had to pass before reaching the exit. These scores were then tallied and ranged from 0 (next to exit) to 10.

Analysis

Statistics were computed in SPSS Statistics 20, with p-levels of $< .05$ taken to indicate statistical significance. To examine the characteristics of the participants and investigate our first research question, we conducted descriptive statistics, independent t-tests and chi-square tests. To test our second research question, bivariate correlations (Pearson), mixed design ANOVAs and independent t-tests were conducted. Bivariate correlations were computed to examine the association between demographic variables (age, gender), trauma characteristics (ISS as

continuous variables, LOS, hospitalisation) and symptoms of PTSD and depression. This was done separately for timepoint 1 (2 months after the crash) and timepoint 2 (9 months after the crash). Among those participants who completed the TSQ or PHQ-2 at both timepoints, mixed design ANOVAs were conducted to examine whether ISS and hospitalisation (as dichotomous, between-subjects factors) were related to the course of PTSD symptoms and depressive symptoms at 2 and 9 months after the crash (within-subject factor with two levels). Independent t-tests were conducted to examine whether number of seats to nearest exit differed between participants at high risk of PTSD or depression vs. participants at low risk.

Results

Characteristics of participants

Table 1 presents demographic data (gender, age, nationality) for adult survivors and participants who completed the TSQ and/or PHQ-2. There were no significant differences in the distribution of gender, age and nationality between the participants who completed the study protocol and non-responders.

Table 1 includes ISS, hospitalisation and LOS for the population of adult survivors and the samples at timepoints 1 and 2. At timepoint 1 ($N = 82$) and timepoint 2 ($N = 76$) there was no difference between the study sample and non-responders in terms of mean scores on ISS and LOS and group distributions on ISS and hospitalisation. After the crash 3 adult survivors were not injured (ISS = 0) and 118 were injured (ISS > 0). Of the 121 adult survivors, 45% ($n = 54$) had an ISS score of 1 (e.g. bruises, lacerations) and 30% (n = 36) were moderately to severely injured e.g. fractures, multiple trauma (ISS score > 8). Of those hospitalised (n = 64), 21 stayed at the hospital for longer than 1 week and 3 participants stayed for more than 1 month.

Table 1. Demographics and physical injury of the participants

	Adult Survivors (N = 121)		Timepoint 1 (N = 82)		Non-responders Timepoint 1 (N=39)		Timepoint 2 (N = 76)		Non-responders Timepoint 2 (N=45)	
	N (%)	*M* (SD)	*N* (%)	*M* (SD)	*N* (%)	*M* (SD)	*N* (%)	*M* (SD)	*N* (%)	*M* (SD)
Male	85 (70)		55 (67)		29 (74)		49 (65)		35 (78)	
Female	36 (30)		27 (33)		10 (26)		27 (35)		10 (22)	
Age		40.2 (13.2)		40.4 (13.7)		39.7 (12.4)		41.7 (14.1)		37.6 (11.4)
Dutch	60 (50)		47 (57)		13 (33)		45 (59)		15 (33)	
Turkish[a]	46 (38)		28 (34)		18 (46)		26 (34)		20 (45)	
Other[b]	15 (12)		7 (9)		8 (21)		5 (7)		10 (22)	
ISS 0-8	85 (70)		60 (73)		25 (64)		53 (70)		32 (71)	
ISS >8	36 (30)		22 (27)		14 (36)		23 (30)		13 (29)	
ISS		6.6 (9.3)		5.4 (6.5)		9.0 (13.1)		6.1 (7.0)		7.4 (12.2)
Hospitalised	64 (53)		42 (50)		22 (56)		41 (54)		23 (51)	
LOS		9.9 (15.7)		8.1 (9.8)		13.2 (23.0)		8.3 (9.9)		12.6 (22.6)
Distance to nearest exit		4.7 (2.5)		4.6 (2.5)		4.7 (2.7)		4.6 (2.4)		4.7 (2.8)

[a] We compared the distribution of Turkish and Dutch participants vs. non-responders. For other nationalities, groups were too small for chi-square analysis

[b] Other nationalities were mostly Iranian, American, English and Syrian.

Research question 1: Participants showing a probable PTSD or depressive disorder

At timepoints 1 and 2, respectively 32 (of $N = 70$) and 35 (of $N = 75$) participants were considered to be at risk for PTSD (indicated by a score of ≥ 6). Mean TSQ scores were 5.2 at timepoint 1 (SD = 3.5) and 4.8 at timepoint 2 (SD = 3.5). Of those participants who completed the TSQ at both timepoints ($N = 64$), 21 showed a probable PTSD at both moments in time. Furthermore, 28 (of $N = 80$) participants at timepoint 1 and 24 participants (of $N = 76$) at timepoint 2 were at risk for depression (indicated by a PHQ-2 score of ≥ 3). Mean PHQ-2 scores were 2.1 at timepoint 1 (SD = 2.0) and 1.8 at timepoint 2 (SD = 1.9). A minority of 9 participants (of $N = 66$) showed a probable depression at both timepoints.

Risk for PTSD and depression co-occurred: 18 participants (of $N = 68$) showed both a probable PTSD and probable depression at timepoint 1. At timepoint 2 this was the case for 22 participants (of $N = 75$).

Research question 2: Association of PTSD and depression with trauma characteristics

ISS, hospitalisation (being hospitalised or not), age and gender were not associated with PTSD or depression at either timepoint. At timepoint 2, among those hospitalised, longer LOS correlated with a higher score on PTSD symptoms ($n = 40$, $r = .33$, $p = .04$) and depressive symptoms ($n = 41$, $r = .45$, $p = .001$). At timepoint 1, LOS did not significantly correlate with PTSD symptoms ($n = 36$, $r = .12$, $p = .48$) or depressive symptoms ($n = 41$, $r = .14$, $p = .39$).

Tables 2 and 3 show mean TSQ and PHQ-2 scores for participants grouped by injury severity and hospitalisation. Regarding TSQ score and PHQ-2 score there was no significant interaction between time and ISS (F (1, 62) = 1.14, $p = .29$ and F (1, 64) = .47, $p = .50$ respectively), indicating that the course of PTSD symptoms and depressive symptoms did not differ significantly between participants with high and low injury severity. We also found no significant main effect of time on PTSD symptoms (F (1, 62) = .64, $p = .43$) or depressive symptoms (F (1, 64) = .09, $p = .76$), indicating that participants' symptoms of PTSD and depression didn't change between 2 and 9 months after the crash. We also found no significant main effect of low and high injury severity groups on PTSD symptoms (F (1, 62) = 1.53, $p = .22$) or depressive symptoms (F (1, 64) = .94, $p = .34$), which means that participants with low and high injury severity did not differ in their level of PTSD symptoms and depressive symptoms.

In case of hospitalisation as an independent (between group) variable, there was no significant interaction effect between time and hospitalisation regarding TSQ and PHQ-2 score (F (1, 62) = 3.83, $p = .06$ and F (1, 64) = .21, $p = .65$ respectively). This means that the course of PTSD symptoms and depressive symptoms did not differ between hospitalised participants and not-hospitalised participants. There was also no significant main effect of time on PTSD symptoms (F (1, 62) = 2.43, $p = .12$) or depressive symptoms (F (1, 64) = .47, $p = .50$), and no significant main effect of hospitalisation on PTSD symptoms (F (1, 62) = 2.14, $p = .15$) or depressive symptoms (F (1, 64) = 2.34, $p = .13$), indicating that both time and hospitalisation had no effect on the symptom level of PTSD and depression.

Table 2. Mean TSQ score with respect to ISS and hospitalisation

	N (64)[a]	TSQ Timepoint 1	TSQ Timepoint 2
		M (SD)	*M* (SD)
ISS = 0-8	46	5.0 (3.4)	4.3 (3.5)
ISS ≥ 9	18	5.7 (3.7)	5.8 (3.5)
Not hospitalised	30	5.0 (3.3)	3.7 (3.5)
Hospitalised	34	5.4 (3.6)	5.5 (3.3)

[a] Number of participants that completed the TSQ at both timepoints

Table 3. Mean PHQ-2 score with respect to ISS and hospitalisation

	N (66) [a]	PHQ-2 Timepoint 1	PHQ-2 Timepoint 2
		M (SD)	*M* (SD)
ISS = 0-8	47	1.8 (2.0)	1.6 (1.8)
ISS ≥ 9	19	2.1 (1.6)	2.2 (2.0)
Not hospitalised	31	1.7 (2.0)	1.3 (1.6)
Hospitalised	35	2.1 (1.8)	2.1 (2.0)

[a] Number of participants that completed the PHQ-2 at both timepoints

The seating distribution of participants at risk for PTSD or depression is shown in Figure 2 and Table 1. Visual inspection of Figure 2 suggests no relationship between seating position and later being at risk for PTSD or depression at both timepoints. Survivors later assessed as at risk were spread throughout the plane. With respect to the number of seats and rows survivors had to pass before reaching the nearest exit, independent t-tests showed no difference at both timepoints between participants at high risk vs. participants at low risk for PTSD (timepoint 1: t (68) = -1.02, p = .31; timepoint 2: t (73) = -1.40, p = .17) or depression (timepoint 1: t (78) = -1.74, p = .09; timepoint 2: t (74) = -.73, p = .47).

Discussion

The first research question focused on the proportion of survivors of a commercial airplane crash near Amsterdam, in the Netherlands, showing a probable PTSD or depressive disorder. We found that 2 months after the crash 32 survivors (46%) were at risk for PTSD and 28 (32%) for depression. Nine months after the crash, still 35 survivors (47%) were at risk for PTSD and 24 (35%) for depression. Risk for PTSD and depression also co-occurred:18 (27%) participants showed both a probable

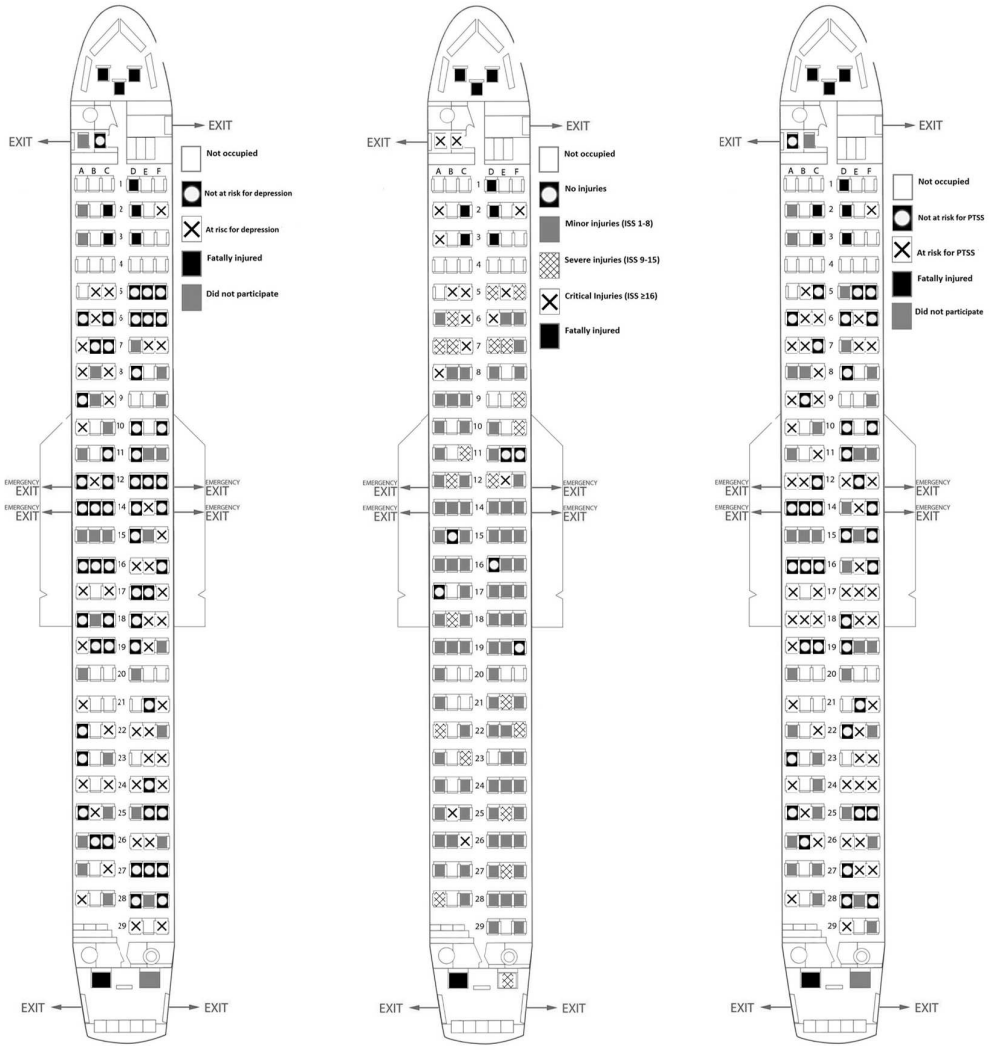

Figure 2. Seating position with respect to injury severity, risk for depression and risk for PTSD. The left figure shows risk for depression at timepoint 1 or 2. The right figure shows risk for PTSD at timepoint 1 or 2. The middle figure shows injury severity directly after the crash.

PTSD and depression 2 months after the crash. This was the case for 22 (29%) participants 9 months after the crash. These rates are relatively high, compared to previously reported prevalence of 10% (Breslau et al., 1998; Person, Tracy, & Galea, 2006). Possible explanations are that, firstly, all survivors were in close proximity to the event and were unable to escape; proximity is an important risk factor for mental health problems (Bonanno et al., 2010; Van den Berg, Wong, Van der Velden, Boshuizen, & Grievink, 2012). Although close proximity varies between events, it is common in accidents such as an airplane crash. Close proximity might explain why Gregg et al. (1995) also found prevalence rates of 40% for PTSD and 33% for major depression among survivors of an air crash in England (in which 47 people died and most of the 79 survivors were injured) in the year after the crash. Sloan (1998) followed up 32 survivors of a non-fatal charter flight crash and also found initially intense stress that subsided over the following months. However, results of other types of accidents, such as motor vehicle accidents, contradict this explanation: although some studies find a high risk of mental health problems (Beck & Coffey, 2007; Haagsma et al., 2012; Schyder, Moergeli, Klaghofer, & Buddeberg, 2001; Shih, Schell, Hambarsoomian, Belzberg, & Marshall, 2010), other do not find elevated rates (Malt, 1999; Zatzick et al., 2007).

A second explanation for the rather high percentage of participants showing a probable PTSD or depression relates to the use of self-report screening instruments. These are known to overestimate mental health problems compared to structured clinical interviews [32]. This explanation cannot in itself explain the higher prevalence, as many studies of mental health problems in disaster survivors have used self-report questionnaires and reported lower prevalence (Drogendijk et al., 2007; Norris et al., 2002; Van der Velden, IJzermans, & Grievink, 2009). It is important to note that the TSQ and PHQ-2 questionnaires are considered accurate for the early identification of PTSD and depression.

A third explanation relates to cultural differences. Drogendijk et al. (2011, 2012) found that Turkish migrant victims of a disaster scored considerably higher than native Dutch victims on instruments assessing mental health problems and posttraumatic stress. To test this explanation we compared Turkish and Dutch participants in our sample, but found no group differences in either TSQ or PHQ-2 score.

A fourth explanation might be that some survivors have not received the mental health care they needed. Survivors can be dissatisfied with the support provided after an airplane crash (Klerx van Mierlo, 2009). The CHS actively sought to identify all survivors with mental health problems to help them find local psychosocial care. Nevertheless, this explanation cannot be ruled out.

The second research question focused on whether symptoms of PTSD and depression were associated with trauma characteristics. Injury severity and hospitalisation were not associated with the course of symptoms of PTSD and depression. Previous studies also did not find any relations between physical injuries and mental problems (Delahanty et al., 2003; Fujita & Nishida, 2008; Sijbrandij et al., 2013). A possible explanation is that the subjective experience of the severity of an event may be more important than objective indicators of trauma severity (such as ISS or hospitalisation) (Brasel. deRoon-Cassini, & Bradley, 2010; Schnyder et al., 2001; Sijbrandij et al., 2013). Interestingly, seating position seemed also not related. Those showing a probable PTSD or depression were not nearer to an exit, where they might have been exposed to the crash for a shorter period of time or might have been less afraid of not being able to exit. Evidently, they were also not overly represented at the front of the plane, where the severe and critical injuries occurred.

Among those hospitalised, length of stay in a hospital was significantly correlated with symptoms of PTSD and symptoms of depression 9 months after the crash. This result is consistent with the findings of Sijbrandij et al. (2013), who reported that injury tends to be associated with late-onset symptoms rather than early symptoms. In the long term survivors may become functionally impaired and have work or relationship difficulties that may contribute to symptoms of depression and PTSD (Hours et al., 2013). They suggest that survivors may focus on physical recovery first and become aware of psychological distress later.

Limitations

This study has a number of limitations. Obviously, sample size was limited, which reduced the statistical power of the study. The TSQ and PHQ-2 do not measure the whole spectrum of symptoms of PTSD and depression (e.g. the TSQ specifically does not address avoidance symptoms). This could have resulted in misclassification of individuals in our sample with undetected symptoms of PTSD or depression. Although the PHQ-2 has proven to accurately detect and monitor depression over time (Löwe et al., 2005), the TSQ has mainly proven accurate for the early identification of PTSD and more research is needed to assess its accuracy months after the event. There was no information available on pre-existing symptoms of PTSD and depression in the population under study, so one cannot assume that PTSD and depression symptoms are 'new'. Because we started measuring symptoms at 2 months after the crash, we could not identify survivors who suffered from symptoms within the first 2 months but recovered naturally before the study started. There were also no longer term (>2 years) measurements in order to investigate

delayed-onset PTSD and/or depression. Finally, note that there are many other possible predictors of PTSD and depression that were not tested in this study (e.g. history of mental illness, childhood trauma, sense of death threat, social support) (Bonanno et al., 2010; Brewin et al., 2000).

Given these limitations we strongly recommend future research to confirm our findings, using different and larger samples with varying severity of physical injury, to improve our understanding of the relationship between proximity to a stressor and subjective and objective injury, and the possible influence of length of hospital stay on mental health.

Conclusions

Mental health risks of airplane accidents have rarely been studied. This study showed a risk for PTSD and depression among survivors of an airplane crash. Objectively measured physical injuries and hospitalisation had no association with the course of the symptoms of either PTSD or depression. Raising awareness of these results among health care providers is important. Victims' need for mental health care cannot be related to their often much more visible physical needs, so monitoring mental health needs is particularly important, not only during the first days after an incident but also over the following weeks and months. Survivors without severe injuries may nevertheless suffer from mental health problems; communication and cooperation between the medical health care system and community health services is therefore essential to deliver optimal long-term care.

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References

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders.* 4th ed., text rev. Washington, DC: American Psychiatric Association.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders.* 5th ed. Arlington, VA: American Psychiatric Publishing.

Baker, S. P., o'Neill, B., Haddon Jr, W., & Long, W. B. (1974). The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care. *Journal of Trauma and Acute Care Surgery*, *14*(3), 187-196.

Beck, J. G., & Coffey, S. F. (2007). Assessment and treatment of posttraumatic stress disorder after a motor vehicle collision: Empirical findings and clinical observations. *Professional Psychology: Research and Practice*, *38*(6), 629.

Bonanno, G. A., Brewin, C. R., Kaniasty, K., & Greca, A. M. L. (2010). Weighing the costs of disaster: Consequences, risks, and resilience in individuals, families, and communities. *Psychological Science in the Public Interest*, *11*(1), 1-49.

Brasel, K. J., & Bradley, C. T. (2010). Injury severity and quality of life: whose perspective is important?. *Journal of Trauma and Acute Care Surgery*, *68*(2), 263-268.

Breslau, N., Kessler, R. C., Chilcoat, H. D., Schultz, L. R., Davis, G. C., & Andreski, P. (1998). Trauma and posttraumatic stress disorder in the community: the 1996 Detroit Area Survey of Trauma. *Archives of General Psychiatry*, *55*(7), 626-632.

Gregg, W., Medley, I., Fowler-Dixon, R., Curran, P., Loughrey, G., Bell, P., ... & Harrison, G. (1995). Psychological consequences of the Kegworth air disaster. *The British Journal of Psychiatry*, *167*(6), 812-817.

Brewin, C. R., Andrews, B., & Valentine, J. D. (2000). Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, *68*(5), 748.

Brewin, C. R., Fuchkan, N., Huntley, Z., & Scragg, P. (2010). Diagnostic accuracy of the Trauma Screening Questionnaire after the 2005 London bombings. *Journal of Traumatic Stress*, *23*(3), 393-398.

Brewin, C. R., Rose, S., Andrews, B., Green, J., Tata, P., McEvedy, C., ... & Foa, E. B. (2002). Brief screening instrument for post-traumatic stress disorder. *The British Journal of Psychiatry*, *181*(2), 158-162.

Dekkers, A. M. M., Olff, M., & Näring, G. W. B. (2010). Identifying persons at risk for PTSD after trauma with TSQ in the Netherlands. *Community Mental Health Journal*, *46*(1), 20-25.

Delahanty, D. L., Raimonde, A. J., Spoonster, E., & Cullado, M. (2003). Injury severity, prior trauma history, urinary cortisol levels, and acute PTSD in motor vehicle accident victims. *Journal of Anxiety Disorders*, *17*(2), 149-164.

Drogendijk, A. N., Dirkzwager, A. J., Grievink, L., Van der Velden, P. G., Marcelissen, F. G., & Kleber, R. J. (2007). The correspondence between persistent self-reported post-traumatic problems and general practitioners' reports after a major disaster. *Psychological Medicine*, *37*(2), 193-202.

Drogendijk, A. N., Van der Velden, P. G., Gersons, B. P., & Kleber, R. J. (2011). Lack of perceived social support among immigrants after a disaster: comparative study. *The British Journal of Psychiatry*, *198*(4), 317-322.

Drogendijk, A. N., Van der Velden, P. G., & Kleber, R. J. (2012). Acculturation and post-disaster mental health problems among affected and non-affected immigrants: A comparative study. *Journal of Affective Disorders*, *138*(3), 485-489.

Engelhard, I. M., van den Hout, M. A., Weerts, J., Arntz, A., Hox, J. J., & McNally, R. J. (2007). Deployment-related stress and trauma in Dutch soldiers returning from Iraq. *The British Journal of Psychiatry*, *191*(2), 140-145.

Fujita, G., & Nishida, Y. (2008). Association of objective measures of trauma exposure from motor vehicle accidents and posttraumatic stress symptoms. *Journal of Traumatic Stress*, *21*(4), 425-429.

Haagsma, J. A., Ringburg, A. N., Van Lieshout, E. M., Van Beeck, E. F., Patka, P., Schipper, I. B., & Polinder, S. (2012). Prevalence rate, predictors and long-term course of probable posttraumatic stress disorder after major trauma: a prospective cohort study. *BMC Psychiatry*, *12*(1), 236.

Hannan, E. L., Waller, C. H., Farrell, L. S., & Rosati, C. (2004). Elderly trauma inpatients in New York state: 1994–1998. *Journal of Trauma and Acute Care Surgery*, *56*(6), 1297-1304.

Hours, M., Chossegros, L., Charnay, P., Tardy, H., Nhac-Vu, H. T., Boisson, D., ... & Laumon, B. (2013). Outcomes one year after a road accident: results from the ESPARR cohort. *Accident Analysis & Prevention*, *50*, 92-102.

Klerx van Mierlo, F (1992). *Nasleep van een vliegtuigramp: resultaten van de derde enquête onder slachtoffers en nabestaanden van de vliegtuigramp in Faro, Portugal 1992. [Aftermath of an airplane crash: results of a third survey among victims and survivors of the airplane crash in Faro, Portugal 1992.]* Tilburg: Intervict, University of Tilburg.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2003). The Patient Health Questionnaire-2: validity of a two-item depression screener. *Medical Care*, *41*(11), 1284-1292.

Löwe, B., Kroenke, K., & Gräfe, K. (2005). Detecting and monitoring depression with a two-item questionnaire (PHQ-2). *Journal of Psychosomatic Research*, *58*(2), 163-171.

Malt, U. (1988). The long-term psychiatric consequences of accidental injury. A longitudinal study of 107 adults. *The British Journal of Psychiatry*, *153*(6), 810-818.

Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001. *Psychiatry: Interpersonal and Biological Processes*, *65*(3), 207-239.

Palmer, C. (2007). Major trauma and the injury severity score-where should we set the bar? *Annual Proceedings/Association for the Advancement of Automotive Medicine* , 51, 3-29.

Pedersen, S. S., Denollet, J., de Jonge, P., Simsek, C., Serruys, P. W., & van Domburg, R. T. (2009). Brief depression screening with the PHQ-2 associated with prognosis following percutaneous coronary intervention with paclitaxel-eluting stenting. *Journal of General Internal Medicine*, *24*(9), 1037-1042.

Person, C., Tracy, M., & Galea, S. (2006). Risk factors for depression after a disaster. *The Journal of Nervous and Mental Disease*, *194*(9), 659-666.

Postma, I. L., Winkelhagen, J., Bloemers, F. W., Heetveld, M. J., Bijlsma, T. S., & Goslings, J. C. (2011). February 2009 airplane crash at Amsterdam Schiphol airport: an overview of injuries and patient distribution. *Prehospital and Disaster Medicine*, *26*(4), 299-304.

Roberts, N. P., Kitchiner, N. J., Kenardy, J., & Bisson, J. I. (2009). Multiple session early psychological interventions for the prevention of post-traumatic stress disorder. *Cochrane Database of Systematic Reviews, 3*, 1-43.

Rutledge, R., Hoyt, D. B., Eastman, A. B., Sise, M. J., Velky, T., Canty, T., ... & Osler, T. M. (1997). Comparison of the Injury Severity Score and ICD-9 diagnosis codes as predictors of outcome in injury: analysis of 44,032 patients. *Journal of Trauma and Acute Care Surgery*, *42*(3), 477-489.

Schnyder, U., Moergeli, H., Klaghofer, R., & Buddeberg, C. (2001). Incidence and prediction of posttraumatic stress disorder symptoms in severely injured accident victims. *American Journal of Psychiatry*, *158*(4), 594-599.

Shih, R. A., Schell, T. L., Hambarsoomian, K., Marshall, G. N., & Belzberg, H. (2010). Prevalence of PTSD and major depression following trauma-center hospitalization. *The Journal of Trauma*, *69*(6), 1560.

Sijbrandij, M., Engelhard, I. M., de Vries, G. J., Luitse, J. S., Carlier, I. V., Gersons, B. P., & Olff, M. (2013). The role of injury and trauma-related variables in the onset and course of symptoms of posttraumatic stress disorder. *Journal of Clinical Psychology in Medical Settings*, *20*(4), 449-455.

Sloan, P. (1988). Post-traumatic stress in survivors of an airplane crash-landing: A clinical and exploratory research intervention. *Journal of Traumatic Stress*, *1*(2), 211-229.

Van den Berg, B., Wong, A., van der Velden, P. G., Boshuizen, H. C., & Grievink, L. (2012). Disaster exposure as a risk factor for mental health problems, eighteen months, four and ten years post-disaster–a longitudinal study. *BMC psychiatry*, *12*(1), 147-160.

Van der Velden PG, Yzermans CJ, Grievink L (2009). The Enschede fireworks disaster. In Y. Neria, S. Geleo, & F.H. Norris FH (Eds.), *Mental Health and Disasters* (pp. 94-115. New York: Cambridge University Press.

Zatzick, D. F., Rivara, F. P., Nathens, A. B., Jurkovich, G. J., Wang, J., Fan, M. Y., ... & Mackenzie, E. J. (2007). A nationwide US study of post-traumatic stress after hospitalization for physical injury. *Psychological Medicine*, *37*(10), 1469-1480.

Chapter 5

A longitudinal evaluation of active outreach after an airplane crash: screening for PTSD and depression and assessment of self-reported treatment needs

Submitted as:
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Abstract

Background
In 2009 an airplane crashed near Amsterdam. To remedy unmet mental health needs, active outreach was used to identify victims at risk for posttraumatic stress disorder (PTSD) and depression.

Objective
Evaluating this strategy by examining: 1) the accuracy of screening methods in predicting PTSD and depression, 2) self-reported treatment needs, and 3) the extent to which perceived treatment needs predict trajectories of PTSD.

Methods
In 112 adult survivors, semi-structured telephone interviews were held at 2 (T1, $n = 76$), 9 (T2, $n = 77$) and 44 months (T3, $n = 55$) after the crash. The Trauma Screening Questionnaire (TSQ) and the Patient Health Questionnaire-2 (PHQ-2) measured symptoms of PTSD and depression, respectively. At T3, a clinical interview assessed PTSD and depression diagnoses. Based on the TSQ scores on the 3 timepoints, participants were manually grouped into a resilient, chronic, recovery, delayed onset or relapse trajectory.

Results
The TSQ accurately predicted PTSD at T3 (sensitivity ranged from 0.75 to 1.00 and specificity from 0.79 to 0.90). The PHQ-2 showed modest accuracy (sensitivity: 0.38 to 0.89, specificity: 0.67 to 0.90). Both measures provided low positive predictive values (0.57 and 0.50 at T3 for the TSQ and PHQ-2, respectively). A substantial number of participants reported unmet treatment needs (T1: 32.9%, T2: 19.5%, T3: 10.9%). Participants reporting unmet needs at T2 were more often assigned to the chronic PTSD trajectory compared to those with no treatment needs ($p < .01$).

Conclusions
The prevalence of unmet treatment needs at 44 months after the crash within a chronic PTSD trajectory indicated that active outreach may be warranted. Nevertheless, although the TSQ was accurate, many participants screening positive did not develop PTSD. We discuss how the advantages of screening (e.g., fewer people with untreated PTSD) weigh up against its costs (e.g., avoidable clinical assessments).

Keywords
• Air-plane crash • disaster • PTSD • depression • screening • longitudinal
• unmet needs • treatment needs • prevention • outreach

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Research design and data collection: Gouweloos-Trines, J., Te Brake, H., & Sijbrandij, M.
Data analysis: Gouweloos-Trines, J., & Te Brake, H.,
Paper writing: Gouweloos-Trines, j., Te Brake, H., Sijbrandij, M., Boelen, P.A., Brewin, C.R., & Kleber, R. J.

Background

In 2009 an airplane of Turkish Airlines crashed near Amsterdam, the Netherlands. Of the 135 passengers, 126 people survived the crash, most of whom had Dutch or Turkish nationality. The regional Community Health Service (CHS) launched an outreach strategy to identify survivors at risk of mental health problems, such as post-traumatic stress disorder (PTSD) and depression, and to support them in finding appropriate psychological care.

Several prospective studies found four distinct trajectories of mental health symptoms after disasters and large scale incidents: resilient (no or only mild symptoms), recovery (initial high symptoms that decrease over time), chronic (continuously high symptoms), and delayed onset (high symptoms that start at a minimum of 6 months post-event; Van de Schoot et al., 2018). It is generally acknowledged that many victims of disasters and large scale incidents follow a resilient trajectory; they are able to cope with the aversive event (Bonanno, Brewin, Kaniasty, & La Greca, 2010; Kleber & Brom, 1992). However, a significant minority can develop severe mental disturbances, of which PTSD, major depressive disorder (MDD) and anxiety disorders are most commonly reported (Norris et al., 2002). In the specific context of an airplane crash, a prevalence of 40% for PTSD and 33% for depression was found (Gregg et al., 1995), which is high compared to other disasters (10%-20%; Bonanno et al., 2010; Norris et al., 2002).

For individuals who need treatment, timely identification is crucial: evidence-based treatment such as Trauma-Focused Cognitive Behavioral Therapy may effectively treat acute PTSD and prevent a chronic course of PTSD symptoms (Roberts, Kitchiner, Kenardy, & Bisson, 2009). Although in some countries existing pathways to mental health care via general practitioners have appeared to be sufficient in the post-disaster context (Van der Velden et al., 2006), victims may experience significant barriers to service utilization. The proportion of people with unmet treatment needs after disasters has been found to vary between fourteen and fifty percent (Dyb, Jensen, Glad, Nygaard, & Thoresen, 2014; Stuber, Galea, Boscarino, & Schlesinger, 2006). Detection of PTSD may be hampered, as general practitioners do not always recognize it (Rosenbaum, 2004). In addition, victims themselves experience barriers such as the stigma attached to psychological problems, avoidance of trauma-related memories, or the idea that others need help more than they do (Stuber et al., 2006; Weisæth, 2001). These barriers may prevent people with severe levels of distress from finding and using the care and support they need. Therefore, recent guidelines on psychosocial care after disasters or crises stress the importance of an active approach to identify people with high levels

of distress and to foster timely referral to (specialized) mental health care, often referred to as a 'proactive outreach' (Bisson et al., 2010; Shultz & Forbes, 2014; Te Brake et al., 2009).

In order to implement proactive outreach, screening programs have attempted to detect people with significant levels of distress. However, research on the performance of screening instruments in the disaster context is scarce, where the logistics of detecting and monitoring victims is often challenging (e.g., the Amsterdam plane crash survivors came from several different countries). In addition, the results of studies on the diagnostic accuracy of screening instruments that may be used as part of active outreach are inconsistent. Although some studies found high levels of both sensitivity and specificity for PTSD screeners (Brewin, 2005), other studies showed that specificity was low 6 months after traumatic injury (Mouthaan, Sijbrandij, Reitsma, Gersons, & Olff, 2014) and during the first 18 months after a terrorist attack (Brewin, Fuchkan, Huntley, & Scragg, 2010a). This would imply that many healthy people need to be subjected to assessment (i.e. false positives). Furthermore, research has predominantly focused on screening for PTSD, instead of other common disorders such as depression, and on screening for current disorders rather than the risk for future disorders (O'Donnell et al., 2008).

The potential benefit of active outreach not only depends on the existence of accurate instruments to detect those at risk, but also on the number of people having unmet treatment needs, in the short and long term, and on the extent to which people themselves are able to fulfil their needs. As most studies are cross-sectional (e.g., Dyb et al., 2014; Stuber et al., 2006) little is known about the course of treatment needs over time and whether treatment needs in the first months after a disaster predict adverse long-term trajectories of PTSD. Furthermore, the long-term psychological wellbeing of people without treatment needs has, to our knowledge, attracted limited attention. In the post-disaster mental health field, knowledge about the long-term health of victims who report not needing any treatment is crucial to understand whether we can rely on people's own estimation of whether they need professional care.

In this longitudinal study we evaluated an outreach strategy that sought to identify and help those at risk for PTSD and depression after an airplane crash. The program was partly modelled after the Screen and Treat program developed by Brewin and colleagues (2010b) after the London Bombings. First, people were screened for PTSD and depression. Those who screened positive and/or expressed unmet treatment needs, were advised by the CHS to contact their local health care providers (such as general practitioners) who could provide formal assessment and, when needed, provide or refer to evidence-based treatment. Contact details of local

health care providers specialized in evidence-based trauma treatment were available to support victims in finding appropriate care.

In this study, we first examined whether we were able to screen people effectively for clinically significant PTSD and depression by measuring the performance (sensitivity and specificity) of screening methods 44 months (3.5 years) post-event. Secondly, we examined the proportion of self-reported treatment needs at 2 months, 9 months and 44 months after the crash. Thirdly, we sought to investigate the extent to which potential treatment needs assessed at 2 months after the crash predicted PTSD trajectories.

Methods

Procedure

The regional CHS ('GGD Kennemerland') conducted a survey at 2 (T1), 9 (T2) and 44 months (T3) after the crash. The survey consisted of a semi-structured section on treatment needs and psychosocial support and a structured section to screen for PTSD and depression. At T3, a structured clinical interview (Mini International Neuropsychiatric Interview (MINI); Sheehan et al., 1997) was added to test the performance of the screening instruments. Instruments were administered by telephone in Turkish, Dutch or English by social workers or psychologists. Time between filling out the screening instrument and conducting the clinical interview was no longer than 1 week. The clinical interviewer was unaware of the outcome of the screener so that this could not influence the diagnostic assessment. A second researcher independently scored the diagnostic decisions of the clinical interview in 30% of the cases. Concerning depressive disorders, agreement between raters was 82% (100% after deliberation). Agreement was 100% regarding PTSD. The regional Medical Research Ethics Committee of Noord Holland gave approval for this study (M012-014).

Participants

Figure 1 provides a flow diagram presenting the number of participants and reasons for non-response. We excluded children under 14 years. Survey response rates were 62.8%, 63.6% and 45.5% at T1, T2 and T3 respectively. In total, 89 respondents participated at one or more timepoints and 35 participated at all three timepoints. When asked, reasons given for non-participation were current hospitalization/physical complaints (n = 5), already receiving treatment (n = 2), not having any psychosocial problems (n = 5), and not wanting to talk about the event (n = 2). Of all people participating at T3, 69.1% (n = 38) completed the MINI.

Demographics (age, gender, nationality) for the total population, the samples at each timepoint, and non-responders are provided in Tables 1 and 2. We found no significant differences in age between those who completed the surveys and non-responders. At T2, participants were more often female (χ^2 (1) = 4.14, p = .042) and of Dutch origin (χ^2 (2) = 7.98, p = .019) compared to non-responders at T2. At T1 and T3 there were no such differences. At T3, those refusing to undergo the MINI reported higher symptom levels of PTSD (n = *16, M* = 6.20, *SD* = 3.53) compared to those completing the MINI (M = 3.52, SD = 2.88): $t(51) = 2.86$, p = .006, 95% CI [0.80, 4.56]. There were no such differences in the level of depressive symptoms or in the distribution of demographic variables.

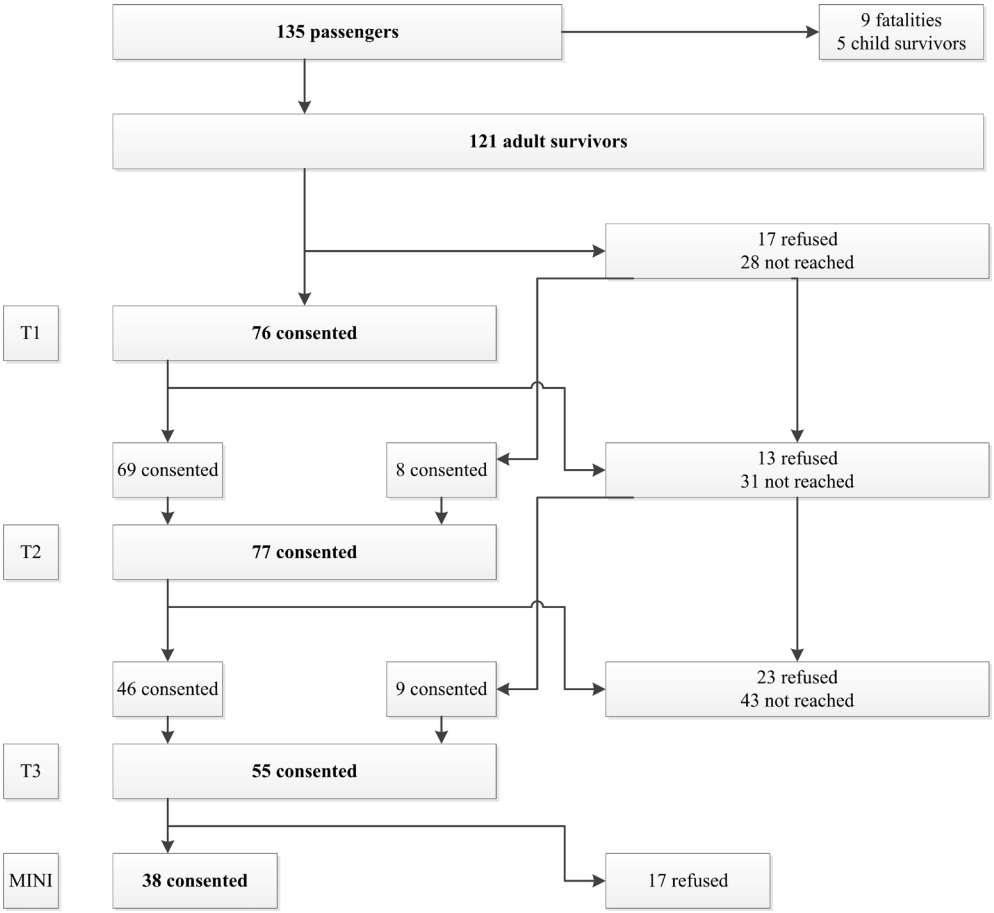

Figure 1. Response and non-response at T1 (2 months after the crash), T2 (9 months after the crash) and T3 (44 months after the crash).

Table 1. Demographics, treatment needs and symptoms of PTSD and depression in the base population and studied samples

		Adult survivors	T1: 2 months	T2: 9 months	T3: 44 months	T3: MINI
Total n		*121*	*76*	*77*	*55*	*38*
Age	*n*	*118*	*73*	*74*	*55*	*38*
	Mean (*SD*)	40.15 (13.20)	40.03 (14.05)	41.68 (13.97)	44.27 (13.13)	42.95 (12.60)
Gender	Men	84 (69.4%)	49 (64.5%)	49 (63.6%)	35 (63.6%)	24 (63.2%)
	Women	36 (29.8%)	27 (35.5%)	28 (36.4%)	20 (36.4%)	14 (36.8%)
Nationality	Dutch	60 (49.6%)	44 (57.9%)	45 (58.4%)	32 (58.2%)	23 (60.5%)
	Turkish	46 (38.0%)	25 (32.9%)	26 (33.8%)	17 (30.9%)	10 (26.3%)
	Iranian	4 (3.3%)	3 (3.9%)	3 (3.9%)	3 (5.5%)	3 (7.9%)
	Other[A]	11 (9.1%)	4 (5.3%)	3 (3.9%)	3 (5.5%)	2 (5.3%)
Treatment needs	*n*		74	76	54	38
	Unmet needs		25 (32.9%)	15 (19.5%)	6 (10.9%)	6 (15.8%)
	Treatment		28 (36.8%)	42 (54.5%)	34 (61.8%)	23 (60.5%)
	No need		21 (27.6%)	19 (24.9%)	14 (25.9%)	9 (23.7%)
TSQ score	*n*		70	75	52	37
	Mean (SD)		5.23 (3.46)	4.79 (3.47)	4.27 (3.31)	3.49 (2.91)
PHQ-2 score	*n*		73	76	53	37
	Mean (SD)		1.95 (1.93)	1.84 (1.93)	1.51 1.41)	1.38 (1.36)

Note: Variables may have different sample sizes and percentages do not always count up to 100% due to missing values. [A]Other countries were: U.S.A., U.K., Bulgaria, Germany, Italy, Soudan, Syria, Taiwan

Table 2. Demographics for non-responders

		T1: 2 months	**T2: 9 months**	**T3: 44 months**	**T3: M.I.N.I.**
Total n		*45*	*44*	*66*	*17*
Age	*n*	45	44	66	17
	Mean (*SD*)	38.76 (12.02)	37.59 (11.51)	42.03 (13.30)	47.24 (14.17)
Gender	Men	35 (77.8%)	35 (79.5%)	49 (74.2%)	11 (64.7%)
	Women	9 (20.0%)	8 (18.2%)	16 (24.2%)	6 (35.3%)
Nationality	Dutch	16 (35.6%)	15 (34.1%)	28 (42.4%)	9 (52.9%)
	Turkish	21 (46.7%)	20 (45.5%)	29 (43.9%)	7 (36.8%)

Measures

Symptoms of PTSD during the past week were measured using the Trauma Screening Questionnaire (TSQ), a ten-item questionnaire with a yes/no response format (Brewin at al., 2002). It consists of five items about re-experiencing and five items about arousal; scores range from 0 (asymptomatic) to 10. At the standard cut-off of 6 symptoms in any combination the TSQ showed a sensitivity/specificity of .86/.93 in predicting PTSD in rail crash survivors at six to 12 months post-trauma (Brewin et al., 2002). After the 2005 London bombings, sensitivity decreased from .95 within the first month to .63 two years later, while specificity rose from .26 to .64 (Brewin et al., 2010a).

Symptoms of depression were measured with the Patient Health Questionnaire-2 (PHQ-2), a two-item measure that inquires about the frequency of depressed mood and anhedonia over the past two weeks (Kroenke, Spitzer, & Williams, 2003). The PHQ-2 uses a four-option response format (not at all - nearly every day). The total score ranges from 0 to 6. A PHQ-2 score ≥3 has been found to agree well with formal diagnosis, with sensitivities of .83- .87 and specificities of .78-.92 being reported in primary care and medical settings (Kroenke et al., 2003; Löwe, Kroenke, & Gräfe, 2005).

Anxiety, mood or trauma-related disorders according to DSM-IV were assessed with the Mini International Neuropsychiatric Interview (MINI) version 5.0.0 (Sheehan et al., 1997). Comparison with other 'gold standard' clinical interviews revealed that the validity and reliability of the MINI are high (Lecrubier et al., 1997; Sheehan et al., 1997).

Subjective treatment needs were measured with questions about received psychological treatment since the crash ('Are you currently receiving any psychological treatment?' and 'Did you receive any psychological treatment since the crash?') and unmet treatment needs ('Are you in need of any psychological support?'), using a yes/no response format. Open-ended questions followed-up on the kind of treatment they received ('What kind of psychological support do you receive?'). Two researchers (JG and HtB) independently categorized these perceived needs as: 1) unmet treatment needs, 2) met needs, defined as receiving or having received counselling or treatment since the crash (from a psychologist, psychiatrist or other mental health care professional), or 3) no need for treatment. Participants who had received psychological treatment but expressed additional treatment needs (6 participants) were coded as having unmet treatment needs. Differences in coding between the researchers were discussed and resolved.

Data Analysis

Statistics were computed in SPSS Statistics 23, with two-tailed alpha levels of < .05 indicating statistical significance.

To evaluate the accuracy of the TSQ and PHQ-2, sensitivity (the probability that someone with a MINI diagnosis of PTSD or MDD screened positive), specificity (the probability that someone without a MINI diagnosis screened negative), positive predictive value (PPV; the proportion of those who screened positive and met criteria for PTSD or depression), and negative predictive value (NPV; the proportion of individuals who screened negative and did not meet criteria for PTSD or depression) were established. Receiver Operating Characteristic (ROC) curves were calculated for the screening instruments in relation to the 44 months diagnoses of PTSD and MDD. The area under the curve (AUC) represents the accuracy of the instruments. Missing data were replaced with the scale mean (PHQ-2: one case with one missing item; TSQ: two cases with two and three missing items).

To analyze the treatment needs and course of PTSD, multiple imputation (MI) implemented in SPSS was used to handle missing data on the TSQ. The missing values appeared to be not at random: drop-outs at T3 reported higher scores on depressive symptoms at T2 (n = 31, M = 2.52 , SD = 2.20) compared to participants at T2 who did not drop-out at T3 (n = 45, M = 1.38, SD = 1.59): $t(74) = 2.62$, p = .011, 95% CI [0.27, 2.00]. There were no significant differences in terms of PTSD. MI is the preferred way to handle missing values not at random compared to, for instance, listwise deletion (Newman, 2003). We included the total sum scores of the TSQ for those who had at least participated at one timepoint in the imputation model and used 'fully conditional specifications' and 'predictive mean matching' (TSQ scores were slightly positively skewed; Van Buuren, 2012) as methods for addressing the missing data. Multiple (500) versions of the dataset were produced. When statistical analyses were performed, the parameter estimates for all of the imputed datasets were pooled.

We examined whether treatment needs at T1 predicted PTSD trajectories by firstly distinguishing PTSD trajectories in this sample. We inspected and rated all the possible combinations of being at risk or not for PTSD at the three timepoints (see Table 5 for an explanation of the combinations). We identified 5 PTSD trajectories in the imputed sample (N = 89): resilient (n =38, 42.7%), chronic (n = 30, 33.7%), recovery (n = 9, 10.1%), delayed onset (n = 9, 10.1%), and relapse (n = 3, 3.4%; Table 5). Similar trajectories were found in the non-imputed sample (N = 38): resilient (n = 17, 44.7%), chronic (n = 12, 31.6%), recovery (n = 5, 13.2%), delayed onset (n = 3, 7.9%); and relapse (n = 1, 2.6%). We used Fisher exact and Chi-square tests to examine whether treatment needs predicted these trajectories.

Results

Accuracy of Screening Instruments

Of the participants who completed the MINI at T3 ($N = 38$), five (13.2%) met criteria for current PTSD (plane crash as index trauma) and six for MDD (15.8%). PTSD caused by other traumatic experiences or other depressive disorders were not reported. Two participants were diagnosed with comorbid PTSD and MDD. Table 3 presents the TSQ and PHQ-2 scores for individuals participating in the clinical interview.

Table 3. Risk groups for PTSD and depression measured with the TSQ and PHQ-2

		T1: 2 months	**T2: 9 months**	**T3: 44 months**
TSQ[A]	*n*	28	33	37
	Risk	8	9	7
	No Risk	20	24	30
PHQ-2[B]	*n*	30	33	38
	Risk	6	7	8
	No Risk	24	26	30

[A] At risk was defined by a score of 6 or higher. [B]At risk was defined as a score of 3 or higher

Table 4 shows that AUCs of the TSQ were adequate at all timepoints (varying from .78 - . 93), indicating that the TSQ accurately predicted PTSD status. The TSQ yielded good sensitivity and specificity at all timepoints. For example, at T3, 80% of the participants with a PTSD diagnosis screened positive on the TSQ (sensitivity; true positives), while 20% went undetected (false negatives). In addition, 90% of the participants without a PTSD diagnosis screened negative (specificity; true negatives) while 10% without the disorder were identified as at risk for PTSD (false positives). Although the NPV was high at all three timepoints (ranging from 95%-100%,), PPV was low (ranging between 38% and 57%), indicating that given a positive test result, only around half would be diagnosed with PTSD. The use of alternative cut-off points did not enhance the performance of the TSQ in this population.

AUCs of the PHQ-2 were adequate (varying from .72 - . 87; Table 4). The PHQ-2 proved accurate in identifying those without MDD: at all timepoints specificity and NPV were good. However, at T1 and T3 sensitivity was low, indicating a high number of false negatives. PPV was also low at these timepoints: 50% of those who screened positive did not have a diagnosis of MDD. At T2, a cut-off point of 2

increased the sensitivity of the PHQ-2 (.83), without losing its specificity (.85). At T1 and T3 a cut-off point of 3 proved optimal in this population compared to other cut-off points.

To check whether the TSQ and PHQ-2 were accurate in detecting any trauma-related psychopathology, we assessed the sensitivity and specificity of both instruments in detecting any anxiety, mood or trauma-related disorder measured with the MINI. For both instruments, sensitivity was low, while specificity was high (Appendix A).

Table 4. Diagnostic performance of the TSQ and PHQ-2 in predicting PTSD and MDD

Screener	Timepoint	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Area Under the Curve	*n*
TSQ[A]	1	0.75	0.79	0.38	0.95	0.78 (C.I. 0.59-0.98)	28
	2	1.00	0.86	0.56	1.00	0.96 (C.I. 0.90-1.00)	33
	3	0.80	0.90	0.57	0.97	0.93 (C.I. 0.83-1.00)	37
PHQ-2[B]	1	0.60	0.88	0.50	0.92	0.72 (C.I. 0.45-0.96)	30
	2	0.89	0.67	0.92	1.00	0.96 (C.I. 0.89-1.00)	33
	3	0.38	0.90	0.50	0.84	0.87 (C.I. 0.74-0.96)	38

[A] A cut-off of 6 or higher was taken to indicate risk for PTSD. [B] A cut-off of 3 or higher was taken to indicate risk for depression.

Proportion of Subjective Treatment Needs

Perceived unmet treatment needs were reported by 32.9% of the participants at T1, decreasing to 19.5% at T2, and 10.9% at T3 (Table 1). At each timepoint, approximately a quarter of the participants perceived no treatment needs. The group with met treatment needs since the crash increased from 36.8% at T1 to 62.8% at T3. Of the nine participants with a PTSD and/or MDD diagnosis at T3, six reported having had psychological treatment since the crash, while three reported unmet treatment needs. The course of perceived treatment needs is presented in Figure 2.

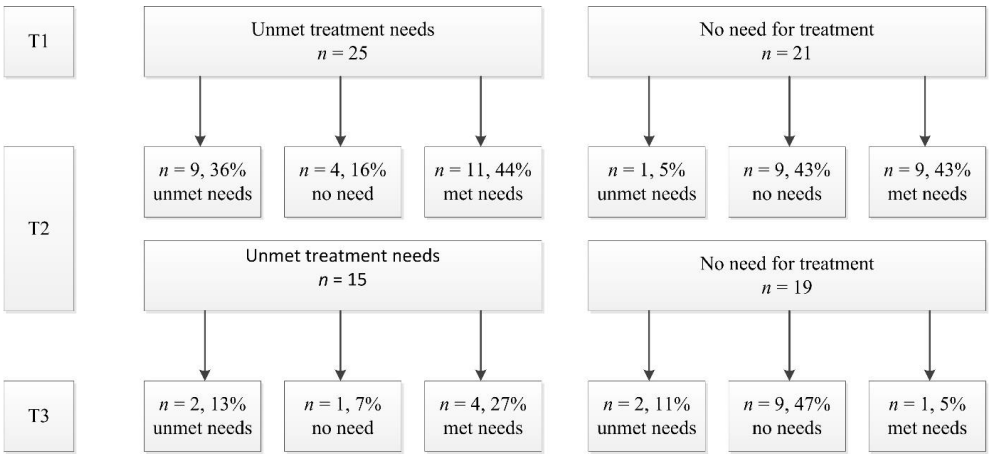

Figure 2. Flow diagram of the course of unmet treatment needs and no needs for treatment. Note that percentages do not add up to 100 because drop-outs are not included in the figure. From T1 to T2, 1 participant with unmet treatment needs and 3 participants with no need for treatment dropped out. From T2 to T3 these numbers were 8 and 7, respectively.

Subjective Treatment Needs and PTSD Trajectories

There was a significant association between potential treatment needs at T1 and the PTSD trajectories (Fisher's exact test, $p = .013$). The largest proportion of people with no treatment needs were included in the resilient group (46.7%), while the proportion of unmet treatment needs was larger in the other groups: 48.0% in the chronic group, 28.6% in the recovery group, 44.4% in the delayed onset group, and 66.7% in the relapse group; see Table 5. Since the recovery, delayed onset, and relapse groups were small ($n < 10$), we checked whether the differences between the chronic and resilient group regarding unmet treatment needs and no needs were significant using a 2 X 2 contingency table. Those with unmet needs more often showed a chronic trajectory compared to those with no treatment needs, who more often showed a resilient trajectory: χ^2 (1, $N = 34$) = 9.66, $p = .005$. This reflects the fact that the odds of belonging to the resilient group were 11.2 times higher when someone expressed no treatment needs at T1 than if someone expressed unmet treatment needs at T1.

Table 5. Treatment needs at T1 related to PTSD trajectories

Trajectories	N (%)	Explanation trajectories	Treatment needs N (%) at T1			Mean TSQ		
		T1-T2-T3	Met Need	No Need	Unmet Needs	T1	T2	T3
Resilient	38 (42.7)	0-0-0[A]	11 (36.7)	14 (46.7)	5 (16.7)	2.54	1.89	2.06
Chronic	30 (33.7)	1-1-1	10 (40.0)	3 (12.0)	12 (48.0)	8.37	8.27	8.28
Recovery	9 (10.4)	1-0-0/1-1-0	5 (71.4)	0 (0.0)	2 (28.6)	7.46	4.00	3.57
Delayed onset	9 (10.4)	0-1-0/0-1-1[B]	2 (22.2)	3 (33.3)	4 (44.4)	3.78	7.27	4.96
Relapse	3 (3.4)	1-0-1	0 (0.0)	1 (33.3)	2 (66.7)	9.00	3.67	7.45

[A]0 indicates not at risk for PTSD and 1 indicates at risk for PTSD (cut-off of 6 or higher); [B]0-0-1 did not exist in this sample

Discussion

This study evaluated, in a longitudinal design, the implementation of an outreach strategy after an airplane crash near Amsterdam in 2009 by examining the accuracy of validated screening instruments for PTSD and MDD, self-reported treatment needs, and the extent to which perceived treatment needs predicted trajectories of PTSD. Taking into account the relatively low prevalence of PTSD diagnosis in this study and the uncertainty that arises with few PTSD cases, the TSQ proved stable over time in detecting both PTSD cases and non-cases at 44 months after the crash (i.e., sensitivity and specificity were good). The accuracy of the TSQ was comparable to previous findings among rail-crash survivors (Brewin et al., 2002). It was also comparable to the accuracy of another PTSD screener, the Impact of Event Scale-Revised, which was used six years after the 2004 Indian Ocean tsunami disaster (Arnberg, Michel, & Johannesson, 2014). The findings provided less support for the use of the PHQ-2 to detect MDD. Its performance was inconsistent over time: either a significant proportion of participants with MDD went undetected or a significant proportion without the disease were classified as being at risk. Using an adjusted cut-off score did not improve the stability and overall performance of the PHQ-2. Although the PHQ-2 proved an accurate screening instrument in primary care and medical settings (Kroenke et al., 2003; Löwe et al., 2005), an instrument of two items to measure depression may be too brief in a disaster setting including victims with various cultural backgrounds. A study in a Turkish clinical sample showed that somatization symptoms were a predominant mode of expression of depressive symptoms (Uluşahin, Başoğlu, & Payke, 1994).

The PPVs of both the TSQ and the PHQ-2 were low, indicating that a significant proportion of those at risk will eventually not be diagnosed with PTSD or MDD.

In our sample, the highest chance of someone with a positive result on the TSQ developing PTSD was 57%. This is probably due to the low prevalence of PTSD and MDD among this group of victims (Baldessarini, Finklestein, & Arana, 1983). Low PPV is a recurrent problem of screening instruments (Mouthaan et al., 2014), including among disaster victims (Arnberg et al., 2014). It underscores that screening positive should not be taken as indicative of a PTSD or MDD diagnosis, but instead should signal further assessment. A low PPV also highlights the need to carefully weigh up the advantages and disadvantages of screening. A significant proportion of participants who screen positive (and receive an additional assessment) will eventually not develop a clinical disorder. There is also no information about possible negative effects of screening healthy people, meaning that we do not know whether screening carries a risk of medicalization, framing normal behaviour as problematic and interfering with healthy ways of coping with disaster. On the other hand, the decision not to screen carries a risk of untreated PTSD, which has been related to a chronic PTSD course, low quality of life, other clinical disorders such as substance abuse, and considerable health care costs (Bichescu et al., 2005; Priebe et al., 2009).

The discussion about the advantages and disadvantages of the use of screening instruments touches on a larger debate about the degree to which post-disaster strategies for psychosocial care should involve 'outreach' (Dückers & Thormar, 2014; Te Brake et al., 2009; Te Brake & Dückers, 2013). Interventions after disaster greatly differ in how actively they monitor the victim's health. Some interventions primarily trust the existing health care system and victims' ability to find the care they need (e.g., Van der Velden, Yzermans, & Kleber, 2006), while other interventions lean towards actively intervening because of indications that a proportion of those in need may be overlooked (e.g., Stene, Wentzel-Larsen, & Dyb, 2016). Dückers and Thormar (2014) comment that these differences exist partly because of differences in the availability of existing healthcare systems after disasters, and partly because of different attitudes among scholars and policy advisors regarding to what extent one should rely on victims' own capacity to find treatment.

We found that a significant proportion of participants reported unmet treatment needs, even 3.5 years post-event (33% at 2 months to 11% at 44 months). Unmet needs two months after the crash were also more often related to a chronic PTSD trajectory than no treatment needs. These findings are in agreement with many disaster studies showing that existing pathways to mental health care were not always sufficient (Reifels et al., 2013). In countries like the UK (Brewin et al, 2010b) and Norway (Dyb et al., 2014) it was found that outreach generated more referrals of affected individuals as compared to normal referral channels. Even when general

practitioners were strongly involved, the creation of additional flexible pathways increased victim self-referral, suggesting that a disaster-specific case-management service may indeed enhance service access (Dyb et al., 2014; Reifels et al., 2015). The finding in this study that unmet needs were more often related to a chronic trajectory may even raise the question whether a strategy in which participants at risk were automatically routed into an assessment and, when needed, evidence-based treatment, such as after the London bombings (Brewin et al., 2010b), would have generated more recoveries.

In line with a more neutral attitude to outreach, this study showed that a substantial number of participants (e.g., 30% at 2 months and 26% at 44 months) indicated they did not need any treatment. No perceived treatment needs 2 months after the crash was also related to a resilient trajectory from 2 to 44 months after the crash, implying that we can actually trust in victims' self-judgment of their need for care. This, in turn, suggests that many of those without self-reported treatment needs do not require additional screening or assessment. However, we need to be cautious about generalizing this finding to other disasters or crises. Boscarino, Adams, Stuber and Galea (2005) showed that, among adults with diagnoses of PTSD or MDD after the 2011 New York terrorist attacks, a substantial number (especially African Americans) did not believe that they had a problem that needed treatment. As a group of residents with ethnic minority status exposed to terrorism differs from victims of a plane crash travelling for business reasons or holidays, these contradictory results underscore that, after each disaster, psychosocial responses need to proactively address the needs and potential barriers to health care experienced by various survivor subgroups (Reifels et al., 2013).

Strengths and Limitations

By evaluating the course of a disaster response in a longitudinal design, this study contributes to the improvement of guidelines for psychosocial support and their implementation into actual practice. The study nevertheless has a number of limitations, most of which directly result from its unique setting. Given the circumstances in which the research was performed, neither random sampling nor controlled experimentation were possible, precluding any direct conclusions about the effectiveness of 'active outreach' in terms of preventing (exacerbation of) posttraumatic stress and associated problems. Sample size was limited, making it impossible to control for confounding variables (e.g., it was not possible to compare the accuracy of the screening instruments between Dutch and Turkish victims). Non-response was high, especially at follow-up, and individuals with higher symptoms of depression were more likely to drop out. We also found higher levels

of PTSD symptoms in participants who were lost to the MINI. These limitations not only point to possible attrition biases in our results, but also have implications for the usefulness of active outreach: a substantial minority of people may not be willing to participate, which has also been found after some other disasters (Dijkema, Grievink, Stellato, Roorda, & Van der Velden, 2005). A final limitation to be considered is that other life events, such as sickness or loss of a beloved one, were not included in the study, which especially over the longer term are likely to have occurred in participants' lives, and may have influenced their perceived needs.

To fully understand the potential benefits of active outreach, we recommend future research to examine the impact of screening and clinical assessment on the resilience of disaster victims, to investigate the cultural validity of screeners in a disaster context, and to focus on alternative outcomes that are likely to benefit from active outreach, such as social acknowledgement.

Conclusion

Although guidelines recommend detecting individuals at risk of mental health problems after crises and disasters, literature on the evaluation and practical implementation of outreach strategies is scarce. This study among 121 adult survivors of an airplane crash suggests that, given the risk of chronic PTSD in combination with unmet needs, screening may be warranted. At the same time, as a significant proportion of victims screening positive will not develop a PTSD diagnosis, more research is needed to study the effects of screening healthy people.

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References

Arnberg, F. K., Michel, P. O., & Johannesson, K. B. (2014). Properties of Swedish posttraumatic stress measures after a disaster. *Journal of Anxiety Disorders*, *28*(4), 402-409.

Baldessarini, R. J., Finklestein, S., & Arana, G. W. (1983). The predictive power of diagnostic tests and the effect of prevalence of illness. *Archives of General Psychiatry*, *40*(5), 569-573.

Bichescu, D., Schauer, M., Saleptsi, E., Neculau, A., Elbert, T., & Neuner, F. (2005). Long-term consequences of traumatic experiences: an assessment of former political detainees in Romania. *Clinical Practice and Epidemiology in Mental Health*, *1*(1), 17.

Bisson, J. I., Tavakoly, B., Witteveen, A. B., Ajdukovic, D., Jehel, L., Johansen, V. J., ... & Sezgin, A. U. (2010). TENTS guidelines: Development of post-disaster psychosocial care guidelines through a Delphi process. *British Journal of Psychiatry*, *196*(1), 69-74.

Bonanno, G. A., Brewin, C. R., Kaniasty, K., & La Greca, A. M. (2010). Weighing the costs of disaster: Consequences, risks, and resilience in individuals, families, and communities. *Psychological Science in the Public Interest*, *11*(1), 1-49.

Boscarino, J. A., Adams, R. E., Stuber, J., & Galea, S. (2005). Disparities in mental health treatment following the World Trade Center Disaster: Implications for mental health care and health services research. *Journal of Traumatic Stress*, *18*(4), 287-297.

Brewin, C. R. (2005). Systematic review of screening instruments for adults at risk of PTSD. *Journal of Traumatic Stress*, *18*(1), 53-62.

Brewin, C. R., Fuchkan, N., Huntley, Z., & Scragg, P. (2010a). Diagnostic accuracy of the Trauma Screening Questionnaire after the 2005 London bombings. *Journal of Traumatic Stress*, *23*(3), 393-398.

Brewin, C. R., Fuchkan, N., Huntley, Z., Robertson, M., Thompson, M., Scragg, P., ... & Ehlers, A. (2010b). Outreach and screening following the 2005 London bombings: usage and outcomes. *Psychological Medicine*, *40*(12), 2049-2057.

Brewin, C. R., Rose, S., Andrews, B., Green, J., Tata, P., McEvedy, C., ... & Foa, E. B. (2002). Brief screening instrument for post-traumatic stress disorder. *The British Journal of Psychiatry*, *181*(2), 158-162.

Dijkema, M. B., Grievink, L., Stellato, R. K., Roorda, J., & Van der Velden, P. G. (2005). Determinants of response in a longitudinal health study following the firework-disaster in Enschede, The Netherlands. *European Journal of Epidemiology, 20*(10), 839-847.

Dückers, M. L., & Thormar, S. B. (2014). Post-disaster psychosocial support and quality improvement: A conceptual framework for understanding and improving the quality of psychosocial support programs. *Nursing & Health Sciences*, *17*(2), 159-165.

Dyb, G., Jensen, T., Glad, K. A., Nygaard, E., & Thoresen, S. (2014). Early outreach to survivors of the shootings in Norway on the 22nd of July 2011. *European Journal of Psychotraumatology*, *5*(1), 23523.

Gregg, W., Medley, I., Fowler-Dixon, R., Curran, P., Loughrey, G., Bell, P., ... & Harrison, G. (1995). Psychological consequences of the Kegworth air disaster. *The British Journal of Psychiatry*, *167*(6), 812-817.

Kleber, R.J. & Brom, D. (1992). *Coping with trauma: Theory, prevention and treatment.* Abingdon-on-Thames, UK: Taylor & Francis (reprint 2003).

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2003). The Patient Health Questionnaire-2: validity of a two-item depression screener. *Medical Care*, *41*(11), 1284-1292.

Lecrubier, Y., Sheehan, D. V., Weiller, E., Amorim, P., Bonora, I., Sheehan, K. H., ... & Dunbar, G. C. (1997). The Mini International Neuropsychiatric Interview (MINI). A short diagnostic structured interview: reliability and validity according to the CIDI. *European Psychiatry*, *12*(5), 224-231.

Löwe, B., Kroenke, K., & Gräfe, K. (2005). Detecting and monitoring depression with a two-item questionnaire (PHQ-2). *Journal of Psychosomatic Research*, *58*(2), 163-171.

Mouthaan, J., Sijbrandij, M., Reitsma, J. B., Gersons, B. P., & Olff, M. (2014). Comparing screening instruments to predict posttraumatic stress disorder. *PloS One*, *9*(5), e97183.

Newman, D. A. (2003). Longitudinal modeling with randomly and systematically missing data: A simulation of ad hoc, maximum likelihood, and multiple imputation techniques. *Organizational Research Methods*, *6*(3), 328-362.

Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001. *Psychiatry: Interpersonal and Biological Processes*, *65*(3), 207-239.

O'Donnell, M. L., Creamer, M. C., Parslow, R., Elliott, P., Holmes, A. C., Ellen, S., ... & Bryant, R. A. (2008). A predictive screening index for posttraumatic stress disorder and depression following traumatic injury. *Journal of Consulting and Clinical Psychology*, *76*(6), 923.

Priebe, S., Matanov, A., Janković Gavrilović, J., McCrone, P., Ljubotina, D., Knežević, G., ... & Schützwoh, M. (2009). Consequences of untreated posttraumatic stress disorder following war in former Yugoslavia: morbidity, subjective quality of life, and care costs. *Croatian Medical Journal*, *50*(5), 465-475.

Reifels, L., Bassilios, B., Spittal, M. J., King, K., Fletcher, J., & Pirkis, J. (2015). Patterns and predictors of primary mental health service use following bushfire and flood disasters. *Disaster Medicine and Public Health Preparedness*, *9*(3), 275-282.

Reifels, L., Pietrantoni, L., Prati, G., Kim, Y., Kilpatrick, D. G., Dyb, G., ... & O'Donnell, M. (2013). Lessons learned about psychosocial responses to disaster and mass trauma: An international perspective. *European Journal of Psychotraumatology*, *4*(1), 22897.

Roberts, N. P., Kitchiner, N. J., Kenardy, J., & Bisson, J. I. (2009). Systematic review and meta-analysis of multiple-session early interventions following traumatic events. *American Journal of Psychiatry*, *166*(3), 293-301.

Rosenbaum, L. (2004). Post-traumatic stress disorder: a challenge for primary care--misunderstood and incognito. *The British Journal of General Practice*, *54*(499), 83.

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Janavs, J., Weiller, E., Keskiner, A., ... & Dunbar, G. C. (1997). The validity of the Mini International Neuropsychiatric Interview (MINI) according to the SCID-P and its reliability. *European Psychiatry*, *12*(5), 232-241.

Shultz, J. M., & Forbes, D. (2014). Psychological first aid: Rapid proliferation and the search for evidence. *Disaster Health*, *2*(1), 3-12.

Stene, L. E., Wentzel-Larsen, T., & Dyb, G. (2016). Healthcare needs, experiences and satisfaction after terrorism: a longitudinal study of survivors from the Utøya attack. *Frontiers in Psychology*, *7*, 1809.

Stuber, J., Galea, S., Boscarino, J. A., & Schlesinger, M. (2006). Was there unmet mental health need after the September 11, 2001 terrorist attacks? *Social Psychiatry and Psychiatric Epidemiology*, *41*(3), 230-240.

Te Brake, H., Dückers, M., De Vries, M., Van Duin, D., Rooze, M., & Spreeuwenberg, C. (2009). Early psychosocial interventions after disasters, terrorism, and other shocking events: Guideline development. *Nursing & Health Sciences*, *11*(4), 336-343.

Te Brake, H., & Dückers, M. (2013). Early psychosocial interventions after disasters, terrorism and other shocking events: is there a gap between norms and practice in Europe?. *European Journal of Psychotraumatology*, *4*(1), 19093.

Uluşahin, A., Başoğlu, M., & Paykel, E. S. (1994). A cross-cultural comparative study of depressive symptoms in British and Turkish clinical samples. *Social Psychiatry and Psychiatric Epidemiology*, *29*(1), 31-39.

Van der Velden, P. G., Grievink, L., Kleber, R. J., Drogendijk, A. N., Roskam, A. J. R., Marcelissen, F. G., ... & Gersons, B. P. (2006). Post-disaster mental health problems and the utilization of mental health services: A four-year longitudinal comparative study. *Administration and Policy in Mental Health and Mental Health Services Research*, *33*(3), 279-288.

Velden, P., Loon, P. V., IJzermans, J., & Kleber, R. J. (2006). Psychosociale zorg direct na een ramp [Psychosocial care directly after a disaster]. *De Psycholoog*, 658-663.

Van Buuren, S. (2012). *Flexible imputation of missing data*. Boca Raton, FL: CRC press.

Van de Schoot, R., Sijbrandij, M., Depaoli, S., Winter, S. D., Olff, M., & Van Loey, N. E. (2018). Bayesian PTSD-trajectory analysis with informed priors based on a systematic literature search and expert elicitation. Multivariate behavioral research, 53(2), 267-291.

Weisæth, L. (2001). Acute posttraumatic stress: nonacceptance of early intervention. *The Journal of Clinical Psychiatry*, *62*(17), 35-40.

Appendix A

Diagnostic performance of the TSQ and PHQ-2 in predicting any anxiety, mood or trauma related disorder

Screener	Timepoint	Sensitivity	Specificity	Positive Predictive Power	Negative Predictive Power	n
TSQ[A]	1	.50	.86	.78	.63	28
	2	.53	.94	.90	.67	34
	3	.40	1.00	1.00	.60	38
PHQ-2[B]	1	.27	.87	.67	.54	30
	2	.44	1.00	1.00	.65	33
	3	.30	.89	.75	.53	38

[A] A cut-off of 6 or higher was taken to indicate risk for PTSD. [B] A cut-off of 3 or higher was taken to indicate risk for depression.

Chapter 6

Psychosocial care to affected citizens and communities in case of CBRN incidents: a systematic review

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Abstract

Disasters are associated with a substantial psychosocial burden for affected individuals (including first responders) and communities. Knowledge about how to address these risks and problems is valuable for societies worldwide. Decades of research into post-disaster psychosocial care has resulted in various recommendations and general guidelines. However, as CBRN (chemical, biological, radiological, nuclear) events form a distinctive theme in emergency planning and disaster preparedness, it is important to systematically explore their implications for psychosocial care. The aim of this study is to answer two questions: 1). To what extent does psychosocial care in the case of CBRN events differ from other types of events? 2). How strong is the scientific evidence for the effectiveness of psychosocial care interventions in the context of a CBRN event? A systematic literature review was conducted. Searches were performed in Medline, PsychINFO, Embase and PILOTS. Studies since January 2000 were included and evaluated by independent reviewers. The 39 included studies contain recommendations, primarily based on unsystematic literature reviews, qualitative research and expert opinions. Recommendations address: 1) public risk-and crisis communication, 2) training, education and exercise of responders, 3) support, and 4) psychosocial counselling and care to citizens and responders. Although none of the studies meet the design criteria for effectiveness research, a substantial amount of consensus exists on aspects relevant to CBRN related psychosocial care. Recommendations are similar or complementary to general post-disaster psychosocial care guidelines. Notable differences are the emphasis on risk communication and specific preparation needs. Relevant recurring topics are uncertainty about contamination and health effects, how people will overwhelm health care systems, and the possibility that professionals are less likely to respond. However, the lack of evidence on effectiveness makes it necessary to be careful with recommendations. More evaluation research is absolutely needed.

Keywords
• Psychosocial care • CBRN events • Guidelines • Systematic review • Disasters • Mental health

Acknowledgment of author contributions:
Research design, data analysis and paper writing: Gouweloos, J., Dückers, M., Te Brake, H., Kleber, R.J., & Drogendijk, A.
Data collection: Gouweloos, J., & Dückers, M.

1. Introduction

Disasters are characterised by their sudden and unpredictable onset, widespread human, material, economic and/or environmental losses and the inability of the affected community or society to cope with it (United Nations, International Strategy for Disaster Reduction). They affect individuals (e.g. children, parents, first responders), specific organisations that have to respond to the disaster (e.g. medical emergency teams, public health organisations, fire brigades) and the community at large. Disasters are associated with a substantial psychological burden for affected people (Bonanno, Brewin, Kaniasty, & La Greca, 2010; Neria, Nandi, & Galea, 2008; Neria, Galea, & Norris, 2009; Norris, Friedman, & Watson, 2002a; Norris, Friedman, Watson, Byrne, Diaz, & Kaniasty, 2002b). Although most people are resilient and recover on their own merit, an important minority suffers from long-term mental health disturbances (Bonanno et al., 2010; Grievink et al., 2007; Norris et al., 2002b). Psychosocial care aims to address mental health problems and needs. It covers all the support and care directed at the psychological wellbeing and health of people affected during and after an event targeted at communities as well as individuals. Psychosocial care interventions are needed in the context of disasters or crises, also in case of chemical, biological, radiological or nuclear (CBRN) events. Such events are characterised by the involvement of CBRN agents, such as toxic and hazardous chemicals/materials, chemical and biological warfare agents or radiological materials. Exposure to these agents can be caused by an industrial accident (e.g. 2011 Fukushima Daiichi nuclear disaster, 1986 Chernobyl disaster, 1989 Exxon Valdez Oil spill), warfare (e.g. 1991 Gulf War, 1945 atomic bombings of Hiroshima and Nagasaki, use of mustard gas and tear gas during World War I), or terrorism (e.g. 2001 U.S. Anthrax attacks, 1995 Tokyo Sarin attacks). According to Lemyre, Johnson and Corneil (2010b), the psychosocial impacts of CBRN agents are greater than the physical impacts. Recently, the Chernobyl Forum concluded that mental health was the largest public health problem unleashed by the nuclear accident in 1986 (Bromet, 2012). The atypical nature of a CBRN event and its mental health effects justify the question of whether psychosocial care in case of CBRN should be different than after a non-CBRN disaster. This question is even more relevant in a world with a chemical industry that continues to grow by more than 3% for the continuing 20 years (World Trade Organization, 2012). In 2004, there were 2780 technological related disasters that affected 144 million people (International Federation of the Red Cross and Red Crescent Societies, 2005). Accidents will continue to happen. Combined with the very real threat of criminal activity and malicious intent for the deliberate release of toxic chemicals, a strong and shared approach to deliver customised psychosocial care is called for.

1.1. Post-disaster psychosocial care: general guidelines and guidance

Several initiatives have been taken to develop general standards for psychosocial care after disasters to help organisations prepare for and respond to all sorts of disasters, natural as well as technological, accidental or with malicious intent. Hobfoll and colleagues synthesised available empirical evidence and formulated five "essential principles" that may be helpful for responders dealing with survivors: promoting a sense of safety, calming, a sense of self-and community efficacy, connectedness and hope (Dückers, 2013; Hobfoll et al., 2007). In Europe, The European Network for Traumatic Stress (TENTS) developed guidelines that cover a broad spectrum of psychosocial interventions at various moments in time: planning and preparation, initial response (first week), early response (first month) and the response between 1 and 3 months (Bisson et al., 2010). Primary recommendations are summarised in Table 1. In short, it is recommended that every area should have a multi-agency psychosocial care planning group comprising mental health professionals. Second, responses should aim to promote the five "essential principles" and provide access to social, physical and psychological support. Third, early application of formal psychosocial applications should not occur (for instance "psychological debriefing"), as many early interventions have not been proven to effectively prevent mental health problems. Fourth, Trauma-Focused Cognitive Behavioural Therapy (TF-CBT) is the first line intervention for individuals who suffer from acute stress disorder and acute Post Traumatic Stress Disorder (PTSD). Both disorders are characterised by unwanted intrusive thoughts of the event, avoidance, negative mood alterations and hyperarousal and last less than respectively 1 to 3 months (American Psychiatric Association, 2013). Finally, detailed planning should occur to support local services for several years following the disaster.

Simultaneously, the EU-project EUTOPA was conducted to create consensus-based guidelines using the Dutch "Multidisciplinary guidelines on early psychosocial interventions after disasters, terrorism and other shocking events" as a point of reference (Impact, 2007; Te Brake & Dückers, 2013). Overall, a large level of consensus was found among experts and care professionals on the content of the guidelines that cover the first 6 weeks after a disaster. It was concluded that psychosocial interventions in the first period should have the following aims: 1) the promotion of natural recovery and the use of natural resources, 2) the identification of people in need of acute psychological help and 3) the referral and treatment of people who need acute psychological help (for an overview of the recommendations see Te Brake et al., 2009).

Table 1. Principal recommendations of the TENTS guidelines

Multi-agency planning group: every area should have a multi-agency psychosocial care planning group that includes mental health professionals with expertise in traumatic stress who have a designated responsibility for psychosocial care following disasters and major incidents. Individuals affected by disasters or major incidents should also be represented.
Psychosocial care plan: every area should have guidelines on the provision of psychosocial care in emergencies (a psychosocial care plan) that are incorporated into the overall disaster/major incident plan and regularly updated.
Training and supervision: all care providers should have undergone formal training and receive on-going training, support and supervision.
Response: the response should promote a sense of safety, self and community efficacy/empowerment, connectedness, calm and hope. Responses should provide general support, access to social support, physical support and psychological support.
Formal early interventions for all: provision of specific formal interventions such as single session individual psychological debriefing for everyone affected should not occur.
Social support: efforts should be made to identify the correct supportive resources (e.g. family, community, school, friends, etc.).
One-stop shop: a humanitarian assistance centre/one-stop shop should be established where a range of services potentially required can be based.
Symptomatic individuals: individuals with psychosocial difficulties should be formally assessed by a trained professional with consideration for their physical, psychological and social needs before receiving any specific intervention.
Trauma-Focused Cognitive Behavioural Therapy (TF-CBT): treatment with trauma-focused CBT should be available for individuals with acute stress disorder or acute post-traumatic stress disorder (PTSD).
Other evidence-based treatments: other treatments with an evidence base for chronic PTSD should be available for individuals with acute PTSD when trauma-focused CBT is not available or is not tolerated.
Evidence-based interventions for individuals with other mental health difficulties should be available.
Long-term coordinated planning and cooperation: detailed planning should occur with local authorities/ governments and existing services to fund and provide appropriate extra provisions to support local services for several years following the disaster.

The essential principles described by Hobfoll et al. (2007) and the TENTS and EUTOPA guidelines are based on a combination of existing empirical evidence and systematically obtained expert consensus. The strength of scientific evidence for recommendations in these general guidelines varies. The World Health Organization (2013) systematically examined the evidence and rated the strength of some (curative) interventions like CBT for PTSD as "average". They are proven to be effective by multiple Randomised Controlled Trials (RCTs). However, evidence for other recommendations is rated as low. For instance community interventions such as 'population screening for mental health problems shortly after a disaster' or

'providing practical and social support', lack high-quality effectiveness research. It remains uncertain whether and how these interventions should be implemented. Response organisations are in need of guidance, and in spite of a current lack of evidence-based interventions are still expected to provide support during times of crisis. In order to minimise the risk that guidelines reflect untested views of experts, guideline development should be based on a combination of empirical evidence and systematically obtained expert consensus (Bisson et al., 2010). The challenge is to identify patterns and at the same time avoid groupthink.

1.2. Psychosocial consequences of CBRN events

The general guidelines discussed were developed to help organisations to prepare for and respond to a diversity of calamities and disasters. No distinction is made in disaster characteristics, while a vast body of literature claims that there are definitely reasons to do so. The psychological response to chemical disasters has specific features, which warrant separate discussion (Hall, Norwood, Fullerton, & Ursano, 2002; Hyams, Murphy, & Wessely, 2002; Weisaeth & Tonnessen, 2003). First, Hyams et al. (2002) concludes after a synthesis of available research that the following features of a health threat are associated with prolonged psychosocial effects: 1) involuntary threats that occur without warning (opposed to individual choice like cigarette smoking); 2) manufactured threats versus natural disasters ("acts of God"); 3) unfamiliar threats with unknown health effects; and 4) threats that pose a danger to children and future generations. All these criteria are applicable to CBRN events. Second, Weisaeth and Tonnessen (2003) conclude that technological disasters have a greater psychosocial impact because they are either caused by malicious intent or human failure, unlike natural disasters, and therefore lead to increased feelings of blame, loss of control, and questions of self-esteem. Third, compared to general disasters, CBRN events typically result in high levels of public fear and uncertainty about exposure to the agent and its negative health effects (Havenaar & Van den Brink, 1997). Fourth, at an organisational level, CBRN disasters typically place a heavy, added burden on the medical system, as a lot of people will have somatic symptoms due to fear of exposure but not because of the hazardous agent. This is illustrated by the 1995 Sarin Attacks in the Tokyo subway: approximately 5510 people sought medical help for physical symptoms even though they were not exposed (Ohbu et al., 1997; Smithson & Levy, 1999). Also, responders (e.g. fire brigade, police, military, medical personnel, and technologists or toxicologists responsible for decontamination) have to take all kinds of physical self-protection measures to not become contaminated and are concerned about their own health and that of their loved ones (Cowan, Ching, Clark, & Kemper, 2005; Wynia &

Gostin, 2004). In Australian responders, Smith, Burkle and Archer (2011) found that high levels of fear and unfamiliarity may make them less willing to respond to CBRN events compared to events that are more familiar (e.g. bush fires, floods) or less feared (e.g. tsunami, earthquakes). Finally, literature suggests that specific groups of people might be at higher risk for the development of psychosocial problems than after natural disasters. Pregnant women form a risk group because of the impact on the unborn child and increased abortion rates (Auvinen et al., 2001; Bertollini, DiLallo, Mastroiacovo, & Perucci, 1990; Knudsen, 1991; Lemyre, Corneil, Johnson, & Boutette, 2010a). Children are at risk because they are smaller (lower proximity to the ground) and tend to put things in their mouth which increases the likeliness of exposure to agents (Lemyre et al., 2010a). Evacuees are another risk group. Long-term evacuation due to decontamination procedures has a significant effect on psychological and physical health, as shown after the Chernobyl disaster (Bromet & Havenaar, 2009; Havenaar et al., 1996).

1.3. New contribution

Despite the presence of generic guidelines on the provision of post-disaster psychosocial care, it is uncertain whether they are applicable to circumstances that involve the (possible) presence of CBRN agents. As these situations might yield the specific psychosocial consequences as mentioned before, a legitimate question is whether these consequences justify different psychosocial interventions to deliver optimal care to people exposed to CBRN disasters. What do we know about psychosocial care after CBRN events and to what extent does it depart from the general guidelines? And if there are differences, what are the implications for actors at different positions within the psychosocial care delivery system? To our knowledge, this is the first study that systematically reviews the international literature in order to examine this question. This study aims to answer two questions:

1). To what extent does psychosocial care in the case of CBRN events differ from other types of events?
2). How strong is the scientific evidence for the effectiveness of psycho-social care interventions in the context of a CBRN event?

The first question will result in an overview of recommendations on behalf of an optimal psychosocial care to communities, organisations and individuals confronted with CBRN-events. The second question will contribute to the knowledge about the evidence base of psychosocial care and the identification of possible gaps in research.

2. Methods

2.1. Databases

To identify empirical studies, electronic searches were performed in Medline, PsycINFO, EMBASE and PILOTS. Searches were conducted in February 2013 and January 2014.

2.2. Search strategy

The search strategy was based on a combination of search terms related to CBRN events together with psychosocial interventions/approaches (see Table 2 for the Medline search strategy). Terms were used in keyword, title, abstract and singular and plural form, with medical subject headings (MeSH) if the database supported this option.

2.3. Inclusion and exclusion criteria

Studies were excluded if the setting was not a CBRN event. Second, studies were excluded if no psychosocial intervention or approach was described that was specifically related to prevention, detection, mitigating or amelioration of the psychosocial impact. Studies not published in English and published before the year 2000 were excluded as well. No exclusion criterion was applied in relation to the target population: studies on civilians, specific groups of civilians (such as children or elderly), responders and communities were included.

To answer the second research question on the effectiveness of interventions, additional stringent inclusion criteria were adopted concerning the study design. We focused on systematic reviews, randomised controlled trials (RCTs), controlled-before-and-after studies (CBAs), interrupted time series (ITSs) and uncontrolled-before-and-after studies (UBAs; the weakest design).

Table 2. Search strategy used to identify studies for inclusion.

1	*Keywords related to CBRN events* CBRN OR CBRNe OR NBC OR WMD OR chemic* OR biologic* OR radiologic* OR radioactive OR nuclear OR "weapons of mass destruction" OR "explosive agents" OR bombs OR "nuclear weapons" OR "biological warfare" AND emergencies OR terrorism OR terror OR attack OR accident OR disaster OR calamity OR emergency OR critical care OR crisis OR war OR battle OR combat OR confrontation OR confronted OR exposure
2	*Keywords related to psychosocial interventions* "psycho-social" OR psychosocial OR psychological OR social OR emotional OR psychosocial deprivation" AND prevent* OR "prevention and control" OR protect* OR detect* OR identify* OR screen* OR reduce* OR mitigate* OR ameliorate* OR monitor* OR track*OR training OR trained
1 AND 2	
Limits:	date of publication: 2000-2013, abstract available, English language, human

2.4. Screening

Screening took place in different stages. During the first round, four reviewers independently screened articles retrieved on title and abstract or, if needed, the full text, based on the inclusion criteria related to setting (CBRN events), psychosocial intervention and population (community/responder/individuals). One reviewer screened all the articles (JG). The other three reviewers each screened an equal number of articles. In those instances in which discrepancies were found, an independent reviewer was consulted to decide if the study should be included for the first round.

During the second round, the quality of the study design was examined. Data were extracted using restructured forms by 1 reviewer (JG). The data extraction was checked for completeness and correctness by an independent second reviewer (MD). In the case of systematic reviews, the topic, setting, search period, data sources, number of included studies, main outcomes, and conclusions were described. For non-review articles, the study setting and the nature of the intervention were described.

For the second research question, a general hierarchy of evidence classification was applied, the first being the strongest: systematic reviews, RCTs, CBAs, ITSs, and UBAs. For all included articles, the strategy was to report an indication of the methodological quality of the study. This approach was based on Cochrane Effective Practice and Organisation of Care Group (EPOC) criteria for reviews, RCTs, CBAs and ITSs (The Cochrane Collaboration; criteria are summarised in Appendix A). We chose these criteria because the research focus of the EPOC Group is on interventions designed to improve the delivery, practice, and organisation of health care interventions. Classification on methodological quality was based on the rule that: If zero to two of the criteria are not fulfilled or reported as unclear in the case of an RCT, CBA, or ITS, the study can be considered "strong". Study designs with half or less of the criteria not fulfilled or reported unclearly can be labelled "moderate". Designs are considered "weak" if more than half of the criteria are not fulfilled or reported. UBAs are "inherently weak due to the absence of a comparison group and the data to examine trends (Eccles, Grimshaw, Campbell, & Ramsay, 2003)."

2.5. Categorisation of findings

To answer research question 1 in a structured manner, we adopted the psychosocial risk assessment and management (P-Ram) framework for CBRN events to categorise recommendations found in the literature (Lemyre et al., 2005). This categorization framework was needed to enable a clear overview of

the recommendations. We selected this comprehensive framework, because it does not recommend specific interventions, but divides them into 4 categories: risk communication, education, social support and professional counselling. To fit all the studies found, we broadened the categories and changed them into 1) risk-and crisis communication (communication during a crisis entails more than communication about risks), 2) education, training and exercise (broader than education), 3) support (includes practical support and a variety of information) and 4) professional care and counselling (covering specialised treatment).

3. Results

3.1. Studies included

A total of 2252 studies were found in the various literature databases. Approximately 42% of these were provided by Medline. After the total number of studies was checked for duplicates, the abstracts of 1966 unique studies were examined using the inclusion criteria. After abstract screening and full-text confirmation (first round screening), 58 articles were found to be eligible. Two reviewers assessed these articles in full text. This excluded another 19 studies as further analysis showed that they did not describe a psychosocial intervention or CBRN event. As a result, 39 studies were included to answer research question 1. In Section 3.3 we describe how useful these studies are for answering research question 2. Appendix B provides an overview of these 39 studies and describes their design, the targeted CBRN event(s), the target group of the intervention (community, organisation or individuals), the proposed intervention(s), and executors of the intervention (e.g. authorities or mental health personnel).

3.2. Research question 1. CBRN related differences

3.2.1. Type of CBRN event

Most of the 39 studies aim to describe psychosocial responses after CBRN events caused by a malicious intent (31 studies), such as terrorism or war, 3 studies focus solely on technological, man-made disasters (accidental or due to negligence) in which CBRN agents were released and 5 studies make no distinction between the two. Almost all included studies base their recommendations on the literature of multiple CBRN events or disasters, most commonly the 2001 U.S. anthrax attacks, 1995 Tokyo Sarin attacks, 1986 Chernobyl disaster, Gulf War (1990– 1991), 2011 Fukushima earthquake disaster that damaged a nuclear power plant, and the 1987 Goiana, Brazil radiation accident. The authors often are inspired by literature

on non-CBRN events, such as 9-11 World Trade Center attacks in 2001, 2005 London bombings, 1995 Oklahoma City bombings, 2003 SARS pandemic, and 1979 Three Miles Island accident. Moreover, concerning the type of CBRN event (e.g. terrorist attack and accident), most of the unsystematic literature reviews and expert opinions do not base their recommendation solely on studies describing the type of event focused on. For instance, a study on bioterrorism can also include information from studies on the psychosocial consequences of 9/11 or Chernobyl.

3.2.2. Psychosocial care

To provide a clear overview of the various recommendations of the 39 studies, we categorised them into 1) risk-and crisis communication, 2) education, training and exercise, 3) support and 4) professional care and counselling.

3.2.2.1. Risk and crisis communication.

Conflicting or unclear messages from authorities and experts are considered to enhance uncertainty and worry among the public and may increase psychosocial problems and risky behaviour, such as non-adherence to prophylactic medication or ignoring advice to evacuate (Lemyre et al., 2010b; Rubin, Chowdhury, & Amlôt, 2012; Wessely, 2005). Unclear information potentially increases the amount of people seeking help, although not suffering from medical problems due to exposure to the CBRN incident (Hick et al., 2011). A large majority of the studies (29; Appendix B) underlines the importance of clear and consistent risk- and crisis communication from governmental and (public) health organisations. Recommendations can be divided into the kind of information that must be provided and how this information must be communicated.

Regarding the kind of *information*, authors advise authorities to communicate about risk of exposure, objective signs of exposure rather than subjective (e.g. location or fever instead of increased heart rate, or other physical symptoms also caused by anxiety), protective behaviour (e.g. adherence to advice to wear protective clothing), dangerous behaviour (e.g. searching for loved ones in a high radiation area), quarantine and isolation, decontamination strategies, vaccination strategies and distribution of medication (Dodgen, Norwood, Becker, Perez, & Hansen, 2011; Hall, Norwood, Fullerton, Gifford, & Ursano, 2004; Rubin et al., 2012; Sheppard, Rubin, Wardman, & Wessely, 2006; Ursano, Fullerton, & Norwood, 2002).

To make sure this information reaches the public (*how*), a vast amount of recommendations deals with actions authorities should take before, during, and shortly after an event and, in the long term (Ritchie et al., 2004). Before an event, it is advised first to prepare a strong and proactive risk communication strategy that

integrates public risk perspectives (Hall et al., 2004; Lemyre et al., 2010b; Noy, 2004; Oordt, 2006; Rubin et al., 2012; Tinker & Vaughan, 2004; Wodarski, 2004).

Second, pre-event communication on CBRN agents helps people to make well-informed judgements rather than adopting spontaneous precautionary actions that may not produce optimal health outcomes (Pastel & Ritchie, 2006; Sheppard et al., 2006). It takes out the mystery of microorganisms and enhances a sense of self-efficacy, mastery, shared expectations and preparedness (Fullerton, Ursano, & Norwood, 2004; Lemyre et al., 2010b). However, Rubin et al. (2012) warn that it is difficult to find a naturally occurring moment that people become receptive to pre-event information. Providing information too early will cause people to be less receptive because the occurrence and consequences of a CBRN attack are too unlikely while providing it too late means that people are already feeling uncertain and threatened for some time, maybe more than necessary. Furthermore, Durodie (2004) concludes that preparing the public for CBRN attacks cannot be short-circuited by a "technical" information campaign. Public resiliency to the mass chaos, fear and conflict which bioterrorism aims to generate benefits from a sense of common purpose and active political engagement in society.

During or shortly after the event, the following recommendations are made (Alexander & Klein, 2003; Blanchard et al., 2005; Cwikel, Havenaar, & Bromet, 2002; Hyams et al., 2002; Lemyre et al., 2010a,b; Pastel & Ritchie, 2006; Ursano et al., 2002; Wessely, 2005):

- Set up a central information centre.
- Work closely with community members and leaders.
- Develop a collaborative relationship with the media and provide them with good quality information to avoid rumours or false information that may enhance uncertainty.
- Organise credible governmental leaders for the media who have a basic understanding of CBRN agents, health effects and other scientific issues.
- Utilise popular news media.
- Give consistent messages to different groups in the community (e.g. do not raise suspicion of discrimination, as illustrated by the 2001 U.S. Anthrax attacks in which the predominantly African American postal workers believed that unfair treatment on the basis of race/ethnicity and socioeconomic status had occurred).

Long-term surveillance studies should be initiated to generate evidence-based answers to questions about rates of exposures and diseases (Hyams et al., 2002; Ursano et al., 2002; Wessely, 2005; Wodarski, 2004). This research should be set up in an early stage after an incident or disaster and not in response to later public/

media pressure and can play an important role in preventing or mitigating social stigma and diminishing concerns about (mental and physical) health effects and reproductive behaviour (Lemyre et al., 2010a; Ursano et al., 2002).

3.2.2.2. Education, training and exercise

27 studies focus on preparation of the health care system and training of responders who take care of the affected community and high-risk groups. The health care system has an essential role: a confronted community needs both emergency intervention and long-term health care. During and shortly after a CBRN event, the medical system might be confronted with a large group of people suffering from CBRN related problems that might be caused by physical exposure but may be very well caused by fear of exposure. This happened, for instance, after the Tokyo Sarin attacks in 2005 and the radiological contamination incident in Goiania, Brazil, in 1987 (Knudson, 2001; Petterson, 1988). To prevent the health care system from getting overwhelmed, and to provide optimal short-and long-term psychosocial care for those affected, the following recommendations are made (Becker, 2005; Benedek, Holloway, Becker, 2002; Fullerton et al., 2004; Hall et al., 2002; Markel et al., 2008; Noy, 2004; Pastel & Ritchie, 2006; Scharoun & Dziegielewski, 2010; Ursano et al., 2002; Wessely, 2005; Wodarski, 2004):

- Plan and train for a quick mobilisation of the system to be able to quickly diagnose symptoms of contamination and provide treatment.
- Develop and coordinate a(n electronic) network for quick information dissemination between different organisations (medical system, first responders, public health organisations, authorities, etc.).
- Prepare for decontamination and quarantine measures.
- Implement a triage system that helps to distinguish those with medical problems from those with symptoms due to fear of exposure. To accomplish this, the mental health care system must join with the public health system and emergency response system.
- Train in signalling and responding to psychological problems after disasters, such as fear, anger, and somatic symptoms.
- Prepare for follow-up and registries, that are needed in the long term to identify those with psychical injuries such as late radiation-induced damage or cancer, or psychiatric disorders. Monitoring these medical health consequences of CBRN agents will require expert input from epidemiologists.

High-risk groups require specific preparation. Lemyre et al. (2010a) warn first responders to be prepared for psychosocial interventions for children. Drug treatment needs to be modified for children's lower body mass, decontamination units must be customised to child size, and evacuation procedures are to be made responsive to the fear of children to be disconnected from their family. Evacuees who are permanently displaced pose significant problems with the continuity of their complex medical and social care (Hick et al., 2011). Also, elderly people may need more preparation time because they are more difficult to evacuate and may react differently to medication (Johnson et al., 2006). Furthermore, after the Japanese earthquake in 2011 that damaged a nuclear power plant in Fukushima, midwives advised pregnant women about radiation effects to relieve their worries about the negative impact upon their unborn child (Kikuchi & Kikuchi, 2012).

Responders and medical staff should also educate and train themselves in the (health) effects of CBRN agents and in using protective measures to be able to respond appropriately when disaster strikes. Focus groups among nurses reveal that in order to support nurses' ability to cope during bioterrorism, education on CBRN agents, decontamination procedures, self-protection measures, available content experts, information on ways to communicate with their family and training with scenarios using protective equipment are important interventions that may reduce their anxiety to respond (O'Boyle, Robertson, & Secor-Turner, 2006). From previous incidents, such as the SARS epidemic, we know that concerns about contamination of responders themselves or their loved ones may make them less willing to come to work (Alexander & Klein, 2003; O'Boyle et al., 2006; Williams & Williams, 2010). Another factor that may complicate the response to CBRN events is the need for responders to wear protective equipment. This can cause anxiety or claustrophobia which may be reduced by frequent practice to become accustomed to the experience of functioning when wearing protective gear (Alexander & Klein, 2003; Oordt, 2006; Pastel & Ritchie, 2006). Responders who suffer from severe gas mask phobia may benefit from a combination of exposure therapy and relaxation techniques (Oordt, 2006). Finally, to strengthen resilience among responders and authorities, it is strongly recommended to learn about personal reactions to stress and stress management techniques (Alexander & Klein, 2003; Reid et al., 2005; Ursano et al., 2002; Vazquez et al., 2010).

3.2.2.3. Support

Interventions following a CBRN event should be practical and supportive: "The first thing people want is practical support, the second thing is to talk or not or talk with people from their own social network; professionals come low down on

the list" (Wessely, 2005). 15 studies addressed the importance of the accessibility of support for the affected community (Dodgen et al., 2011; Hick et al., 2011; Lemyre et al., 2010a,b; Oordt, 2006; Ritchie et al., 2004) and specific groups such as children and responders (Benedek et al., 2002; Kikuchi & Kikuchi, 2012; Lemyre et al., 2010a; O'Boyle et al., 2006; Ursano et al., 2002; Vazquez et al., 2010). Various recommendations to facilitate support are given. At first, family reunification is a priority and a family reunification system will need to be activated and aggressively implemented (Hick et al., 2011). Second, in case of a (CBRN) terrorist attack, authorities may wish to block mobile phones. Because people become more anxious and less resilient when they cannot reach their loved ones, they should be reluctant to implement this measure and search for ways to keep such a blockage as short as possible (Wessely, 2005). Third, practical support to return to a state of normalcy with respect to appropriate permanent housing, schooling and community service is essential to reduce the risk of long-term psychological impact on children and families (Lemyre et al., 2010a). Fourth, attention must be given to the fact that first responders are often also parents whose primary concern is with their family. Organisations should facilitate communication with family members of their workers and provide safety to their family; otherwise it will be difficult for responders to keep doing their work for they may fear to contaminate their family and stay home (Lemyre et al., 2010a; O'Boyle et al., 2006). According to Benedek et al. (2002), "it is unrealistic to expect staff to respond with empathy for their patients if their own emotional needs are ignored". Finally, in case of CBRN disasters, responders should be aware that quarantine makes social support inaccessible and thereby may lead to psychosocial problems (Lemyre et al., 2010a).

3.2.2.4. Professional care and counselling

18 studies recommend specific psychological interventions for people with or at risk of mental health problems. In line with the general recommendations on post-disaster psychosocial care, it is advised to (Benedek et al., 2002; DiGiovanni, 2003; Dodgen et al., 2011; Fullerton et al., 2004; Hyams et al., 2002; Ursano et al., 2002; Wessely, 2005):

- Identify those at risk of adverse mental health problems and monitor vulnerable groups.
- Offer CBT to those suffering from psychiatric problems and avoid early interventions such as immediate grief counselling or psychological debriefing, as they may not be effective.

Recommendations on professional care, specific to CBRN disasters and not typically recommended after other disasters are:

- Reassure people who are in fear of contamination but are not actually contaminated, it is advised to medically screen them or offer them prophylactic medication (Benedek et al., 2002; Lemyre et al., 2010b).
- Make information cards, available via hospitals, with information on likely emotional reactions and how people can manage these themselves. This may be helpful for a large group of citizens who will come to hospitals because they experience physical symptoms while they have not been exposed (Wessely, 2005).
- Implement a programme to identify, monitor and treat people suffering from idiopathic symptoms (Engel, Hyams, Scott, 2006; Engel, Jaffer, Adkins, Riddle, & Gibson, 2004; Engel et al., 2007).

Engel et al. (2004, 2006, 2007) developed a programme based on the literature on the 1991 Gulf War (after which 17% of UK Gulf War veterans suffered from the 'Gulf War syndrome' and suffered from symptoms of chronic pain, fatigue and depression) comprising preventive efforts, such as family education and support networks, signalling those with symptoms, low intensity primary care treatment, and finally, intensive rehabilitation to reduce morbidity. Finally, after Fukushima, various interventions to prevent PTSD among children have been conducted (but not evaluated), such as setting up play centres for children in evacuation centres (Kikuchi & Kikuchi, 2012).

3.3. Research question 2. Effectiveness of interventions

To answer the second research question on the effectiveness of interventions, we evaluated the design of the 39 studies. Appendix B provides a description of the design. Most studies are unsystematic literature reviews (21 studies). 9 studies are expert opinions (often in combination with unsystematic literature reviews), guidelines (2), or are a description of an intervention or scenario (2). None of these studies clearly specify their research design, provide a clear account of the process by which their findings are produced or describe their method of analysis to support the interpretations and conclusions. We found 3 qualitative studies (using focus groups or open-ended questionnaires) and 1 cross-sectional survey that did provide a description of their research methods. However, none of the 38 studies described above are systematic reviews, RCTs, CBAs, ITSs or UBAs and do not meet the EPOC design criteria. Therefore the quality of design is rated as "weak". We found 1 systematic review (Rubin et al., 2012). The quality of this study is rated as weak because more than half of the criteria for reviews (Appendix A)

are not fulfilled or reported. As a result, none of these 39 studies can be included to ascertain the effectiveness of psychosocial interventions.

4. Discussion

The potential psychosocial impact of CBRN events in combination with the question of whether an alternative response and aftercare is appropriate inspired us to conduct the current study. The studies examined illustrate that (the risk of) CBRN agents in a disaster or emergency situation have specific effects on physical, mental, behavioural and social health.

4.1. Research question 1. CBRN related differences

To what extent does psychosocial care in case of CBRN events differ from other types of events? While going through the 39 studies based primarily on expert consensus, qualitative interviews and unsystematic literature reviews, we reached qualitative saturation. Based on the collected material, we can conclude that most of the recommended psychosocial interventions are in line with or complementary to general guidelines on post-disaster psychosocial care. The primary recommendations of the general TENTS (Table 1) and EUTOPA guidelines appear applicable to CBRN events. This is the case with process measures: forming multiagency-planning groups, developing and testing of psychosocial care plans, education and training of responders. In the light of the care content, the starting premise of psychosocial care is identical: most affected people are resilient, efforts must be made to provide practical and social support, a minority will develop long-term psychosocial problems demanding monitoring activities especially of high-risk groups (children, elderly, people with previous mental disorders and ethnic minorities), and timely treatment must be available for those in need.

The compatibility of process measures and care characteristics can be attributed to similarities in risk factors and psychosocial problems. Many of the risk factors that need to be reckoned with when delivering psychosocial care are not different in case of a CBRN event: e.g. severity of traumatic exposure, previous mental health problems, death of loved ones, injury to self or family members, female gender, lower socioeconomic status, smoking, ethnicity and evacuation (Bonanno et al., 2010; Dodgen et al., 2011; Neria et al., 2009). Still, as pointed out in the introduction and in many of the included studies, there seems to be an essential difference urging for additional interventions in case of CBRN disasters. Two themes are elaborated upon in the literature particularly: risk communication and specific preparation needs of the health care system. These themes are found respectively on the community-and organisational level of the psychosocial care delivery system.

Risk communication is essential to decrease uncertainty about contamination and decontamination effects. A reassuring thought, in line with other disaster studies, is that the included studies encourage putting panic reactions of the public into perspective. From the 2005 London bombings, 9/11, 2001 Anthrax attacks and 1995 Sarin attacks we can learn that the public does not seem prone to panic directly after a disaster and tends to behave appropriately (Sheppard et al., 2006). Still, this does not take away the difficult responsibility to deliver clear and consistent messages in the context of a CBRN disaster. What complicates matters is that laypersons and experts often disagree about the health risks from any given toxic source such as radiation or toxic materials: experts tend to base their opinions on statistics, while the non-scientific people are likely to formulate their risk assessment on personal experience, shared stories or sensationalist media sources and tend to think of all toxic substances as one group (Cwikel et al., 2002).

Specific preparation needs are necessary given the major assignment responders and health care providers are confronted with in the wake of a CBRN event. A particularly difficult task is to differentiate between physical consequences of exposure to CBRN agents and effects of stress. Furthermore, when treating people, responders must also take care of their own health in order to not get contaminated. Especially in situations with high uncertainty about health risks, training and preparation efforts must be directed at minimising or mitigating psychosocial problems among responders and stimulate feelings of control and mastery (Considine & Mitchell, 2009; Rokach et al., 2010). Some studies indicate that responders are at less risk of adverse mental health outcomes, probably because they can cope better due to training and have a specific role and task during a disaster (Norris et al., 2002a,b; Weisaeth & Tonnessen, 2003). Having a role gives control over the situation and meaning to it, as compared to a civilian who might feel more passively overwhelmed by the disaster not knowing what to do or what happened to him/her. However, not all responders have received specific CBRN training or have any experience. This may explain why they might feel less certain of their performance and may be more afraid of making mistakes in case of a rare event like a CBRN event (Smith et al., 2011). Therefore, it is important to distinguish between responders with specific CBRN training/experience and those with less training/experience who are none-the-less expected to respond.

Although studies show that public communication and education and preparation of responders are normal elements of the "disaster cycle" (Alexander, 2002), in the 39 studies they receive a substantial amount of attention, even more than "traditional" individual psychosocial interventions such as support and professional care and counselling. Authors describe these latter interventions

as important but do not elaborate on them and their recommendations depend heavily on the general disaster and mental health literature. Otherwise, the general psychosocial care guidelines take the specific CBRN-related psychosocial consequences into account less. The psychosocial risk assessment and management (P-RAM) framework for CBRN events of Lemyre et al. (2005) can serve as a tool to integrate the current guidelines with the knowledge of CBRN events. The framework is based on and in line with general disaster frameworks (reference is made to the handbook by NSW Institute of Psychiatry and Centre for Mental Health, 2000), but the framework also gives attention to the risk communication and takes the specific role of the health care system and medical personnel into account. Although we highly recommend combining this framework with psychosocial care guidelines, we also advise being aware that guideline implementation will be just as challenging for CBRN events as it is for other disasters. The implementation of guidelines is a crucial step in disaster preparation. And it is a problematic step. The field of post-disaster psychosocial care displays a gap between guidelines developed by experts and actual field practice (Te Brake & Dückers, 2013; Witteveen et al., 2012).

To put it shortly, in relation to the first research question, we conclude that recommendations found in the studies are similar or complementary to general post-disaster psychosocial care guidelines with a notable emphasis on risk- and crisis communication and specific preparation needs. Second, although predominantly focussing on the community and organisations, psychosocial interventions in the case of a CBRN event are ultimately aimed at protecting and supporting individuals, risk and crisis communication, education, training and exercise, support, and psychological care and counselling. Yet the community is used as mediating or moderating factor and as a vehicle to reach individuals. Efforts invested in risk communication (prevent or reduce anxiety, fear or unrest) and system preparedness (well-equipped and knowledgeable professionals) are undeniably valuable for the health and wellbeing of individuals, both citizens and professionals. Third, responders, although some may be more resilient than citizens due to training, selection and role behaviour, are just as worried about the fate of their families, friends and personal well-being. Responders will perform a crucial job for the individuals and communities affected by CBRN events. While doing so, they can be exposed to agents that can be mitigated by wearing protective gear or operating in isolation; measures that are paradoxically stressful themselves.

Finally, when interpreting these results, it is important to realise that they are heavily based on unsystematic literature reviews. Many studies are non-empirical and subjective. Moreover, this implies that, for a large part, this review does not

include original data. The recommendations listed are based on behavioural, social and psychological consequences of CBRN events (often prevalence studies or unsystematic literature reviews themselves), reflect the author's estimation of how to decrease the risk of these negative consequences, and are not based on evaluations of interventions. Another limitation to be aware of is that a substantial portion of the recommendations is based on knowledge of regular psychological and psychiatric literature, as well as crisis management studies that are extrapolated to the CBRN domain (e.g. Benedek et al., 2002; Lemyre et al., 2005, 2010a, 2010b). Extrapolation also occurs the other way around: Reid et al. (2005) discussed the application of a bioterrorism training in response to flooding. Furthermore, a lot of the studies discuss many different disasters, CBRN as well as terrorism and in some cases even natural disasters. Many disasters appear in more than one of the studies. This raises the risk that authors are encouraged to focus on similarities and less on context-specific idiosyncrasies.

4.2. Research question 2. Effectiveness of interventions

The second study objective was to determine if there is any scientific evidence for the effectiveness of psychosocial interventions after CBRN events. After reviewing more than 1900 articles, no studies were found that provide methodologically sound evidence to confirm the effectiveness of recommended interventions. We planned to apply strict inclusion criteria on study design to be able to conclude something about the effectiveness of interventions. UBAs, studies without controls and only before and after measurements, are technically insufficient to attribute effects to a given phenomenon or intervention (Eccles et al., 2003). But even UBAs were not found.

How can it be explained that we did not find any effectiveness studies into psychosocial care after CBRN events? One reason can be that only studies after the year 2000 were included in this review. Major disasters such as Chernobyl and Bhopal happened in the previous century. However, the literature we studied frequently referred to studies published before the year 2000 and we found no referral to evidence-based interventions. The Great Japan Earthquake is too recent to determine its effects and the effectiveness of interventions. Another reason may be that focus of CBRN studies has been on the prevalence of health problems and not on prevention, mitigation and amelioration of these problems. The effectiveness of psychosocial care remains difficult to assess. Many psychosocial interventions after CBRN events are broad-scale community interventions, such as risk communication, family and community support, and primary and secondary preventions that do not follow a strict protocol and seek to reach a large group

of people with variation in stress reactions, level of exposure, past experiences, etc. Therefore, the preferred circumstances for RCTs (in general the ultimate design for effectiveness studies) are more difficult to obtain. On the other hand, less strict designs may yield better insight into treatment effects, for example, because they allow evaluation of treatments that are actually delivered in the field and sample without obvious bias to those enrolling which improves ecological validity (Seligman, 1995). However, this review did not solely look at RCTs and interventions meeting Seligman's criteria would not have been missed.

As mentioned before, current psychosocial care guidelines depend heavily on expert consensus and not on strong scientific evidence. They are rather evidence-informed than evidence-based. Although welcome as road maps, we must be aware of the "terra incognita" and continue our investment in learning from past experiences. Rigorous evaluation of effectiveness and its determinants is indispensable in order to enhance the map and thus the quality of post-disaster psychosocial care. For instance, the relevance of risk and crisis communication after a CBRN disaster is not disputed; at the same time, not one risk-or crisis communication strategy in case of CBRN events has been tested on (cost-) effectiveness. Potentially, this knowledge would not only be valuable to help people overcome their problems, it will also protect them from ineffective interventions. Given the number of potential precipitants involved and the considerable revenues and recourses psycho-social interventions this will demand, it is important for society to gain knowledge on the cost-effectiveness of interventions.

5. Conclusion

Regarding the psychosocial consequences of CBRN events, Wessely (2005) concludes, "The acute effects will be less than we fear and the long-term effects more insidious and difficult to manage than we imagine". We are convinced that evidence-informed knowledge on interventions after CBRN events will help authorities and professionals to manage these effects. This study focused primarily on psychosocial care and not on the nature or prevalence of mental, behavioural or social problems that can arise after a CBRN disaster or event. Other studies, including many of the ones cited, have done this thoroughly. Our aim was to bring together the international body of knowledge on psychosocial interventions after a CBRN event, to identify gaps in the research and to identify recommendations for optimal psychosocial care. We found 39 publications containing suggestions and recommendations for different actors at different positions in the multi-layered post-disaster psychosocial care delivery system. When it comes to sketching an

image of the probable tasks and challenges, we could gratefully build upon the work of the various authors. However, when it comes to the evidence on effectiveness we cannot do anything else than be modest when recommending what to do and how to do it.

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References

Alexander, D. (2002). *Principles of emergency planning and management.* New York: Oxford University Press.

Alexander, D.A., & Klein, S. (2003). Biochemical terrorism: too awful to contemplate, too serious to ignore: subjective literature review. *British Journal of Psychiatry, 183*,

491–7.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders. 5th ed.* Arlington: American Psychiatric Publishing.

Auvinen, A., Vahteristo, M., Arvela, H., Suomela, M., Rahola, T., Hakama, M., & Rytömaa, T. (2001). Chernobyl fallout and outcome of pregnancy in Finland. *Environmental Health Perspectives*, *109*(2), 179.

Becker, S. M. (2005). Addressing the psychosocial and communication challenges posed by radiological/nuclear terrorism: key developments since NCRP Report No. 138. *Health Physics*, *89*(5), 521-530.

Benedek, D. M., Holloway, H. C., & Becker, S. M. (2002). Emergency mental health management in bioterrorism events. *Emergency Medicine Clinics of North America*, *20*(2), 393-407.

Bertollini, R., Di Lallo, D., Mastroiacovo, P., & Perucci, C. A. (1990). Reduction of births in Italy after the Chernobyl accident. *Scandinavian Journal of Work, Environment & Health*, 96-101.

Bisson, J. I., Tavakoly, B., Witteveen, A. B., Ajdukovic, D., Jehel, L., Johansen, V. J., ... & Sezgin, A. U. (2010). TENTS guidelines: development of post-disaster psychosocial care guidelines through a Delphi process. *The British Journal of Psychiatry*, *196*(1), 69-74.

Blanchard, J. C., Haywood, Y., Stein, B. D., Tanielian, T. L., Stoto, M., & Lurie, N. (2005). In their own words: lessons learned from those exposed to anthrax. *American Journal of Public Health*, *95*(3), 489-495.

Bonanno, G. A., Brewin, C. R., Kaniasty, K., & Greca, A. M. L. (2010). Weighing the costs of disaster: Consequences, risks, and resilience in individuals, families, and communities. *Psychological Science in the Public Interest*, *11*(1), 1-49.

Bromet, E. J. (2012). Mental health consequences of the Chernobyl disaster. *Journal of Radiological Protection*, *32*(1), N71.

Bromet, E.J., & Havenaar, J.M. (2009). The long-term mental health impact of the Chernobyl accident. In: Y. Neria, S. Galea & F.H. Norris (Eds.). *Mental health and disasters* (pp. 441–53). Cambridge: Cambridge University Press.

Considine, J., & Mitchell, B. (2009). Chemical, biological and radiological incidents: preparedness and perceptions of emergency nurses. *Disasters*, *33*(3), 482-497.

Cowan, A. E., Ching, P. L., Clark, S. J., & Kemper, A. R. (2005). Willingness of private physicians to be involved in smallpox preparedness and response activities. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, *3*(1), 16-22.

Cwikel, J.G., Havenaar, J.M., Bromet, E.J. Understanding the psychological and societal response of individuals, groups, authorities, and media to toxic hazards. In: J.M. Havenaar, J.G. Cwikel & E.J. Bromet (Eds.). *Toxic turmoil: psychological and societal consequences of ecological disasters* (pp. 39-65). New York: Kluwer Academic/Plenum Publishers.

DiGiovanni, C. (2003). The spectrum of human reactions to terrorist attacks with weapons of mass destruction: early management considerations. *Prehospital and Disaster Medicine*, *18*(3), 253-257.

Dodgen, D., Norwood, A. E., Becker, S. M., Perez, J. T., & Hansen, C. K. (2011). Social, psychological, and behavioral responses to a nuclear detonation in a US city: implications for health care planning and delivery. *Disaster Medicine and Public Health Preparedness*, *5*(S1), S54-S64.

Dückers, M. L. (2013). Five essential principles of post-disaster psychosocial care: Looking back and forward with Stevan Hobfoll. *European Journal of Psychotraumatology*, *4*(1), 21914.

Durodié, B. (2004). Facing the possibility of bioterrorism. *Current Opinion in Biotechnology*, *15*(3), 264-268.

Eccles, M., Grimshaw, J., Campbell, M., & Ramsay, C. (2003). Research designs for studies evaluating the effectiveness of change and improvement strategies. *BMJ Quality & Safety*, *12*(1), 47-52.

Engel, C. C., Jaffer, A., Adkins, J., Riddle, J. R., & Gibson, R. (2006). Can we prevent a second 'Gulf War syndrome'? Population-based healthcare for chronic idiopathic pain and fatigue after war. In *Pain and Depression* (Vol. 25, pp. 102-122). Karger Publishers.

Engel, C. C., Hyams, K. C., & Scott, K. (2006). Managing future Gulf War Syndromes: international lessons and new models of care. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, *361*(1468), 707-720.

Engel, C. C., Locke, S., Reissman, D. B., DeMartino, R., Kutz, I., McDonald, M., & Barsky, A. J. (2007). Terrorism, trauma, and mass casualty triage: How might we solve the latest mind-body problem?. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, *5*(2), 155-163.

Fullerton, C.S., Ursano, R.J., & Norwood, A.E. (2004). Planning for the psychological effects of bioterrorism. In: R.J. Ursano, A.E. Norwood, & C.S. Fullerton (Eds.). *Bioterrorism: psychological and public health interventions* (pp. 2-14). New York: Cambridge University Press.

Grievink, L., Van der Velden, P. G., Stellato, R. K., Dusseldorp, A., Gersons, B. P., Kleber, R. J., & Lebret, E. (2007). A longitudinal comparative study of the physical and mental health problems of affected residents of the firework disaster Enschede, The Netherlands. *Public Health*, *121*(5), 367-374.

Hall, M. J., Norwood, A. E., Fullerton, C. S., Gifford, R., & Ursano, R. J. (2005). The psychological burden of bioterrorism. *Journal of Aggression, Maltreatment & Trauma*, *9*(1-2), 293-304.

Hall, M. J., Norwood, A. E., Fullerton, C. S., & Ursano, R. J. (2002). Preparing for bioterrorism at the state level: Report of an informal survey. *American Journal of Orthopsychiatry*, *72*(4), 486.

Havenaar, J. M., & Van den Brink, W. (1997). Psychological factors affecting health after toxicological disasters. *Clinical Psychology Review*, *17*(4), 359-374.

Havenaar, J. M., Van den Brink, W., Van den Bout, J., Kasyanenko, A. P., Poelijoe, N. W., Wohlfarth, T., & Meijler-Iljina, L. I. (1996). Mental health problems in the Gomel region (Belarus): an analysis of risk factors in an area affected by the Chernobyl disaster. *Psychological Medicine*, *26*(4), 845-855.

Hick, J. L., Weinstock, D. M., Coleman, C. N., Hanfling, D., Cantrill, S., Redlener, I., ... & Knebel, A. R. (2011). Health care system planning for and response to a nuclear detonation. *Disaster Medicine and Public Health Preparedness*, *5*(S1), S73-S88.

Hobfoll, S. E., Watson, P., Bell, C. C., Bryant, R. A., Brymer, M. J., Friedman, M. J., ... & Maguen, S. (2009). Five essential elements of immediate and mid-term mass trauma intervention: Empirical evidence. *Focus*, *7*(2), 221-242.

Holloway, H. C., Norwood, A. E., Fullerton, C. S., Engel, C. C., & Ursano, R. J. (1997). The threat of biological weapons: prophylaxis and mitigation of psychological and social consequences. *JAMA*, *278*(5), 425-427.

Hyams, K. C., Murphy, F. M., & Wessely, S. (2002). Responding to chemical, biological, or nuclear terrorism: the indirect and long-term health effects may present the greatest challenge. *Journal of Health Politics, Policy and Law*, *27*(2), 273-292.

Impact (2007). *Multidisciplinaire richtlijn vroegtijdige psychosociale interventies na rampen, terrorisme en andere schokkende gebeurtenissen* (Multidisciplinairy guidelines early psychosocial interventions after disasters, terrorism and other shocking events). Utrecht: Trimbos Institute.

International Federation of the Red Cross and Red Crescent Societies (2005). *World disaster report. Focus on information in disasters.* Geneva: IFRC.

Johnson, A., Roush Jr, R. E., Howe, J. L., Sanders, M., McBride, M. R., Sherman, A., ... & Weiss, J. (2006). Bioterrorism and Emergency Preparedness in Aging (BTEPA) HRSA-Funded GEC Collaboration for Curricula and Training. *Gerontology & Geriatrics Education*, *26*(4), 63-86.

Kikuchi, S., & Kikuchi, T. (2012). The medical association activity and pediatric care after the earthquake disaster in Fukushima. *The Keio journal of medicine*, *61*(1), 23-27.

Knudsen, L. B. (1991). Legally-induced abortions in Denmark after Chernobyl. *Biomedicine &Pharmacotherapy*, *45*(6), 229-231.

Knudson, G. B. (2001). Nuclear, biological, and chemical training in the US Army Reserves: mitigating psychological consequences of weapons of mass destruction. *Military Medicine*, *166*(suppl_2), 63-65.

Lemyre, L., Clément, M., Corneil, W., Craig, L., Boutette, P., Tyshenko, M., ... & Krewski, D. (2005). A psychosocial risk assessment and management framework to enhance response to CBRN terrorism threats and attacks. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, *3*(4), 316-330.

Lemyre, L., Corneil, W., Johnson, C., & Boutette, P. (2010a). Psychosocial considerations about children and radiological events. *Radiation Protection Dosimetry*, *142*(1), 70-76.

Lemyre, L., Johnson, C., & Corneil, W. (2010b). Psychosocial considerations for mass decontamination. *Radiation Protection Dosimetry*, *142*(1), 17-23.

Markel, G., Krivoy, A., Rotman, E., Schein, O., Shrot, S., Brosh-Nissimov, T., ... & Eisenkraft, A. (2008). Medical management of toxicological mass casualty events. *The Israel Medical Association Journal: IMAJ*, *10*(11), 761-766.

Neria, Y., Galea, S., & Norris, F.H. (2009). *Mental health and disasters.* Cambridge: Cambridge University Press.

Neria, Y., Nandi, A., & Galea, S. (2008). Post-traumatic stress disorder following disasters: a systematic review. *Psychological Medicine*, *38*(4), 467-480.

Norris, F. H., Friedman, M. J., & Watson, P. J. (2002a). 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. *Psychiatry: Interpersonal and Biological Processes*, *65*(3), 240-260.

Norris, F. H., Friedman, M. J., Watson, P. J., Byrne, C. M., Diaz, E., & Kaniasty, K. (2002b). 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981–2001. *Psychiatry: Interpersonal and Biological Processes*, *65*(3), 207-239.

Noy, S. (2004). Minimizing casualties in biological and chemical threats (war and terrorism): the importance of information to the public in a prevention program. *Prehospital and Disaster Medicine*, *19*(1), 29-36.

NSW Institute of Psychiatry and Centre for Mental Health (2000). *Disaster Mental Health Response Handbook.* North Sydney: New South Wales Health.

O'boyle, C., Robertson, C., & Secor-Turner, M. (2006). Public health emergencies: nurses' recommendations for effective actions. *Aaohn Journal*, *54*(8), 347-353.

Ohbu, S., Yamashina, A., Takasu, N., Yamaguchi, T., Murai, T., Nakano, K., et al. (1997). Sarin poisoning on Tokyo subway. The Southern medical journal, 90, 587–93.

Oordt, M.S. (2006). The psychological effects of weapons of mass destruction. In: C.H. Kennedy, & E.A. Zillmer EA (Eds.). *Military psychology: clinical and operational applications* (pp. 295-309). New York: Guilford Press.

Pastel, R.H., & Ritchie, E.C. (2006). Mitigation of psychological effects of weapons of mass destruction. In: E.C. Ritchie, P.J. Watson, & M.J. Friedman (Eds.). Interventions following mass violence and disasters: strategies for mental health practice (pp. 300–18). New York: Guilford Press.

Petterson, J. S. (1988). Perception vs. reality of radiological impact: the Goiania model. *Nuclear News*, *31*(14), 84-90.

Plum, K.C., & Veenema, T.G. (2003) Management of psychological effects. In: T.G. Veenema (Ed.). Disaster nursing and emergency preparedness for chemical, biological and radiological terrorism and other hazards. New York: Springer.

Reid, W. M., Ruzycki, S., Haney, M. L., Brown, L. M., Baggerly, J., Mescia, N., & Hyer, K. (2005). Disaster mental health training in Florida and the response to the 2004 hurricanes. *Journal of Public Health Management and Practice*, *11*(6), S57-S62.

Ritchie, E. C., Friedman, M., Watson, P., Ursano, R., Wessely, S., & Flynn, B. (2004). Mass violence and early mental health intervention: A proposed application of best practice guidelines to chemical, biological, and radiological attacks. *Military Medicine*, *169*(8), 575-579.

Rokach, A., Cohen, R., Shapira, N., Einav, S., Mandibura, A., & Bar-Dayan, Y. (2010). Preparedness for anthrax attack: the effect of knowledge on the willingness to treat patients. *Disasters*, *34*(3), 637-643.

Rubin, G. J., Chowdhury, A. K., & Amlôt, R. (2012). How to communicate with the public about chemical, biological, radiological, or nuclear terrorism: a systematic review of the literature. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, *10*(4), 383-395.

Scharoun, K., & Dziegielewski, S. F. (2004). Bioterrorism and the emergency room: Planning for the unexpected. *Stress, Trauma, and Crisis*, *7*(3), 135-150.

Seligman, M. E. (1995). The effectiveness of psychotherapy: The Consumer Reports study. *American Psychologist*, *50*(12), 965.

Sheppard, B., Rubin, G. J., Wardman, J. K., & Wessely, S. (2006). Terrorism and dispelling the myth of a panic prone public. *Journal of Public Health Policy*, *27*(3), 219-245.

Smith, E. C., Burkle, F. M., & Archer, F. L. (2011). Fear, familiarity, and the perception of risk: a quantitative analysis of disaster-specific concerns of paramedics. *Disaster Medicine and Public Health Preparedness*, *5*(1), 46-53.

Smithson, A., & Levy, L.A. (1999). Rethinking the lessons of Tokyo. In: A. Smithson, L.A. Levy (Eds.). Ataxia, the chemical and biological terrorism threat and the U.S. response, report no. 35 (pp. 71–111). Washington DC: Henry L. Stimson Center.

Sohier, A., & Hardeman, F. (2006). Radiological Dispersion Devices: are we prepared?. *Journal of Environmental Radioactivity*, *85*(2-3), 171-181.

Te Brake, H., & Dückers, M. (2013). Early psychosocial interventions after disasters, terrorism and other shocking events: is there a gap between norms and practice in Europe?. *European Journal of Psychotraumatology*, *4*(1), 19093.

Te Brake, H., Dückers, M., De Vries, M., Van Duin, D., Rooze, M., & Spreeuwenberg, C. (2009). Early psychosocial interventions after disasters, terrorism, and other shocking events: Guideline development. *Nursing & Health Sciences*, *11*(4), 336-343.

Tinker, T.L., & Vaughan, E (2004). Communicating the risks of bioterrorism. In: R.J. Ursano, A.E. Norwood, & C.S. Fullerton CS (Eds.). Bioterrorism: psychological and public health interventions (pp. 308–29). New York: Cambridge University Press.

Ursano, R.J., Fullerton, C.S., Norwood, A.E. (2002). Responding to bioterrorism: individual and community needs. Bethesday MD: Uniformed Services University of the Health Sciences.

Vazquez, M., Jordan, O., Kuper, E., Hernandez, D., Galmarini, M., & Ferraro, A. (2010). Management of acute traumatic stress in nuclear and radiological emergencies. *Health Physics*, *98*(6), 795-798.

Weisaeth, L., & Tonnessen, A. (2003). Responses of individuals and groups to consequences of technological disasters and radiation exposure. In: A.E. Norwood (Ed.). *Terrorism and disaster: individual and community mental health interventions* (pp. 209–35). New York: Cambridge University Press.

Wessely, S. (2005). Don't panic! Short and long term psychological reactions to the new terrorism: the role of information and the authorities. *Journal of Mental Health, 14*, 1–6.

Williams, G., & Williams, E. (2010). A nursing guide to surviving a radiological dispersal device. *British Journal of Nursing*, *19*(1), 24-27.

Witteveen, A. B., Bisson, J. I., Ajdukovic, D., Arnberg, F. K., Johannesson, K. B., Bolding, H. B., ... & Nordanger, D. O. (2012). Post-disaster psychosocial services across Europe: The TENTS project. *Social Science & Medicine*, *75*(9), 1708-1714.

Wodarski, J. S. (2004). Preparing social services and public services professionals for meaningful roles in disaster services. *Crisis Intervention & Time Limited Treatment*, *7*(4), 209-222.

World Health Organization (WHO)., (2013*). Guidelines of the management of conditions specifically related to stress.* Geneva: WHO.

World Trade Organization (WTO) World trade report 2012 (2010). *Trade and public policies. A closer look at non-tariff measures in the 21st century.* Geneva: WTO.

Wynia, M. K., & Gostin, L. O. (2004). Ethical challenges in preparing for bioterrorism: barriers within the health care system. *American Journal of Public Health*, *94*(7), 1096-1102.

Appendix A

EPOC criteria for reviews, RCTs, CBAs and ITSs

Study Design	Criteria
Review	a. eligibility was scored by at least two authors; b. authors used inclusion and exclusion criteria; c. designs were judged using predefined criteria (EPOC); d. findings were scored by at least two authors; e. authors used data extraction forms.
Randomized controlled trial (RCT)	a. protection against selection bias; b. protection against contamination (e.g., randomizing organization/professionals rather than individual patients); c. protection against exclusion bias; d. follow-up of patients or episodes of care; e. comparability of baseline measurements; f. protection against detection bias (blinded assessment of primary outcomes; g. reliability of primary outcome measures.
Controlled-before-and-after studies (CBA)	a. protection against contamination; b. protection against exclusion bias; c. follow-up of patients or episodes of care; d. comparability of baseline measurements; e. protection against detection bias; f. characteristics for studies using second site as control; g. reliability of primary outcome measures.
Interrupted time series (ITS)	a. intervention is independent of other changes; b. data were analysed appropriately (ARIMA or time series regression); c. reason for the number of points preintervention and postintervention given; d. shape of the intervention effect was specified; e. intervention unlikely to affect data collection; f. protection against detection bias; g. completeness of data set; h. reliability of outcome measures.

Appendix B

Characteristics of studies addressing psychosocial care after CBRN events

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
Alexander et al., 2003 (1,2,3,4; unsystematic literature review, weak)	• Training and preparation for first responders should cover: information about reactions to stress, physical effects of toxic agents, decontamination procedures, psychological effects of barrier environments and practice with wearing protective equipment (as this can compromise physical function, communication with colleagues, and can cause overheating, hyperventilation and panic). • It is crucial to develop collaborative relationships with media to prevent distrust in authorities and uncertainty. The general principles of crisis intervention and psychological first aid must be specified to bioterrorism.	Biological or chemical terrorism Combination: CBRN events and general disasters/terrorism, such as 9/11, Tokyo Sarin attacks, Chernobyl disaster Authorities and mental health agencies
Becker, 2005 (1,2; expert opinion (meetings to develop the 'National Council on Radiation Protection and Measurements Report No. 138'), and description of interventions, weak)	• Some of the most difficult aspects of consequence management may relate to the social and psychological after-effects of an incident. Psychosocial and communication issues need attention. Areas need to invest in: • multidisciplinary hospital scenario training with a discussion on psychological effects of disasters or inclusion of psychological casualties; • policy and guidance development, including psychological and behavioural consequence management and managing stress in first responders (early interventions, risk communication); • roundtables to identify hospital and clinician needs (internal and external communication, challenges faced, before, during and after an event) and development of a toolkit for hospitals and clinicians (communication, list of policy information officers and community resources; factsheets on radiation, contamination etc.); • surveys and focus groups among the public to understand their perceptions and concerns and improve risk communication; • integration of psychosocial and communication components into radiological terrorism preparedness and response plans.	Radiological or nuclear terrorism n/a Authorities (federal, local and state agencies), hospitals

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
Benedek et al., 2002 (1,2,3,4; unsystematic literature review, weak)	• Unlike natural disasters, medical responders have a vital role in CBRN disaster and must be aware of this; they are the first to identify the consequences of the event and are challenged to address them. • Although effective recognition, triage, and treatment are the most important aspects of emergency management, these efforts must be accompanied by measures aimed at mitigating rage, helplessness, and hopelessness associated with the experience of an attack or exposure. • Many biological agents have been linked to psychopathologic problems and symptoms (anthrax, brucellosis, q-fever, botulinum toxic, viral encephalitis). • Conservative use of prophylactic medication may reduce symptoms in exposed and uninfected individuals. • There is no evidence that group debriefing techniques and critical incident debriefings reduce the development of psychiatric illness or prevent the development of PTSD. Nonetheless, evidence suggests that ongoing frank and open discussions among care providers and emergency responders (just as with other potential victims) foster cohesion and group understanding of the unfolding event. • Clear, consistent, accessible and reliable information from trusted sources will diminish public uncertainty. • Train, prepare and organise care for medical responders. It is unrealistic to expect the medical staff to respond with empathy for their patients if their own emotional needs are ignored. • Social, psychotherapeutic and psychopharmacological treatments are necessary for some patients. Preventive strategies must take into account that specific groups, , such as first responders and healthcare providers, are at high risk for psychiatric morbidity. These and other specific risk groups will benefit from the same interventions developed for the community as a whole.	Bioterrorism Combination: CBRN events and general disasters/terrorism Medical emergency responders
Blanchard et al., 2005 (1; qualitative study using focus groups, weak)	• The consistency of messages across all groups affected is paramount to encouraging trust. In the event of uncertainty, it is important to be honest and provide reliable updates. • Communication efforts should closely involve people within the community (also the workspace) of exposed individuals. • The community should be involved in helping to devise plans for intervention, treatment and communication. • Future communication efforts must also consider the diversity of individuals who might be affected.	Public health emergencies U.S. Anthrax Attacks Communicators (all those involved in communication about the event)

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
Cwikel et al., 2002 (1; unsystematic literature review, weak)	• Since typically some health services are already functioning, the first step after a disaster is to designate one central information centre and additional centres, clinics, or telephone lines available for those needing help to cope with the disaster. • Authorities and media require a thorough understanding of scientific issues and need to be able to communicate quickly with reliable and specific information to the lay public. They must maintain their trustworthiness and adequately influence the assumption of risk or lack of risk in the population and high-risk groups. • Involve community members in the design, implementation and analysis of risk communication. • There should be a clear public body from the government responsible for communication with the affected public. • When many sectors are involved, it is critical to coordinate the media contact and information release. • The media can play a pivotal role in either providing responsible information on the situation or inflating rumours that increase anxiety. • Advocacy groups are very effective in making sure that problems affecting the exposed population are not forgotten and taken off the public agenda.	Ecological disasters Combination: CBRN events such as Chernobyl disaster (main source), Hiroshima and Nagasaki bombings, Gulf War and Three Mile Island Authorities, media and advocacy groups
DiGiovanni, 2003 (1,2,3,4; unsystematic literature review and expert opinion (workshop of the U.S. government and Red Cross to find consensus on early interventions after traumatic events), weak)	• To manage patients, accurate triage is important: distinguish those with psychiatric symptoms because of anxiety/fear from those who show psychiatric symptoms due to exposure to an agent. Some agents also cause psychological effects. • Mental health resources must be allocated and utilised. • When offering early psychological interventions: 1. professionals should be aware that most distressed victims do not develop mental disorders, 2. interventions should be voluntary, 3. early brief and focused psychotherapy can reduce distress in victims who suffered losses, 4. single one-to-one recital of traumatic events and emotions do not reduce the risk of mental health problems, and 5. not all published early interventions are proven to be effective. • Persons who perform mass interventions such as mass education through media, psychological triage and leadership consultation should have the knowledge and accountability to do so, for they may cause harm.	Attacks with weapons of mass destruction using chemical, biological and radiological agents Combination: CBRN events and general disasters/terrorism Mental health professionals, people responsible for the early management of a disaster

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
Dodgen et al., 2011 (1,2,3,4; unsystematic literature review and expert opinion (e.g. personal communication, reports of expert meetings), weak)	For acute response (within 48 hours), early response (48 hours to 1 month) and recovery (1 month to years) recommended interventions are: • address psychological barriers to protective behaviour (e.g. adhering guidance to shelter, wearing protection); • discourage dangerous behaviour (e.g. searching for loved ones in high radiation areas); • manage patient/survivor flows to diminish surge on hospitals; • support first responders with training (also because it reduces uncertainty and stress); • facilitate medical and psychological triage; • strengthen resilience by promoting the five "essential principles" (a sense of safety, calm, self- and group-efficacy, connectedness with others and hope); • target psychiatric disorders (including medically unexplained physical symptoms); • provide evidence-based early psychological treatment.	Nuclear detonation Combination: CBRN events and general disasters/terrorism, such as bombings on Nagasaki and Hiroshima and 9/11 Behavioural health care providers
Durodie, 2004 (1; unsystematic literature review, weak)	Increase resilience and confidence across society by restoring a sense of common purpose and active political engagement. Political leadership cannot be short-circuited by technical means of information campaigns.	Bioterrorism Combination: CBRN events and general disasters/terrorism Politicians
Engel et al., 2004 & 2006 (4; unsystematic literature review, weak)	A multi-layered population-based healthcare model is developed to prevent and mitigate idiopathic symptoms after war (not specifically CBRN). The model consists of 4 steps: 1. Start with post-war preclinical prevention to reduce incidence and prevalence of idiopathic symptoms. Approach: general prevention efforts on exposures and proximity of exposure to traumatic events or hazardous exposures (e.g. screening and education at the workplace, informal 'lay' debriefings, family education and support networks). 2. Provide routine primary care symptom mitigation to identify and reduce the prevalence of idiopathic symptoms. Approach: primary care provider delivers diagnostic services, low-intensity treatments and psychosocial support. 3. Provide collaborative primary care to reduce the prevalence of idiopathic symptoms and prevent disability. Approach: interdisciplinary practice teams intensify care in coordination with primary care provider (e.g. patient education regarding symptoms and disability, physical and psychosocial reactivation efforts, negotiated goal setting, collaborative problem-solving).	War Gulf War Mental health professionals

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	4. Provide intensive rehabilitation to reduce morbidity. Approach: specialised multidisciplinary and multifaceted rehabilitative programmes (e.g. 3-4 week inpatient or 10-15 weeks weekly ambulatory care, structured and behavioural intensive rehabilitation efforts, graduated return to work, planned practice team follow-up).	
Engel et al., 2007 (4; unsystematic literature review and expert opinion (meetings of the 'Working Group on Psychiatric Screening and Triage during Terrorist Attacks'), weak)	A healthcare system response model with four levels is proposed that addresses the identification and treatment of mass idiopathic illness. • Level 1: distance assessment with an initial remote contact (e.g. telephone or internet). Identify those who need immediate care and those who can stay home. • Level 2: brief medical assessment in which the clinician looks for acute unstable medical or surgical disease and those who need immediate medical attention. • Level 3: clinician obtains a review of systems (symptom count) and assesses health anxiety based on standardised measurement tools (screening) and a more detailed physical examination. Identify idiopathic symptoms. • Level 4: Primary care for people with idiopathic symptoms. This will consist of watchful waiting including scheduled visits, self-care instruction and the provision of health information. Early voluntary psychiatric consultation could reduce symptoms. Several assessment tools are proposed for idiopathic physical symptoms, psychiatric distress, psychiatric disorders, and worry about illness and conviction.	Radiological, biological or chemical terrorist attacks Combination: CBRN events and general disasters/terrorism Healthcare system
Fullerton et al., 2004 (1,2,4; unsystematic literature review, weak)	• Traditional natural disaster models of health care have limited applicability in bioterrorism. • The mental health care system must join with the public health and emergency response system to address the need for triage, surge capacity and health surveillance. • Mental health intervention must target the community and vulnerable groups of directly exposed, those with pre-existing mental health problems and those with limited support systems and recourses. • Mental health intervention includes prompt medical response to a bioterrorist attack. This will increase the public sense of safety and confidence in institutions. • Institutions must be trained and prepared to be able to respond to the sudden surge need of victims to prevent organisational panic.	Bioterrorism Combination: CBRN events and general disasters/terrorism, war and outbreaks of diseases/pandemics Mental health professionals, public health professionals and emergency responders

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• Communication is a core principle of consequence risk management. The public will actively seek information on whether they are at risk and what they can do to protect themselves. Information about the source of exposure scope of the outbreak, number of people exposed, etc. is needed. Physicians play an important role in education about risk and prevention and can influence how people perceive risk and will behave. Overall: educating the authorities and the public about bioterrorism takes out the mystery of microorganisms and prepares people to respond appropriately rather than irrationally.	
Hall et al., 2002 (1,2; qualitative study using an open-ended questionnaire, weak)	Effective and accurate risk communication is a key early psychosocial intervention. States should: • have an interagency emergency planning group; • anticipate differences between response requirements for bioterrorism and natural disasters; • develop plans and policies to address behavioural and mental health issues specific to bioterrorism; • implement a risk communication programme; • implement communication plans to inform the public on psychological/behavioural issues; • make working agreements with the media that include mental health; • be involved in bioterrorism training exercise (including risk communication and interaction with the media). Mental health consultation to bioterrorism planning at all levels (federal, state and local) is crucial to mitigating the psychosocial impact.	Bioterrorism n/a State departments of mental health
Hall et al., 2004 (1,4; unsystematic literature review, weak)	• Develop a risk communication plan and education to address issues like isolation, quarantine, administering vaccinations, and distributing medications. • Early mental health interventions should identify symptoms and behaviours linked to psychological distress and suggest strategies to restore well-being.	Bioterrorism Combination: CBRN events, pandemics and general disasters/ terrorism. People involved in planning for public's psychological and behavioural reactions

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
Hick et al., 2011 (1,2,3; unsystematic literature review, weak)	Public communication, both basic information and risk communication, should be used to reduce unnecessary demands on the medical system. This should be coordinated with governmental messaging. Key principles during the recovery phase: • medical monitoring and care will be ongoing and, in some cases, complex; • social and behavioural health issues will become dominant after the initial acute medical care period and will require multidisciplinary approaches; • family reunification system will need to be activated and aggressively implemented; • continuity of access to health care and essential social systems will be essential to meet victim needs; • a rapid return to a state of normalcy with respect to appropriate permanent housing, schooling, community services, and other essential systems will be essential to reduce the long-term psychological impact on children and families; • a significant portion of the evacuees will be permanently displaced, posing significant problems with the continuity of their complex medical and social care; • long-term monitoring should be done for those deemed to be at risk for late radiation-induced damage or cancer. Those who require monitoring will require expert input from epidemiologists; • long-term follow-up and registries will be needed for other physical injuries and psychiatric support.	Nuclear detonation Combination: CBRN events and general disasters/terrorism, such as hurricane Katrina, terrorist attacks in Israel, 9/11, earthquakes, fires, Oklahoma City bombings Emergency medical services
Hyams et al., 2002 (1,2; unsystematic literature review, weak)	A community confronted with a CBRN threat needs both emergency intervention and long-term healthcare, extensive medical and risk assessment information, and economic support. Multiple challenges to the credibility of governmental and scientific authority could hamper recovery efforts. Recommendations are clustered into three categories:) health care, 2) risk communication and management and 3) surveillance and research. **Healthcare** • Clinical care and specially trained providers must be readily available to meet the community's healthcare needs and restore confidence in public institutions. • Health care has to be furnished by private physicians, health maintenance organisations or federal health care systems.	Chemical, Biological or Nuclear Terrorism Combination: CBRN events and general disasters/terrorism, such as U.S. Anthrax Attacks, Gulf War, Tokyo Sarin Attacks, Chernobyl disaster, 9/11 Heath care system, government, authorities, experts, media

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• To ensure access to health care, well-trained personnel and early identification of worsening health problems, health care should be centralised in local medical facilities. • Offering mental health care shortly after mass terror is important; however immediate grief counselling or psychological debriefing may not be effective. **Risk communication and Management** • The primary method for rapidly disseminating information is through the popular news media. • Public officials and scientific experts have to be as open, clear and forthcoming as possible to the public and provide the press with the best available information: cooperate with the press, discourage false rumours but do not provide false reassurance. • The press has to educate itself about a new health threat in order to accurately report the news. • Effective risk communication requires a two-way exchange of information with the affected public: work closely with community leaders. • The government should take responsibility for its mistakes and clearly explain the reasons for critical decisions in order to maintain trust. • For recovery of people's sense of control and resilience: risk management efforts have to prevent demoralisation and ensure that members of the affected population are characterised as survivors rather than victims. • Rapid financial assistance and the rebuilding of the community's economy provide substantial health benefits. **Surveillance and research** • Identification of affected individuals should be based on the objective characteristics of the injury caused by the particular agent and should not rely on nonspecific symptoms that may be related to mass sociogenic illness: this will lead to misclassification and confusion among the public. • Longitudinal surveillance studies should be initiated to generate evidence-based answers to questions about rates of exposure and diseases. • Research should be initiated early and not in response to later media pressure. It is necessary not only to answer pressing health questions but as part of the risk-management process itself.	

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
Johnson et al., 2006 (2; unsystematic literature review and expert opinion (advice of U.S. Geriatric Education Centres), weak)	• Elderly have complex physical, social and psychological needs. Elders and persons with disabilities may need more preparation time, a variety of communication and warning modalities, availability of oxygen and respiratory equipment, training in alternative transfer techniques and exit routes, and assistance to maintain regularity in medication and treatment regimes. • A trained workforce of interdisciplinary healthcare providers is essential to operationalise systems that are necessary to meet the needs of elders. • Evidence-based guidelines are needed for emergency preparedness plans in various settings across the elder care continuum. • Medical and nonmedical professionals, policy-makers and researchers all have a role in meeting the needs of the elderly.	Biological terrorism Combination: CBRN events and general disasters/terrorism Medical professionals
Kikuchi and Kikuchi, 2012 (3,4; no design described, description of an intervention, weak)	A programme was implemented to alleviate mental health problems in children by: • distribution of leaflets on how to care for children with anxieties; • setting up children's play corners in evacuation shelters; • organising lectures by a childhood trauma specialist and a specialist in nuclear power accidents, non-fiction writer and facilitator of storybook reading; • the organisation of two children's' festivals to provide children with active indoor play and physical exercise. Pregnant women might suffer from anxiety concerning radiation exposure. Midwives can give advice to pregnant women to relieve their worries.	Disasters and crisis Fukushima earthquake disaster that damaged a nuclear power plant Physicians, psychologists, public health nurses, childcare staff
Knudson, 2001 (2; unsystematic literature review, weak)	U.S. army reserves play an important role in responding to an incident. They need training by engaging in realistic scenario exercises that put theory into practice. This will help them gain proficiency in protective equipment and confidence in their medical support and will minimise psychological as well as physical casualties.	Terrorist attacks with biological, toxic, chemical and nuclear weapons of mass destruction Combination: war with and without the use of CBRN weapons People responsible for the U.S. army reserves

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
Lemyre et al., 2005 (1,2; qualitative study (focus groups and public telephone survey), expert opinion (roundtable consultations) and unsystematic literature review, weak)	A psychosocial risk assessment and management (P-RAM) framework is developed to help identify the full range of psychosocial aspects potentially associated with CBRN threats and attacks. Normal and abnormal psychosocial effects of a CBRN event (behavioural, cognitive, spiritual, emotional, social and physical) depend on the *situation* (event characteristics at different points in time: pre-event (preparedness and planning, threat, warning), impact (impact) and post-event (rescue, recovery, and reconstruction)), *population* (community, individuals and vulnerable groups such as elderly, children and responders), and *interventions.* Regarding the intervention, several relevant levels are distinguished within the framework: individual, community and society. Psychosocial interventions can be aimed at these levels and at an organisational level. The interventions are subdivided into four categories: • risk communication; • education; • social support; • professional counselling. Important, too, is that the framework recognises that the implementation of psychosocial or bioenvironmental interventions, may result in further psychosocial effects (for instance quarantine may result in social stigma; communication strategies that address stigma may be needed). A limitation is that the framework does not provide a detailed description of specific psychosocial interventions and the best way to apply them.	CBRN threats and attacks Combination: CBRN events and general disasters/terrorism CBRN emergency responders, planners and decision-makers in different phases
Lemyre et al., 2010a (1,2,3,4; unsystematic literature review, weak)	Psychosocial interventions for children • *General:* Reunify children with their parents, preserve the family unit. Encourage expression through play and discussion with parents and/or peers, give credible reassurance, clarify misconceptions, and encourage social activities. • *First responders:* Be prepared for a lack of local paediatric speciality resources and the fact that children require different intervention as they are affected differently: Drug treatments need to be modified because of children's decreased body mass, decontamination units need to be made fit to children (children are unable to self-decontaminate and children are at greater risk of hypothermia during decontamination), efforts must be made to keep families together, especially during decontamination and communication during evacuation procedures need to be prepared for fear of children to be disconnected with family.	Radiological events Combination: CBRN events and general disasters/terrorism, specifically Goiania Brazil, Oklahoma city bombings, Beslan, 9/11 and Chernobyl disaster First responders, (mental) health organisations, parents, media, schools

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• *Families*: Workers are also parents and response plans must take into account the parental role of workers. Pregnant women require special consideration because of the biological impact upon the unborn and because abortion rates may rise. • *Schools:* Parents, teachers and counsellors should learn to differentiate between stress reactions in children as they may differ from adults. They should know how to convey credible reassurance and foster a sense of safety while guiding children through appropriate self-protection responses. Schools are ideal for exercises, education and drills and are vectors of preparedness for radiological events. • *Media:* Monitor news content and limit the number of time children are exposed to traumatic imaginary on TV. Open discussion of news between parents and children is to be advocated. Media must monitor content shown and warn audiences to remove children. Media plays an important role in educating and preparing the public.	
Lemyre et al., 2010b (1,2,3,4; unsystematic literature review, weak)	• Perceptions matter: an effective risk communication strategy is needed because behaviour, worry and outrage are dependent on risk perceptions. Unclear information on contamination or decontamination can create distrust, uncertainty, and non-adherence to advice (e.g. refusal to take prophylactic medication). • Screening people who are in fear of contamination but are not actually contaminated can reassure them and can increase trust in public officials. Pre-screening using sensitive portal monitors may assist in separating those who fear contamination and those actually contaminated. • Provide good quality information to the media in an open, candid manner and work out a relationship that fosters and feeds the role of the media as protecting the public good. • Use social media to reach a larger public in a timely manner with preventive and mitigating recommendations. • Given the impact of uncertainty upon risk perceptions, it is better to acknowledge what is not known as well as the steps that are being taken to handle a situation than to say nothing at all. • Adapted behaviour from the public and compliance with authority guidelines for decontamination depends on public education and appropriate communication of risk pathways and protective measures. • Enhancing a sense of self-efficacy, agency, mastery through skill sets, shared expectations and preparedness training improves behavioural response.	Radiological, biological or chemical events that require mass decontamination Combination: CBRN events and pandemics, such as Chernobyl disaster, Goiania, Brazil, Tokyo Sarin attacks, U.S. Anthrax attacks, Three Mile Island and the 2003 SARS pandemic Responders, communicators, public officials, personnel of the healthcare and emergency infrastructure, public behaviour

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• Pre-event rehearsal training improves performance, at a minimum, mental imagery, virtual drills, vicarious play in a secure environment will all help if actual enacting is not possible. • People will do everything to get reunited with close ones. Keep families together during an extreme event, plan quarantine assistance to prevent the negative consequences of isolation, pre-plan the surge of people to get connected to each other so that it does not overwhelm the emergency response system. • It is inevitable to rely on community volunteers and this demands pre-planning, pre-training and education about emergency assistance and mass decontamination principles.	
Markel et al., 2008 (2; expert opinion (Armed Forces Radiobiology Research Institute conference in 2000), weak)	Citizens will rapidly overflow the hospitals with symptoms related to stress reaction (mainly acute stress reaction, anxiety with or without somatisation, and concerns for relatives). • Concomitant to field rescue teams, mental health professionals should arrive at the hospitals. • These teams should initiate treatment as soon as possible once the possibility of toxic exposure has been eliminated.	Toxicological mass casualty events. n/a Hospitals
Noy, 2004 (1,2; unsystematic literature review, weak)	Implement a prevention programme, far in advance of a strike, relying on the premise that the public is rational and acts adaptively and should take an active role in protecting itself and the community. The following ingredients are important: • early mobilisation of the medical system for prompt diagnoses and treatment; • early recruitment of detection service (police, emergency services, epidemiological centres, special laboratories); • early preparation of specific instructions to the population for the time of the strike; • slow dissemination of relevant information about the threat; • guidance using effective coping tools for the public (give information before critics discuss it, do not withhold negative information); • informing the public correctly about the threat and the protective steps.	Biological and chemical attacks Combination: CBRN and general terrorism and war studies such as 9/11, Gulf War, U.S. Anthrax Attacks, Goiania Brazil Leaders

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
O'Boyle et al., 2006 (2,3; qualitative study using focus groups, weak)	Preparation for emergencies should include assessment of nurses' or stakeholders' concerns. Specific measures can improve safety, reduce anxiety, increase trust in hospitals and provide physical and emotional support. Interventions that support nurses' ability to cope during bioterrorism are: • accessible and adequate protective equipment; • education and drills; • accessible information; • available content experts and available administrators; • increased security to protect nurses; • emotional and physical support; • communication with family; • commitment from institutions to care for ill or injured nurses.	Bioterrorism n/a Nurses
Oordt, 2006 (1,2,3,4; unsystematic literature review, weak)	Many of the psychological effects of weapons of mass destruction in the military population are the result of wearing or using protective equipment. Effective functioning compromised people wearing protective clothing and a gas mask. To decrease the anxiety of wearing a gas mask it is advised to provide: • stress inoculation training and frequent practice with gas masks; • a psychological intervention involving relaxation techniques and systematic exposure in case of severe gas mask anxiety. Key preparation issues are to: • prepare for effective communication with the public by community leaders who are able to maintain sources of emotional and practical support, and deal with fear and helplessness; • give psychologists a role in managing community reaction after CBRN attacks; • create training scenarios that involve role players with emotional distress, psychiatric symptoms, and behavioural disturbances; • avoid the use of quarantine, when possible, and instead use public education about exposure and request voluntary curtailment of travel; • ensure that all officials are aware of the basic principles of risk communication when working with the media, including the importance of expressing empathy toward the public and providing accurate and honest information; • develop a public education campaign on preparation for an event; • educate and train first responders;	War with CBRN agents Combination: CBRN events and general terrorism and war, such as World War 1 and 2, Gulf War, Iraqi war, U.S. Anthrax Attacks, Tokyo Sarin Attacks, flu vaccine supply and military exercises and training Military, psychologists, community leaders

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• establish a command and control centre to coordinate services and use of personnel; • ensure the security of communication systems; • plan for processing of the dead that is attentive to family wishes and customs.	
Pastel and Ritchie, 2006 (1,2; unsystematic literature review, weak)	Many psychological and medical effects can be prevented or mitigated by proper planning and practice prior to a CBRN event. Mental health care providers need to be integrated with disaster response plans and emergency rooms. • *Preparation:* Planning should be done in many forms: the education of the public, table-top exercises, disaster drills, practice performing tasks in protective equipment and mass casualty exercises. Consider the best way to inform the public about CBRN risks. Explore different types of scenarios, and the role different agencies will play as well as the obstacles (also jurisdictional). Emergency departments must be prepared for large amounts of people concerned about exposure. Medical and mental health care providers need to be trained (e.g. identification and differentiation of medical and psychological effects, attention to workers' concerns about exposure). • *Protection equipment issues:* Organise routine, well-rehearsed training, replicating normal procedures to make staff members familiar with the equipment. • *Risk perception and health risk communication:* Daily or twice daily scheduled briefings with media and public is valuable (also if there is no information to share). The public should be provided with accurate information and workable solutions. • *Triage and issues of differential diagnoses:* Identify and treat psychological symptoms at an early stage. Reassure these symptoms are normal after an abnormal event. Mental health care providers must be integrated into emergency rooms to remove psychological casualties from emergency rooms and take them to a less stressful environment.	CBRN weapons Combination: CBRN events, war, pandemics and general disasters/ terrorism, such as Hiroshima and Nagasaki bombings, Three Mile Island, Chernobyl disaster, US Anthrax Attacks, World War 1 and Gulf War, plaque, SARS pandemic, and 9/11 Authorities, health care providers
Reid et al., 2005 (2; cross-sectional quantitative study, weak)	A 5-day Bioterrorism Trauma Intervention Specialist Training is developed. It is not only useful for responding to bioterrorism but to all kinds of disasters. The training focusses on learning and practising how to offer mental health interventions to victims. The training covers: assessment, triage, early trauma intervention, debriefing, Critical Incident Stress Management, compassion fatigue, grief intervention, cultural competence and team development. It includes interactive methods such as role-playing and scenarios.	Bioterrorism n/a Public health practitioners, healthcare providers, mental health professionals

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	A survey after four hurricanes in Florida in 2004 (no CBRN event) among 53 participants suggests that the training is useful in enhancing knowledge and skills related to traumatic stress reactions and trauma interventions. The training also increased confidence among responders. They applied some of the acquired skills after the hurricanes.	
Ritchie et al., 2004 (1,3,4; no design described, description of a scenario, weak)	In this scenario, injuries, deaths and destruction to properties were minimal and social support systems stayed intact. Therefore, the impact on mental health was moderate to minimal. Components from best practice guidelines on early mental health interventions were applied in the context of the scenario. Recommendations depend on the time phase: Three phases were distinguished: *Initial needs (1-3 days), intermediate responses (3 days- 3 weeks) and longer-term interventions*. Besides provisions for basic needs, community-level programmes were recommended to reduce stress, enhance social support and provide reassurance about future risk. Identifying those at risk for severe impairments is important. Critical interventions in this scenario focused on need assessment, risk communication (leaders who gave consistent messages avoided panic) and targeted interventions fostering natural resilience and support.	Chemical, biological and radiological attacks The scenario of a bomb and Anthrax attack near the Pentagon in the U.S. Mental health professionals, governmental agencies, first responders
Rubin et al., 2012 (1; systematic review (studies included are qualitative studies, cross-sectional surveys or based on hypothetical scenarios), weak)	This review provides guidance on communicating with the public. *What to say?* • Consider the existing understandings and "mental models" of the public and tailor messages accordingly to correct serious misunderstandings and resonate with current conceptions. • Before a CBRN event: Find a naturally occurring moment that people become perceptive to information on CBRN attacks (not too early because occurrence and consequences for the public are too uncertain, and not too late so people will not feel unsafe unnecessarily). Give information that is likely to contribute to the possibility of people to protect themselves and others • After a CBRN event: Explain how recommended actions work and how we know they are effective. Exposed people need information on the likelihood of exposure (this is a determinant of levels of anxiety and adherence to medication). To prevent low-risk patients seeking medical treatment, communicators should focus on explaining objective signs of exposure (e.g. location or fever) rather than subjective. Information about medication (where they have been tested, when and why required, how well they work) may increase adherence.	CBRN terrorism Combination: CBRN events, specifically U.S. Anthrax attacks, London polonium-210 incident, hypothetical scenario's Communicators

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	How to say it? • Trust determines if messages will be attended to or have the desired effect. • Ensure that consistent messages are given by representatives from multiple organisations. • Include representatives and community leaders from different sections of society and in multiple languages. • Demonstrate that responders are motivated solely by the well-being of those affected, that they are competent and that they are being open and honest. This might even reduce the negative impact of inconsistencies between official messages and media reporting.	
Scharoun and Dziegielewski, 2010 (1,2; summary of guidelines, weak)	Recommendations from governmental agencies on hospital preparedness and planning to prevent further medical and psychological problems are summarised: • prevent the health infrastructure from getting overwhelmed; • detect symptoms of contamination in an early stage (delineating it from common flu); • promptly identify the nature of the agents working together with laboratories; • initiate a quick response to prevent disease and take decontamination measures; • prepare strategies to communicate with experts and the community. Additionally, the article provides a quick list of questions that help emergency departments assess their level of preparedness.	Bioterrorism Combination: CBRN events and general disasters/terrorism Public health system
Sheppard et al., 2006 (1; unsystematic literature review, weak)	• A nation's preparation for terrorist attacks must include not only physical response mechanisms (medical care and emergency services) but also psychological measures (risk communication and targeted information). • Effective risk communication could mitigate the adverse behavioural reactions that could undermine a nation's response. • Give specific advice and instructions on evacuations plans, quarantine, and vaccination strategies. • Increase the public understanding of CBRN terrorism to promote desired behavioural responses.	Terrorism Combination: CBRN events and general disasters/terrorism, specifically Tokyo Sarin attacks, 9/11, U.S. Anthrax attacks, London bombings, World War 1 Authorities

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
Sohier and Hardeman, 2006 (1; unsystematic literature review, weak)	Risk communication: provide information on what happened, the reason for intervention and the type of action to be taken. It is essential to build trust between authorities and the public.	Terrorism with radiological dispersion devices Combination: radiological accidents/ disasters such as Chernobyl disaster, Goiania Brazil, radiological accident in Istanbul Authorities
Tinker and Vaughan, 2004 (1; unsystematic literature review and expert opinion (semi-structured interviews with experts), weak)	An extensive list of recommendations for risk communication is categorised into five main recommendations: • adopt a strong proactive strategy for risk communication; • Build public trust and confidence in risk management soon after a suspected or confirmed act of bioterrorism has occurred; • Integrate public risk perspectives into communication planning and preparedness; • Update and improve risk communication training procedures and preparedness to address the unique challenges by dynamic and evolving risk situations; • Strengthen risk communications and public health capabilities for rapid responding in the event of an act of bioterrorism.	Bioterrorism Combination: CBRN events and general disasters/terrorism, such as 9/11 Crisis managers and public health authorities
Ursano et al., 2002 (1,2,3,4; expert opinion (summary of 2001 conference "Planning for biological events. Responses to terrorism and infectious disease outbreaks"), weak)	**Policy needs** • Public health infrastructure must be developed or improved at all governmental levels by implementing standards for public health practice; sustained funding for preventive services and healthcare facilities is necessary. • Government and private enterprise must form partnerships to address psychosocial consequences of bioterrorist attacks as they affect the continuity of enterprise and productivity at work. • Roles and responsibilities for mental health- and behavioural response consequence management need to be delineated at all governmental levels. • There is a need for a national information policy and local implementation plan developed in coordination with representatives of actors at other levels.	Bioterrorism Combination: CBRN and general disasters/ terrorism studies and pandemics Public health authorities, mental health professionals, governmental authorities, media

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• Funding decisions should reflect the critical role of mental health in assuring the continuity of society and an adequate strategy to anticipate psychosocial consequences. The goal of terrorism is the degradation and destruction of the nation's social capital - morale, safety, and productivity. The continuity of an effective social and community organisation must be given high priority. The maintenance of economic viability is critical, as severe economic downturns have been associated with increased rates of psychiatric illness and suicide. • Public and private business policies should be developed to facilitate a rapid recovery in the workplace. Buildings remain intact, but employees may fear to return to them resulting in increased rates of absenteeism and sick leave. • Mental health interventions should be conceived, developed, and funded in a community support context. For example, the provision of instrumental support (e.g. assistance in finding childcare or alternative travel arrangements) is an important opportunity to sustain resilience. • Policies must reflect the medical infrastructure, logistical capacities and personnel availability (e.g. a critical shortage of nurses; the capacity to increase beds,). These matters will determine the medical community's ability to respond. • Policies must address the psychosocial consequences of instituting quarantine, distributing limited resources, mandatory treatment and the use of investigational drugs. • The effects of foot and mouth disease demonstrate the important role of mental health programmes for veterinarians, farmers, and ranchers where economic and emotional losses result from bioterrorism. • After an attack, there will be tensions between the goals of the scientific world and the political world. Coordination between health care, political offices, and public affairs is needed in an ongoing programme. **Mental health- and behavioural planning** • Public officials should anticipate community beliefs in conspiracy theories; scapegoating, paranoia and stigmatisation are expected reactions to a terrorist attack. • Rapid, accurate tests to diagnose illness are significant ways to diminish anxiety. • The significant damage to the economy will be followed by a second surge of mental health consequences affecting a much broader spectrum of society.	

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• Guidelines should be developed that address the psychosocial consequences of quarantine. Mental health acute surge capacity and ongoing service resources must be evaluated. Some people suffer from psychiatric disease as support systems are lost and stressors increase. Preplanned community interventions must be available for high-risk groups such as children and the elderly. • Strategies are needed to diminish terror and mobilise positive action in order to promote resiliency and recovery. • Multidisciplinary training and education programmes are needed, based on evidence-based practices that span the continuum from early crisis counselling to longer-term care for people with psychiatric disorders. • The mental health community should determine how existing hotline models can be adapted for effective interventions with an anxious public. • Local institutions and help groups can be vehicles for fostering social cohesion and decrease fear. • Methods of delivering mental health care that minimise requirements for logistical support (e.g. video teleconferencing, online therapy) must be developed as this can be particularly useful in case of an attack with a contagious organism. • Plans should include contingencies for providing care in circumstances without electrical power or technology. • Mental health interventions should include broadly conceived individual and group interventions and policies for improving function, fostering resilience and providing hope. The design of memorial services and how to return workers to an anthrax-exposed workplace are examples. • While panic is rarely seen, prior planning, education, and realistic training reduce the risk of panic amongst professional groups. • The mental health community should work closely with the clergy, who are an integral part of the healthcare disaster response teams. **Communication programmes** • Physicians require education and preparation on working with the media. Comments must be limited to their professional expertise. • Communications with the public must be bi-directional. • The mental health community must ensure that journalists have ready access to recognised experts. Journalist and public health officials must work together to ensure the accuracy of information.	

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• Influenza and chickenpox seasons offer an opportunity for the medical community to assist the public in self-triage and to establish workable messages that are effective for various populations with fears of infection and contagion. • Efforts must be made to develop "simple" health-related slogans that can be useful to the public in preparation. • Journalists are at high risk for psychological trauma. Efforts should be made to promote resiliency and facilitate their ability to report objectively and accurately. • Multiple and often not considered information vehicles are important for information distribution before and after an attack (e.g. popular TV shows, reading tabloids, the internet). • Journalists and physicians should continuously develop strategies for controlling false rumours and developing educational messages. • Educate journalists on the issues of CBRN threats. "Hands-on" training is welcome. For example, wearing protective gear worn by first responders or working in a laboratory to see how Anthrax testing works. • Public information strategies should be built around the journalistic formula: "Who, what, when, where, why, and how?" • Provide a central website that is updated frequently and offers links to information about bioterrorism health issues. • Provide funding to adapt information developed nationally for other levels. • Governmental authorities need to identify local and credible experts and link them with media programmes. • Inform public and business leaders about the right language to avoid stigmatisation and improper triage. **Education and training** • Educate leadership at all levels about the psychological and behavioural implications of crisis management and issues in relation to bioterrorism. Create awareness. • Education and training of primary care providers on psychological and behavioural responses is a priority. Traumatic events and chronic stress can have a direct effect on mental health and medical problems (e.g. diabetes, heart disease). • Educate leaders about the challenges of bioterrorism for the current mental health system and its lack of surge capacity, particularly about the long-term in relation to the community.	

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• Educate public leaders, the media, and entertainers about the expected problems produced by stigmatisation and conspiratorial theories in the wake of catastrophic events.	
	Decision support (data acquisition for health surveillance and programmes development) • Make mental health surveillance a standard part of post-bioterrorism responses. Provide "real-time" assessments of community perceptions, fears and symptoms, monitor changing mental health needs, and adjust resources accordingly. Use a variety of channels (telephone, internet, traditional information sources such as school absences and work sick days) and existing surveillance and reporting systems. • Learn more about factors contributing to people's sense of safety and factors promoting altruism under difficult circumstances, e.g., what would motivate people to cooperate with quarantine? • Perform epidemiological studies of mental health responses to terrorism and the effect of ongoing terrorist threats on mental health and behavioural service needs. • Evaluate mental health interventions in order to plan for subsequent attacks. • Do research to identify unrecognised high-risk populations (such as bereaved parents of adult children) in order to develop specialised intervention programmes. • Research should delineate valid community-wide measures of mental health (such as the rates of prescriptions for psychotropic medications, alcohol use, school and work absences) that can be incorporated into surveillance programmes. • Develop templates at national level for collecting mental health surveillance data and developing useful databases. Adapt these templates to intermediate and local levels. • Develop a detailed taxonomy of disasters including bioterrorism. Identify common and discriminating elements associated with various events. Information on contextual issues is important. • Lessons learned from earlier events e.g. September 11th and the anthrax attacks) should be incorporated into response plans. • Organise support concerning the course of neurobehavioral change and the impact of psychosocial and psychopharmacological interventions.	

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
Vazques , 2010 (1,2,3,4; unsystematic literature review, weak)	In order to cope with traumatic stress, all organisations involved in preparedness and response should: • recommend responder strategies for the handling of traumatic stress (e.g. no alcohol, quick relaxation techniques, avoid isolation, limiting the time watching the news, keeping in mind that during stressing times "it is normal not to feel well", etc.); • contemplate the intervention of a " mental health team" in plans; • include specific training on stress awareness programmes for managers and stress management for all the staff; • establish an organisational traumatic incident management team; • promote interactions with professionals from other disciplines such as social workers, sociologists and anthropologists enabling a more comprehensive approach to the problem; • inform and educate the population to look for more adequate individual and organisational responses, • establish support programmes to assist families; • instruct the public information officer to inform with clearly and updated facts (prevent rumours); • promote debriefing reunions as a tool for information and social support.	Nuclear and radiological emergencies Combination: Hiroshima and Nagasaki bombings, Chernobyl disaster, Goiania Brazil and Three Mile Island Mental health organisations
Wessely, 2005 (1,2,3,4; unsystematic literature review, weak)	**Short-term** • The first thing people want is practical support, the second thing is to talk (or not to talk) with persons in their own personal network, professionals are low on the list. • Immediate post-trauma counselling of normal people ("debriefing") does not reduce distress or promote resilience. • Interventions must be practical rather than emotional: give timely and accurate information and promote social support of family and friends. Try not to block mobile telephone networks because people need to find their loved ones. • Hospitals may get overwhelmed by people seeking (mostly unnecessary) medical help because of anxiety, uncertainty over perceived symptoms or general concern: preparation is important for instance by stockpiling simple information cards to be available via hospitals with information on likely emotional reactions and how people can manage these themselves.	CBRN terrorism. Combination: U.S. Anthrax Attacks, 9/11, London Blitz during World War II, SCUD missile attacks in Israel in 1991, other war and disaster studies. Authorities

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	Long-term • Rumours and uncertainty on health effects may cause distrust, sap resilience and increase psychosocial problems. This scenario will be easier to manage if: • during the acute crisis authorities are perceived as being open and secure; • authorities are responding fairly and do not seem to discriminate between, for instance, poor postal workers or rich staff; • attempts were made during the acute incident to maintain a register of who was and who was not exposed; • authorities have a programme of sensible research in place from an early period and not in response to later public/media pressure.	
Williams and Williams, 2010 (2; guideline, weak)	Prior training and education are needed to address fears and ensure a positive response. Nurses are less willing to respond to dirty bombs because of concerns about the safety of loved ones, potential staffing problems, contamination, lack of information and self-protection. To address the information gap between nurses' concerns and the impact of radiological dispersal devices, knowledge should be increased on radiological decontamination, self-protection, and their role. Important information is that patients can usually self-decontaminate and pose no genuine threat to nursing staff.	Radiological dispersal devices Combination: CBRN events and general disasters/terrorism Nurses
Wodarski, 2004 (2,3,4; unsystematic literature review, weak)	Mental health professionals must be prepared to deal with the following common psychological reactions (cf. Holloway et al., 2002 and Plum & Veenema, 2003): (1) horror, anger and/or panic; (2) illogical thinking about microbes and viruses; (3) fear of invisible agents and/or fear of contagion; (4) attribution of arousal symptoms to infection; (5) anger at terrorists, the government or both; (6) scapegoating, loss of faith in social institutions; (7) paranoia, social isolation and/or demoralisation. Mental health practitioners will have to be trained in (cf. Holloway et al., 2002 and Plum & Veenema, 2003): • Prevention of group panic; • Avoiding a "rush" through the grievance process; • Careful rapid medical evaluation and treatment (to distinguish between hyperarousal, intoxication and infection); • Avoidance of emotion-based responses; • Effective coordination regarding potential risk; • Control of symptoms secondary to hyperarousal (provide reassurance, or medication if necessary);	Biological, chemical and radiological assaults Combination: CBRN events and general disasters/terrorism Social services and public health professionals

Reference (Intervention category*; overall quality of design)	Intervention	Type of event focused on Event knowledge originated from Recommendations directed at
	• Management of anger, fear or both; • Management of misattribution of somatic symptoms; • Provision of respite as required; • Restoration of an effective, useful social role (e.g. as a worker at a triage site); • Return to usual sources of social support in the community. Mental health providers must learn specific skills to provide for effective caregiving: • Constructive coping styles; • Normalising thoughts, feelings and behaviours; • Support for family members • Reactions to trauma • Stress-related problems (anxiety, sleeplessness, low motivation) • Provision of resources (stress reduction, problem-solving, cognitive restructuring, appropriate assertiveness) • Self-care for professionals • Giving exact information For the development of an integrated community disaster preparedness programme, the following activities should be implemented: • Develop and initiate (electronic) network information dissemination procedures. • Develop reader-friendly brief communications on guidelines for the provision of disaster preparedness services. • Develop brief trainings in stress reduction, cognitive restructuring and strategies for "re-charging batteries". • Provide community information on empirically based interventions and evaluation of outcomes. • Provide for coordination of a network of disaster preparedness. • Continue preparing state-of-the-art papers on empirically-based interventions and prevention approaches. • Execute relevant research studies. • Organise credible leaders for the media. • Hold conferences that facilitate various response networks. • Conduct in-service training at hospitals, police stations and mental health facilities on biological, chemical and radiological disaster preparedness.	

*Categorisation model: 1. risk- and crisis communication, 2. education, training and exercise, 3. support and 4. psychosocial care and counselling

Chapter 7

Discussion

1. Introduction

"Leven is risicovol, pech zal altijd bestaan. Een kleine troost is dat pech per definitie nooit helemaal eigen schuld is. En het sociale vangnet dient de ergste pijn van pech te verzachten."[1]

Arnon Grunberg, 17 January 2018, De Volkskrant

The writer, a Dutch novelist and columnist, touches upon important aspects of exposure to adverse events. It can be viewed as 'bad luck' that a police officer investigating child pornography is suddenly overwhelmed by a video of an extremely violent beating also found on the perpetrators' computer. Or that someone who rarely flies, experiences a plane crash and is suddenly confronted with intense feelings of fear and powerlessness. Disturbing events like these will happen and are to a large extent inevitable. Organizations or governments are not able to prevent these events from happening. Nor can they fully prevent the potentially negative mental health consequences. Nevertheless, there are means to support people in coping with the distress caused by these events.

The social environment surrounding a victim (family, friends, the organization someone works for, or community someone lives in) plays an important role in offering support and fulfilling the victims' basic needs after stressful events. However, although people and organizations around the victims are often willing to help, they are also in need of guidance on how to best address the victims' needs. The first aim of this dissertation was to contribute to the knowledge on support after crises by studying elements of a supportive work environment that facilitates the wellbeing of high-risk professionals.

A minority of those affected develops severe and long-lasting posttraumatic mental health problems. For them, support from the direct environment will not be sufficient and professional care from, for instance, a psychologist is required. Therefore, timely detection of those at risk of mental health problems is crucial. The second aim of this dissertation focused on identifying individuals with high levels of distress after crises

This chapter reflects on the findings in the previous chapters and their implications for future research, practice, and policy. Regarding the theme of providing a supportive work environment, intriguing issues in need of further

1 Life is full of risks, bad luck will always exist. By definition, bad luck is never fully anyone's own fault, which may be a small consolation. And the social safety net should alleviate the worst pain of bad luck

elaboration are: the negative influence of daily organizational stress, the protective impact of perceived support from colleagues and managers compared to actual received support, and the (unknown) effect of repeated exposure to critical incidents. Timely identification after large-scale incidents is discussed by addressing: the importance of studying factors predicting unmet treatment needs in addition to psychopathology, the advantages and disadvantages of active outreach as a disaster response and possibilities to further improve the evidence-base for psychosocial support.

2. A supportive work environment for high-risk professionals

2.1 The impact of organizational stress: implications for practice

A manager of a Human Resources Department suspects that the increase in sick leave of employees due to stress-related health issues is caused by the increased exposure to critical incidents. A mental health organization experienced in supporting high-risk professionals is consulted and based on its advice, employees are offered a yearly consult with a psychologist. In these consultations, employees reveal that most of the time, they do not experience distress resulting from critical incidents. Although some incidents are emotionally demanding, they have the support and experience needed to deal with them. More stressful is the latest reorganization: employees have to cover larger areas of the country and spend more time traveling from work to home, which interferes with their work-home balance and reduces the time to informally talk to colleagues. Also, the reason for reorganization is unclear to them. Their work motivation decreases and they start complaining, which makes them tired and cynical.

Although critical incidents are damaging aspect of the job, employees themselves do not necessarily experience them as most distressing. We found in Chapter 3 that organizational job demands such as high workload or difficulties with supervisors were strongly associated with multiple indicators of reduced wellbeing among police officers investigating sexual assault and child pornography. The actual content of the work and being able to work autonomously related positively to their wellbeing. Prospective studies among other occupational groups also indicated that organizational demands are a stronger predictor of mental health problems than the actual incidents (Huddleston, Stephens, & Paton, 2007; Liberman et al., 2002; Van der Velden, Kleber, Grievink, & IJzermans, 2010).

Currently, guidelines on psychosocial support strongly focus on offering practical and emotional support after critical incidents and monitoring employees' wellbeing (Creamer et al., 2012; Impact, 2012). They emphasis the prevention of psychopathology related to exposure to critical incidents (Creamer et al., 2012; Impact, 2012). However, based on the results in Chapter 3, the impact of daily organizational stress should not be discarded. Stimulating the use of specific personal resources and job resources, such as keeping a professional distance from the work, autonomy and professional development can also contribute to employee's wellbeing. In the subsequent sections of this paragraph, we provide recommendations for practice based on these findings.

Recommendations at an organizational level

Organizations have many priorities and responsibilities that are conflicting with strategies to create a supportive work environment. For example, a police organization could experience political pressures to catch sorts or numbers of perpetrators, a so-called performance indicator. Several perverse effects are associated with these indicators: it becomes difficult to reduce workload for professionals, it diverts investments in human capital to technology and reduces professional development. For change to occur, high-risk organizations must prioritize implementing occupational health policies reducing organizational stress and stimulating the use of (job and personal) resources.

The implementation of (health) policies and the process of organizational change has been extensively studied in the field of governance and public administration. This has led to useful models for change or institutional development (e.g., Ansell & Gash, 2007; Michie, Van Stralen, & West, 2011). In essence these models stress that all levels within an organization (from the directors and managers at macro level, to team supervisors and individual employees at micro level) have to contribute to a supportive work environment, be convinced of the importance of such an environment for wellbeing and work performance (e.g., Schaufeli, Bakker, & Van Rhenen, 2009), and cooperate internally and externally. For example, team supervisors are in the position to function as gatekeepers between the management of an organization and individual employees by timely detecting distressing organizational demands and a lack of job resources such as team cohesion or opportunities for professional development. However, in practice, only when they are supported in this task by the decisions and policies within the organization, they will be able to fulfill this role.

Recommendations at the employee level
Based on our work in Chapter 3 we also recommended that, on the micro level of the individual employee, guidelines add recommendations that focus on dealing with organizational distress. Developed by organizational health psychologists, job crafting is a promising intervention that supports employees to gain control over job demands by stimulating the use of personal resources and job resources (Van Wingerden, Derks, & Bakker, 2017a, 2017b). Examples of beneficial resources are self-efficacy and meaning-making: they help employees to reflect on stressful situations caused by the organization and link these to broader goals in life (Van den Heuvel, 2013). In the Netherlands, Dutch police officers are offered a yearly mental check-up with a psychologist. The aim of this consult is to reflect on the balance between stress and energy deriving from work and to stimulate healthy coping mechanisms. Screening instruments that identify an imbalance between job demands and resources have also been regarded as useful in high-risk organizations (Gouweloos, Lesger, & Te Brake, 2014).

In summary
Current guidelines do not yet offer recommendations on how to implement effective strategies to reduce daily work stress (at macro level and micro level). The fields of governance and public administration and organizational health psychology offer useful strategies to create a supportive work environment. Traditionally they are not involved in guideline development for psychosocial care after critical incidents, which had been predominantly the focus of clinical psychologist experienced in psychological trauma. Considering that preventing psychopathology should not be the only focus of guidelines, collaborations between these fields will be valuable for further guideline development and implementation.

2.2 Perceived support from colleagues and managers compared to received support

The benefits of perceived support
Social support limits distress caused by critical incidents (Bonanno, Brewin, Kaniasty, & Greca, 2010). It increases the likeliness of stressful events to be appraised as comprehensible and contributes to the meaning-making process (e.g., informally talking to a colleague helps with the interpretation of the event, confirming that everything possible was done to support a victim) (Cohen & Wills, 1985; Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Horowitz, 1986; Kleber & Brom, 1992). Even more, lack of support puts professionals at

increased risk of mental health problems (e.g., Marmar et al., 2006). In clinical practice, it is not uncommon that professionals perceived the critical incident as distressing, but the (lack) of response of their supervisors as even more stressful. In line with the above, Chapter 2 revealed that perceived support from colleagues and management was related to lower distress in an international sample of pre-hospital providers (i.e., ambulance personnel). Interestingly, the availability of formal peer support systems was only indirectly related to wellbeing via increased perceived support from colleagues. The latter finding can be explained by studies showing that supportive interventions in times of crises are not directly linked with lower levels of distress, but indirectly via perceived social support. In other words, the beneficial effects of received support, such as formal peer support, may be through its influence on feeling supported (i.e., social support deterioration deterrence model; Norris and Kaniasty, 1996; Prati & Pietrantoni, 2010). Translating our findings in Chapter 2 to practice therefore implies that guidelines and organizations need to focus on enhancing the availability of informal social support from managers and colleagues. For instance by training supervisors and employees in communicating with distressed colleagues and creating awareness about the protective influence of social support.

The limitations of formal supportive interventions

The value of formal interventions such as peer support structures is that they provide a structure to support, monitor, and detect people at risk of developing high levels of distress. The presupposed advantage of such a structure is that it ensures that social support is offered after critical incidents and the quality of care is monitored and evaluated. However, this is also its downside: the offered support may feel as protocol, and not as a sincere concern for someone's wellbeing. Research suggests that social support must be experienced as authentic to be effective (Taylor, 2011). Some scholars even state that people do not notice "real support": it is not an intervention, it is simply and naturally there (Taylor, 2011). Another downside of relying primarily on formalized structures is the risk that managers or team supervisors experience less urge or responsibility to check and monitor the wellbeing of employees after critical incidents. As described in paragraph 2.1: they are not always fully aware of their own influence on employees' wellbeing. Moreover, formal peer support is generally offered only after a critical incident, while professionals also experience other (minor) stressful events at work (e.g., Chapter 3) or at home.

Therefore, in line with paragraph 2.1., we recommend that formal interventions are embedded in a work context in which informal support from colleagues and

management is available. This is even more relevant because of the potential stigma on distress caused by critical incidents, such as described in the case example below.

For a year, Mike works in a team with experienced colleagues who have known each other for multiple years. Mike looks up to them: they often share impressive stories about the incidents they encountered and are not afraid to take on any job. The team strongly believes that not everyone can handle the stress of the job and that someone should find another area of work when they are not up to it. Mike is feeling tired and irritable lately and has difficulties concentrating at work. His mother has become ill and needs care and his young children have difficulties sleeping. He notices that the work demands more of him: he feels stressed and sometimes ruminates at night about the incidents he encountered. One day, he and a colleague are assisting at a severe car accident in which also children are injured. Driving back to the office, a peer supporter calls them to find out whether they need support. Mike thinks he may need it, but when his colleague declines the request, he is afraid to be viewed as weak and refuses the offered support as well.

High-risk professionals are part of an organization in which characteristics such as quick decision making and being tough are valued, making it automatically more difficult to show one's 'soft' feelings (Haugen, McCrillis, Smid, & Nijdam, 2017; Loftus, 2010). When formal interventions are offered in an unsafe environment to disclose feelings of distress, the risk exists that people will not accept the support (Haugen et al., 2017).

2.3 Repeated exposure to the suffering of others

Typical for high-risk professionals is the cumulative character of exposure to adverse events that are —at least for them— a normal part of their working life. In this paragraph, we elaborate upon the effects of repeated exposure to (child) sexual abuse in police officers.

Becoming increasingly negative about the world

The study in Chapter 3 was based on a larger, partly qualitative and cross-sectional research project (described in Gouweloos et al, 2014) in which officers revealed an impressively strong motivation for their work. They felt able to contribute to society by stopping the suffering of victims and doing justice and were often willing to sacrifice private time. Officers showed a remarkable ability in dealing with the often horrific images and stories by keeping their professional role and supporting each other. Most did not experience any negative consequences from their work,

and when they did, symptoms were often related to burnout (i.e., fatigue, increased cynicism) instead of re-experiencing the images/stories of sexual assault. At the same time, police officers mentioned that being confronted with the dark side of the world and human nature negatively impacted their worldview. They also became more protective towards their own children. This was often not considered detrimental, but as a natural side-effect of their work. Occasionally investigators framed their worldview as 'more realistic'.

It is not surprising that officers' worldview becomes more negative: the basic assumptions that the world is a just, benevolent, and safe place are proven wrong on a daily basis (Janoff-Bulman, 1992). When individuals experience an event that violates their worldview (i.e., traumatic material that cannot be easily integrated with previously held worldviews), they no longer perceive the world as benevolent and predictable. This negative worldview than becomes a risk factor for developing a Post-Traumatic Stess Disorder (PTSD) (Park, Mills, & Edmondson, 2012). From this perspective, a negative worldview should not be regarded as an innocent side effect of working with trauma victims, but as an early sign of negative health consequences caused by the work. However, this potentially negative impact can only become visible after a prolonged period of time and, unfortunately, longitudinal studies are currently lacking in this group of police officers.

The inoculation perspective and vulnerability perspective

In other populations, studies on the cumulative effect of critical incidents have resulted in two competing viewpoints: the inoculation perspective and vulnerability perspective. The inoculation perspective proposes that the experience of a critical incident makes it easier for victims to deal with later exposure (Meichenbaum, 1995; Saunders, Driskell, Johnston, & Salas, 1996). It suggests that the greater the number of experiences, the more resilient and consequently the fewer the problems: individuals learn to deal with stress. Evidence for this perspective comes from research showing that work-related stressors have fewer depressive effects in adults previously exposed to work-related stressors in adulthood (Mortimer & Staff, 2004). Additionally, repeated exposure to stressful events that are challenging but not overwhelming may foster emotion regulation, cognitive control and curiosity and, subsequently, diminish the biological stress response induced by exposure to stress (Fergus & Zimmerman, 2005; Lyons & Parker, 2007). Furthermore, the inoculation perspective has also led to the development of Stress Inoculation Training in which individuals are prepared to respond more favorably to negative stress events by developing and practicing a repertoire of coping skills (Meichenbaum, 1995). This training has shown to effectively improve performance (Saunders et al., 1996).

The alternative theory, the vulnerability perspective, proposes that a critical incident makes someone more vulnerable for stress (Van der Ploeg & Kleber, 2013; Smid et al., 2013; Smid et al., 2012). Smid and colleagues (2012 and 2013) found prospective evidence of stress sensitization (i.e., enhanced reactivity to stressors) during the first year of traumatic event exposure in disaster victims and military personnel after war-zone exposure. The effects of stress sensitization would also be in line with the Conservation of Resources (COR) theory (Hobfoll, 1989, 2002). COR theory states that people strive to retain, protect and build resources and that what constitutes a stressor to them, is the potential loss of these resources. For example, a certain critical incident, such as dealing with a particularly severe case of sexual assault, caused stress reactions that subsequently led to concentration problems at work and more irritable behavior towards family and friends (resource loss). This resource loss eventually sensitizes people to subsequent stressful events.

A recent experimental study among police officers supported both the vulnerability and the stress inoculation perspective (Levy-Gigi, Richter-Levin, Okon-Singer, Kéri, & Bonanno, 2016). Interestingly, police officers who are repeatedly exposed to traumatic events seem to have difficulties with modifying their behavior in accordance with changing contextual demands, reacting in a similar way in aversive conditions with both high and low intensity. The authors explain this by suggesting that officers tend to be highly alerted and use extra caution not only in emergency situations but also in safe environments when such a response is no longer adequate. Moreover, their performance (in a high-intensity discrimination task) significantly improved with levels of self-reported cumulative traumatic exposure, suggesting that frequent exposure may train officers to cope and function in intense aversive conditions. This would be in line with studies showing a strong connection between the ability to suppress emotions in high-intensity situations and adaptive functioning (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004).

In conclusion

Although strong evidence is lacking, based on our own results (Chapter 3) and the studies described above, we expect that most officers learn how to effectively deal with the sometimes horrific stories they are confronted with. At the same time, it should be thoroughly studied whether, for whom and how stress sensitization occurs due to the repeated exposure to the suffering of others in combination with daily organizational stress (discussed in 2.1). A negative worldview, although indeed realistic when viewing it from the daily experiences of officers, might lead to resource loss when it isolates them from 'naïve' family and friends and/or reinforces

overly protective behavior such as continuously scanning the environment for potential child molesters or forbidding children to go on vacations with school. Furthermore, learning to suppress emotions may be an effective strategy at work but can become detrimental in minor stressful situations at home in which emotional closeness and support are asked for. Therefore, for as long as scientific evidence does not prove otherwise, we suggest that organizations put efforts into stimulating the wellbeing of this group by offering employees strategies to deal with ongoing stressful situations and not only with acute critical incidents (such as described in section 2.1 and 2.2).

3. Support and identification of civilians at risk of mental health problems after crises

3.1 Defining high-risk groups: focusing on predicting unmet needs

Crises and disasters are associated with a serious mental health toll for a minority of those affected (Bonanno et al., 2010). Knowing who is at risk of future mental health problems can assist policy advisers and healthcare professionals in directing their professional care towards this group. For this purpose, we studied whether being physically injured was related to a negative course of symptoms of PTSD and depression in victims of an airplane crash in 2009 (Chapter 4). We also evaluated a proactive outreach response to identify individuals with unmet treatment needs and examined whether screening instruments were accurate in detecting risk for PTSD or depression (Chapter 5). In short, the severity of physical injuries was not a risk factor for a less favorable course of symptoms of PTSD and depression. Also, although the Trauma Screening Questionnaire (TSQ) was accurate (i.e., good sensitivity and specificity) in detecting risk for PTSD, 43% of those screening positive 3.5 years after the crash were not diagnosed with the disorder. These findings implicate that the identification of individuals at risk can be improved. Especially since 33% of the participants reported having unmet needs 2 months after the crash, which was related to a chronic course of PTSD.

Anderson's Behavioral Model

Anderson's Behavioral Model (Andersen & Newman, 1973) helps to better understand who is at risk for unmet treatment needs: it is one of the most accepted models explaining healthcare use that has also been validated among trauma victims (e.g., Koenen, Goodwin, Struening, Hellman, & Guardino, 2003). The Behavioral Model theorizes that three personal factors can account for an individual's use of health care (Andersen & Newman, 1973; Elhai & Ford, 2009).

First, *enabling* variables are characteristics involving access to and availability of treatment resources. Examples are available mental health care centers that are easy to reach, health insurance and low treatment costs. After disasters, enabling factors are not always present: people do not use the existing referral pathways (e.g., general practitioners; Brewin et al., 2010), large areas, including mental health care centers, are destroyed (e.g., after hurricane Katrina; Rodríguez & Aguirre 2006), or victims live across the world and their home countries do not facilitate treatment access (e.g., 2009 plane crash in the Netherlands). The second group of variables explaining health care use are *need or illness variables* related to one's health, such as PTSD symptoms. People with higher needs (e.g., symptoms of PTSD), are more likely to access healthcare. For example, shortly after disasters, posttraumatic mental health complaints, particular PTSD symptoms, were associated with treatment use (see Elhai & Ford [2009] for an overview). Third, are *predisposing variables:* historical or sociodemographic characteristics dating before one's current health condition. For example, younger age in adults and Caucasian ethnical background (in the United States) are associated with (more) treatment utilization after disasters.

Improving the identification of those at risk

The Behavioral Model clearly illustrates the limitation of current screeners: in predicting who is at risk, they focus specifically on *need factors* (e.g., PTSD symptoms) and do not take into account *predisposing factors* or *enabling factors*. Also, high-risk groups are identified based on their risk for psychopathology instead of unmet treatment needs. Although more scholars plead for studying risk factors for unmet treatment needs instead of psychopathology alone (Van der Velden, 2013), research in this area is still scarce. When we are able to include predisposing and enabling factors in a post-event identification strategy, this could lead to a more accurate and individually tailored response. For example, when deciding to use active outreach because there are many factors that hinder the use of healthcare (e.g., a lack of enabling variables), it can be decided to frequently monitor those who experience a combination of PTSD symptoms, low levels of social support, and are of older age. At the same time, a young woman with PTSD symptoms who reports having a good relationship with her GP could be trusted in finding and accessing health care herself.

Finally, research suggests that different kinds of screening instruments are needed at different timepoints after a disaster. Although PTSD symptoms are predictive of health care use at short-term after a disaster, one year after the event general symptoms of anxiety and distress and low levels of functioning are most

strongly associated with future health care use (see Elhai & Ford (2009) for an overview). Screening programs can be further enhanced by accounting for the finding that, over time, needs of those affected change.

3.2 Considering active outreach: risk of unmet needs versus risk of medicalization

Based on the evaluation study of active outreach (Chapter 5), it can be argued that for a proportion of participants the program was not outreaching enough. Despite being offered support in finding treatment two months after the airplane crash, they suffered from a chronic course of PTSD symptoms. Others showed a resilient trajectory up to 3.5 years after the crash. For them, monitoring their health might not have been necessary (i.e., the program was too outreaching). In this paragraph, we discuss the advantages and disadvantages of active outreach by elaborating on the issues of risking unmet treatment needs and screening healthy people.

3.2.1 Unmet treatment needs after crises

Although the program offered support in finding treatment, results from Chapter 5 showed that unmet treatment needs two months after the crash were related to a chronic PTSD trajectory. How can we explain that these people, although offered support, were apparently not fully recovering from PTSD symptoms in the following years?

Selection bias. First, those with PTSD symptoms who found treatment may have felt less urge to participate in the program than those with unmet treatment needs (i.e., selection bias). If this were true, a higher response rate would have made the relationship between chronic PTSD symptoms and unmet needs less strong. However, this does not change the clinical relevance of the finding that a proportion of people will continuously report unmet needs and severe complaints.

Barriers to accessing and using treatment. Second, it could be argued that the strategy was not 'outreaching enough'. After the London bombings, victims who screened positive were invited to attend an extensive assessment to determine suitability for trauma-focused treatment (e.g., Trauma-Focused Cognitive Behavioral Therapy or Eye Movement Desensitization and Reprocessing) (Brewin et al., 2010). In this way, victims were taken by the hand and routed into treatment when a psychiatric diagnosis was assessed. After the airplane crash, people came from different countries, making the logistics and practical implication of such a strategy, which asks for a coordinated cooperation of multiple treatment centers, much more difficult. Victims were advised when and where to find additional

assessment and treatment but were responsible themselves for actually accessing treatment. The possible limitation of this strategy is that victims can still experience barriers to treatment, which could have been revealed with frequent monitoring of individuals with unmet needs.

Treatment did not remedy mental health problems. Another possible explanation is that people did find treatment, but the treatment did not remedy their mental health problems (i.e., it did not meet their needs). This would be in line with findings after other crises. Six months after the tsunami, a study among Norwegian tourists found that consulting mental health specialists did not facilitate symptom improvement (Hussain, Weisæth, & Heir, 2013). Additionally, in more than one-third of the affected individuals of the New York City terror attacks in 2001 the symptoms persisted for many years even when treatment was given (Boscarino, Adams, Stuber, & Galea, 2005). Possibly, symptoms are maintained and triggered by day-to-day adverse life experiences. After the airplane-crash, physical injuries resulted in the loss of work and limited their social life. For Turkish migrants, fear of flying made it difficult to visit their home country and family members. These additional stressors may have led to comorbid depressive disorders or a chronic course of PTSD, which have a worse prognosis than PTSD resulting from a single traumatic event (i.e., plane crash) (American Psychological Association, 2017).

Furthermore, it could be that the treatment offered was not suitable for posstraumatic psychopathology. After crises and disasters, professionals and authorities often do not know what kind of treatments are offered and whether these treatments were evidence-based. Future research should frequently monitor the individual pathways to treatment to shed light on the quality of the care directed at those affected.

3.2.2 Screening healthy people

Our findings that a significant proportion of victims reported no treatment needs 2 months after the crash, showed a resilient trajectory and, although screening positive, eventually did not develop PTSD (Chapter 5), indicate that when screening after crisis: a) healthy people will be asked multiple times whether they experience symptoms such as nightmares or a depressed mood and, b) a proportion of healthy victims will be invited for an additional clinical assessment focusing on in-depth questions about criteria for psychiatric disorders. Do we, as a result, in fact medicalize normal behavior by screening and assessing efforts? And if so, is that a problem?

Wessely and colleagues (2008) provide an overview of literature suggesting that the message that trauma is a hazard may in itself heighten anxiety and that focusing

on an event and emotional responses can sensitize people to trauma. The research studies used were not related to disasters or trauma specifically, and are therefore only speculative of the potential negative impact. Other research studies focused on the impact of questionnaires that inquire about traumatic exposure for research purposes: an area that has received an increased attention ever since medical ethical committees have been strict in approving of trauma research due to fear of (re) victimization. A review of Newman and Kaloupek (2004) revealed that participants find it useful to think and reflect about the adverse experience with someone outside their own direct supportive network: it provides insight. It may also create positive feelings about their contribution to research, i.e., they are helping other victims. A small minority reports feeling distressed because of the research, but at the same time do not regret participating. Among children, talking about an experienced event in questionnaires did not enhance PTSD symptoms (Kassam-Adams & Newman, 2002). A study among the (Dutch) general population showed that perceived distress caused by participating in a survey about trauma exposure and traumatic stress was predicted by previous participation in surveys about other topics (for example, political values), implying that some people experience surveys as stressful, and others do not, irrespective of the content of the survey (Van der Velden et al., 2015). This study also showed that distress was not predicted by low self-efficacy or symptoms of PTSD. Based on these studies, it can be concluded that the negative consequences of participating in trauma research using self-report questionnaires are limited.

Nevertheless, participating voluntarily in research cannot be generalized to screening after disasters: the latter is far more personal as it assesses whether or not you, as an affected individual, are coping well after a potentially traumatic event. Therefore, to fully understand its impact, research that specificcaly examines the effects of (clinical) screening on feelings of self-efficacy or worries about an individual's own health response deserves attention.

3.2.3 Reconsidering active outreach

Lack of enabling factors after a disaster. Based on lessons learned from other disasters (Reifels et al., 2013), current guidelines stress that first priority should be given to creating a strong existing healthcare system to prevent unmet treatment needs. Nevertheless, as discussed in paragraph 3.1, a lack of *enabling* factors after crises can result in unmet treatment needs. For example, general practitioners play an important role in the early detection of mental health problems and timely referral to specialized mental health care in many industrialized countries. Interestingly, there is evidence that they have difficulties recognizing PTSD or other

disaster-related health complaints (Brewin, Fuchkan, & Huntley, 2009). Training and schooling of healthcare professionals in detecting those at risk could contribute to resolving this important barrier (Bisson et al., 2007; Impact, 2014). Additionally, certain high-risk groups, such as ethnic minorities, have been found to experience barriers regarding healthcare utilization after disasters (Boscarino et al., 2005). These specific barriers to treatment must be made visible and addressed after each disaster (Reifels et al., 2013). Furthermore, relying on the existing health care system is evidently not possible in low resource countries in which such a system is lacking or not able to fulfill all the victims' needs. Organizations such as the World Health Organization, Médicines Sans Frontières, International Red Cross and War Trauma Foundation have developed and implemented guidelines that focus on enhancing mental health and psychosocial support in low resource countries or conflict situations, for example by training aid workers in providing psychological first aid modified to the culture, context, needs and capacities of each situation (e.g., Inter-Agency Standing Committee, 2007).

Given these shortcomings, we believe it is unwise, also in industrialized countries, to fully rely on the existing health care system in fulfilling all the needs of victims, especially when enabling factors are evidently lacking. When this is the case, active outreach has found to be a beneficial approach to detect those with unmet needs and support them in finding treatment (e.g., Stene, Wentzel-Larsen, & Dyb, 2016). The program after the airplane crash detected many victims with unmet needs, who even might have been monitored more frequently to make sure whether they found effective treatment (paragraph 3.2.1). Exactly how outreaching a response should be depends on the kind of disaster, its impact, the location of the disaster (e.g., logistics, availability of healthcare) and the needs of victims. For example, after the crash, it was possible to talk to people individually, as there were 121 adult survivors. After most disasters, a much larger group is affected and other strategies may be used to create safety nets beside the existing health care system (see for an example, the next case description).

After the terrorist attack on the MH17 airplane, the Dutch government decided to primarily trust on the capacities of the existing health care system and to launch an online 'Information and Referral Center' providing, among others, information on psychosocial health and support after a traumatic loss (Te Brake & Schaap, 2016). The center was frequently used and positively evaluated, especially because it offered timely and accurate information about the identification process of victims' beloved ones (Te Brake & Schaap, 2016). There was also an option for an online or telephone consult with a clinician when victims themselves, general practitioners, or victim support workers had questions about the severity of psychological and social complaints, whether treatment would be needed and where they could find evidence-based treatment (Dückers, Gouweloos, & Drogendijk, 2014; Gouweloos, Dückers, Smid, & Drogendijk, 2015). Although this safety net was not frequently used, it was regularly used by victims with unmet needs and by professionals uncertain about whether problems were a normal grief reaction or a signal of severe stress reactions due to traumatic loss (Gouweloos, 2015).

Social acknowledgment. A second reason to consider outreach is its potential effects on social acknowledgment. Active outreach is not only a way to detect psychopathology but is also a way for society to provide social acknowledgment to the victims. Maercker and Müller (2004; see Dückers, IJzermans, Jong, & Boin, 2017) defined social acknowledgment as the experience of "positive reactions from society that show appreciation for the victim's unique state and acknowledge the victim's current difficult situation". Active outreach could send survivors the message that government/society will not forget the traumatic event and keeps on supporting those affected, thereby adding to the fulfillment of people's basic need of support (e.g., Dückers et al., 2017). After the additional shock, people often experience an increase in support and community cohesion, often referred to as the 'honeymoon phase' (IJzermans & Gersons, 2002). After a few months, however, society, friends and family who have not been affected by the event move on and media attention declines. Social support deteriorates and more or less explicitly, victims receive the message that they have to pick up their 'normal' life. This decline in support may evoke feelings of isolation, incomprehension, anger or sadness. Outreach may then contribute to feelings of social acknowledgment and subsequently to people's functioning and wellbeing. After the 2009 airplane crash, participants were often positive of the support they received and the fact that the Dutch government did not forget about the impact of the event, even 3.5 years afterward.

The use of screening instruments. In line with current guidelines on psychosocial care (Bisson et al., 2007; Impact, 2014) and based on the findings and the (methodological) considerations described in this dissertation, we advise to take a restraints approach towards the use of screeners. Current screeners may lack accuracy because they do not take into account enabling factors and predisposing factors (3.1). Additional questions about support, needs, barriers to treatment, and risk and protective factors should be added. This will also help to decide how actively individuals should be monitored.

4. Lack of effectiveness of psychosocial support

Evidence for preventive communitive interventions
Until now, there are no community interventions (i.e., targeting all of those affected and not only those with severe levels of distress or early onset PTSD) after trauma exposure that have proven to be effective in preventing the emergence of psychopathology (i.e, secondary prevention, see also Chapter 1). Recently, preliminary evidence has been found for playing Tetris 6 hours after a stressful event to prevent PTSD: the game with high visuospatial demands significantly reduced intrusive memories in survivors of motor vehicle accidents (Iyadurai, 2018). However, in a disaster setting, this intervention will be difficult to implement due to the often occurring logistical problems: the power system may be down and smartphones or tablets cannot be used. A widely used and studied preventive intervention after trauma was debriefing (Mitchell, 1983), but this intervention proved not effective and may even impede natural recovery (McNally, Bryant, & Ehlers, 2003). An Internet-based early intervention based on the principles of Cognitive Behavioral Therapy (CBT) offered to all victims of motor vehicle accidents in the first month after traumatic exposure (regardless of whether they experienced high levels of distress) was also not proven to be effective: PTSD symptoms and depressive symptoms decreased over time without a significant difference between the intervention group and the control group (Mouthaan et al., 2013). For both interventions, it can be argued that the aim to prevent PTSD by offering *all* victims a specific strategy to deal with emotional reactions after trauma exposure, either by ventilating emotions or by using certain cognitive strategies, is not addressing the primary needs of victims.

Generating evidence for psychosocial support
In practice (and this is also reflected in guidelines) it is generally acknowledged that what people need is practical and emotional support from those who are

close to them. Most people are capable of dealing with emotions using their own coping strategies when certain conditions are met and resources are available. Psychosocial support aims to closely address these basic needs of people affected by crises by offering, for example, practical assistance and contact with beloved ones. In principle, the response should promote a sense of safety, self and community efficacy/empowerment, connectedness, calm and hope. (see Chapter 1 for an overview of recommendation on support) (Hobfoll et al., 2007).

Unfortunately, as mentioned before, evidence for offering psychosocial support as a preventive community intervention after crises is lacking (see also Chapter 6). Without scientific evidence, the recommendations in current guidelines that sound logical and in practice are appreciated by victims, are for a large part untested views of experts. This leaves room for all kinds of interpretations of recommendations and implementation of interventions that do not effectively enhance natural recovery or reduce distress. Therefore, we recommend that policymakers and researchers put effort into finding ways to measure whether psychosocial support indeed promotes resilience and natural recovery. Are there specific interventions implemented after disasters that have been found effective in, for example, increasing feelings of safety, connectedness with others, self-efficacy, and hope in the community?

Furthermore, to date, research has mainly focused on PTSD as an outcome measure of preventive community interventions. Although we did not measure the effectiveness of interventions, part of the studies in this dissertation also focused on factors that contribute to the alleviation of symptoms of distress, PTSD or depression after crises. This is understandable, as one of the overarching aims of all preventive interventions after critical incidents is to prevent suffering from (long-term) adverse effects (see also Brom & Kleber, 1989). Nevertheless, the strength of psychosocial support compared to other preventive interventions is that it aims to prevent distress by fostering resilience and enhancing social mobilization. In future research, including outcome measures related to resilience would add to the understanding of the working mechanisms of psychosocial support.

Finally, there are many difficulties when it comes to testing the effectiveness on psychosocial support in real-world settings. Schultz and Forbes (2014) provided useful suggestions for conducting field evaluation studies. First, the organizational context, with known and predictable ongoing exposures may be a good place to start with evaluating psychosocial care. Forbes and colleagues (2011) outline a phased approach to evaluation, starting with developing psychosocial care-consistent organizational policies and procedures (such as suggested in chapter 2 and 3), followed by education and training programs to deliver psychosocial care. Second, it is possible to test the effectiveness of psychosocial care in controlled

settings such as hospital emergency rooms in which a large number of trauma victims routinely present immediately following trauma exposure. Lastly, the difficulty with evaluating strategies in the disaster context is the unpredictable nature of disasters, making pre-post designs impossible. However, certain disasters are more or less predictable: particular areas are frequently exposed to bushfires or floods. In such settings, pre-post designs may be implemented.

Concluding remarks

With this dissertation, we intended to give an impetus to the refinement of guidelines on psychosocial support after critical incidents and disasters. In-depth recommendations for research and practice are summarized in bullet points in Tables 1, 2 and 3 and based on findings in this dissertation and on the many lessons learned from other evaluation studies after crises. We hope that this dissertation will support organizations of high-risk professionals and governments with their important role in meeting the psychosocial needs of professionals and disaster victims in a way that does justice to their resilience in addition to often high levels of distress. As critical incidents will continue to happen, this support functions as a significant 'safety net' for those who have to cope with the emotional aftermath of the event.

Table 1. Recommendations for future research

1. High-risk professionals are repeatedly exposed to critical incidents, in combination with daily organizational stress. This dissertation showed that specifically organizational stress adds to the burden of these professionals. More research is needed that pays attention to the mechanisms through which critical incidents and daily organizational stress leads to resource loss over time and affects someone's daily functioning.
2. Current guidelines are not straightforward in their advice on how to detect individuals at risk of distress. Screening is not recommended due to a lack of evidence on their performance, but other methods are not provided. To eventually be able to recommend whether or not to use screening instruments after disasters, the potential adverse effects of screening 'healthy' people on outcomes such as self-efficacy needs to be studied.

3. We also need to better understand risk factors for unmet treatment needs after disasters to predict who will need professional care. Current screening instruments focus only on whether someone is risk for developing psychopathology (predominantly PTSD). Examing factors that predict whether someone is capaple of finding treatment themselve, will add to our knowledge on who will need support in finding treatment and improve the accuracy of identification strategies.
4. To enhance the utilization of evidence-based treatments among those with posttraumatic mental health problems after disasters and reduce the risk of unmet needs, we need to have a clear view on which kind of treatments are offered to victims and the barriers victims experience in accessing evidence-based treatment. This can be accomplished by examining the individual trajectories to treatment after crises.
5. Research on the effectiveness of psychosocial support should not only focus on preventing PTSD or other psychopathology but also on whether psychosocial support improves resilience, for instance by measuring its impact on feelings of calm, safety, connectedness with others, self-efficacy, and hope in the community.
6. When developing guidelines concerning psychosocial care, this dissertation showed the importance of a cooperation between clinical psychology (i.e., focusing on mental health after critical incidents) and other fields such as organizational health psychology (i.e., focusing on strategies to reduce organizational job demands and increase job resources) and governance and public administration (i.e., focusing on implementing health policies at an organizational level).

Table 2. Recommendations for the support of high-risk professionals

1. When aiming to prevent mental health problems among high-risk professionals, psychosocial support should not only focus on the impact of critical incidents but also on stress related to the organization. We found organizational demands to have a stronger influence on employee wellbeing than the actual critical incidents.
2. For change to occur, all levels within a high-risk organization (from higher management at macro level to employees at micro level) should fully support implementing occupational health policies that focus on minimizing organizational stress and stimulate work satisfaction. When sufficiently supported by the organization, team supervisors are enabled to function as gatekeepers between the organization and individual employee to timely detect whether certain organizational demands are causing distress and whether job resources such as opportunities for professional development are lacking
3. On the micro level of the individual employee, strategies should be developed and implemented that do not only focus on the psychosocial consequences of a single acute critical incident but also on dealing with repeated exposure in combination with daily work demands. In this way, interventions will function as a primary preventive strategy (i.e, preventing distress before the incident has occurred) and will help employees dealing with the cumulative nature of critical incidents.
4. Any intervention, whether incident-driven or organizational and practical, can only thrive within a supportive atmosphere at the workplace. It is therefore recommended that formal interventions such as peer support systems are embedded in a general supportive work context in which direct support from colleagues and management is available. To accomplish this we suggest that organizations start with focusing on creating awareness about the importance of social support of supervisors and colleagues, decreasing the stigma on mental health problems (e.g.., by role-models that openly talk about severe stress reactions) and implementing instruments to timely detect when employees experience an imbalance between demands and resources at work.

Table 3. Recommendations for the detection of those at risk after disasters

1. After each disaster, active outreach should be considered to support and identify victims with unmet treatment needs. In a disaster context, a lack of enabling factors (i.e., barriers towards accessing healthcare) can hamper the use of healthcare for those needing it most. When this is the case, additional strategies for support and timely detection are needed. These outreaching strategies have to be tailored to each disaster-context and can range from screen-and-treat programs that target all affected individuals to (online) information points. What is needed, depends on the kind of disaster, its impact, the location of the disaster (logistics, availability of healthcare) and the needs of victims.

2. After detecting victims with unmet needs, it is advisable to actively support them in accessing appropriate evidence-based treatment in addition to providing advice about where to find professional help. People with unmet needs are at risk of developing chronic mental health problems and may experience barriers to accessing evidence-based treatment.

3. When actively reaching out to victims, it is recommended to take a reluctant approach towards the use of screeners to identify those at high-risk of distress. In practice, screeners specifically targeting PTSD or depression have not yet proved optimal as many people at risk will eventually not be diagnosed with health problems. When using screening instruments, additional questions about support, needs, potential barriers to support and treatment, and risk and protective factors are recommended to identify unmet needs and decide how actively monitoring should take place.

References

American Psychological Association (2017). *Clinical practice guidelines for the treatment of PTSD.* Retrieved from http://www.apa.org/ptsd-guideline/ptsd.pdf.

Andersen, R., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the United States. *The Milbank Memorial Fund Quarterly. Health and Society*, 95-124.

Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of Public Administration Research and Theory*, *18*(4), 543-571.

Bisson, J. I., Ehlers, A., Matthews, R., Pilling, S., Richards, D., & Turner, S. (2007). Psychological treatments for chronic post-traumatic stress disorder: Systematic review and meta-analysis. *The British Journal of Psychiatry*, *190*(2), 97-104.

Bonanno, G. A., Brewin, C. R., Kaniasty, K., & Greca, A. M. L. (2010). Weighing the costs of disaster: Consequences, risks, and resilience in individuals, families, and communities. *Psychological Science in the Public Interest*, *11*(1), 1-49.

Bonanno G. A., Papa, A., Lalande, K., Westphal, M., & Coifman, K. (2004). The importance of being flexible the ability to both enhance and suppress emotional expression predicts long-term adjustment. *Psychological Science 15*(7), 482–7.

Boscarino, J. A., Adams, R. E., Stuber, J., & Galea, S. (2005). Disparities in mental health treatment following the World Trade Center Disaster: Implications for mental health care and health services research. *Journal of Traumatic Stress*, *18*(4), 287-297.

Brewin, C.R., Fuchkan, N., Huntley, Z. (2009). *Evaluation of the NHS Trauma Response to the London Bombings.* London: University College London.

Brewin, C. R., Fuchkan, N., Huntley, Z., Robertson, M., Thompson, M., Scragg, P., ... & Ehlers, A. (2010). Outreach and screening following the 2005 London bombings: usage and outcomes. *Psychological Medicine*, *40*(12), 2049-2057.

Brom, D. & Kleber, R.J. (1989). Prevention of posttraumatic stress disorders. *Journal of Traumatic Stress Studies*, *2*, 335-351.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*(2), 310.

Creamer, M. C., Varker, T., Bisson, J., Darte, K., Greenberg, N., Lau, W., ... & Watson, P. (2012). Guidelines for peer support in high-risk organizations: An international consensus study using the delphi method. *Journal of Traumatic Stress*, *25*(2), 134-141.

Dückers, M. L., Gouweloos, J., Drogendijk, A. (2014). Nazorg Contact Punt. Een ontbrekend puzzelstuk in de nazorg na rampen. *Magazine Nationale Veiligheid en Crisisbeheersing,* 6, 38-19.

Dückers, M. L., & Thormar, S. B. (2014). Post-disaster psychosocial support and quality improvement: A conceptual framework for understanding and improving the quality of psychosocial support programs. *Nursing & Health Sciences*, *17*(2), 159-165.

Dückers, M. L., Yzermans, C. J., Jong, W., & Boin, A. (2017). Psychosocial Crisis Management: The Unexplored Intersection of Crisis Leadership and Psychosocial Support. *Risk, Hazards & Crisis in Public Policy*, *8*(2), 94-112.

Elhai, J. D., & ford, J. D. (2009). Utalization of Mental Health Services after Disasters. In Y. Neria, S. Galea, F. H. Norris (Eds.), *Mental Health and Disasters* (pp. 366 – 384). New York, NY: Cambridge University Press.

Fergus, S., & Zimmerman, M. A. (2005). Adolescent resilience: A framework for understanding healthy development in the face of risk. *Annual Review of. Public Health*, *26*, 399-419.

Folkman, S., Lazarus, R. S., Dunkel-Schetter, C., DeLongis, A., & Gruen, R. J. (1986). Dynamics of a stressful encounter: cognitive appraisal, coping, and encounter outcomes. *Journal of Personality and Social Psychology*, *50*(5), 992.

Forbes, D., Lewis, V., Varker, T., Phelps, A., O'Donnell, M., Wade, D. J., ... & Creamer, M. (2011). Psychological first aid following trauma: Implementation and evaluation framework for high-risk organizations. *Psychiatry: Interpersonal & Biological Processes*, *74*(3), 224-239.

Gouweloos, J. (2015, June). *Post-Disaster Psychosocial Support Referral Point. Supporting stepped care after the MH17 airplane disaster.* Paper presented at the 14th ESTSS conference, Vilnius, Lithuania.

Gouweloos, J., Dückers, M., Smid, G. E., & Drogendijk, A. N. (2015). Herken klachten na traumatisch verlies [Recognizing complaints after traumatic loss]. *Medisch Contact*, 70, 1274-1276.

Gouweloos, J., Lesger, D., Te Brake, H. (2014). *Onderzoeksrapport: ontwikkeling van een zelfscreener voor medewerkers werkzaam in de opsporing van zedendelicten en kinderpornografie* [Research Report: development of a screening instrument for employees investigating sexual assault and child pornography]. Diemen: Stichting Impact.

Haugen, P. T., McCrillis, A. M., Smid, G. E., & Nijdam, M. J. (2017). Mental health stigma and barriers to mental health care for first responders: A systematic review and meta-analysis. *Journal of Psychiatric Research*, *94*, 218-229.

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, *44*(3), 513.

Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology*, *6*(4), 307.

Hobfoll, S. E., Watson, P., Bell, C. C., Bryant, R. A., Brymer, M. J., Friedman, M. J., ... & Maguen, S. (2007). Five essential elements of immediate and mid–term mass trauma intervention: Empirical evidence. *Psychiatry: Interpersonal and Biological Processes*, *70*(4), 283-315.

Horowitz, M. J. (1986). *Stress response syndromes*. San Fransisco: Jossey-Bass

Huddleston, L., Stephens, C., & Paton, D. (2007). An evaluation of traumatic and organizational experiences on the psychological health of New Zealand police recruits. *Work,* 28(3), 199-207.

Hussain, A., Weisæth, L., & Heir, T. (2013). Posttraumatic stress and symptom improvement in Norwegian tourists exposed to the 2004 tsunami–a longitudinal study. *BMC Psychiatry*, *13*(1), 232.

Inter-Agency Standing Committee (IASC) (2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC.

Janoff-Bulman, R. (1992). *Shattered assumptions: towards a new psychology of trauma*. New York: Free Press.

Kassam-Adams, N., & Newman, E. (2002). The reactions to research participation questionnaires for children and for parents (RRPQ-C and RRPQ-P). *General Hospital Psychiatry*, *24*(5), 336-342.

Kleber, R. J. & Brom, D. (1992). *Coping with trauma: Theory, prevention and treatment*. Lisse: Swets & Zeitlinger Publishers.

Koenen, K. C., Goodwin, R., Struening, E., Hellman, F., & Guardino, M. (2003). Posttraumatic stress disorder and treatment seeking in a national screening sample. *Journal of Traumatic Stress*, *16*(1), 5-16.

Levy-Gigi, E., Richter-Levin, G., Okon-Singer, H., Kéri, S., & Bonanno, G. A. (2016). The hidden price and possible benefit of repeated traumatic exposure. *Stress*, *19*(1), 1-7.

Liberman, 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), 421-441.

Loftus, B. (2010). Police occupational culture: classic themes, altered times. *Policing & Society, 20*(1), 1-20.

Lyons, D. M., & Parker, K. J. (2007). Stress inoculation-induced indications of resilience in monkeys. *Journal of Traumatic Stress*, *20*(4), 423-433.

Iyadurai, L., Blackwell, S. E., Meiser-Stedman, R., Watson, P. C., Bonsall, M. B., Geddes, J. R., ... & Holmes, E. A. (2018). Preventing intrusive memories after trauma via a brief intervention involving Tetris computer game play in the emergency department: a proof-of-concept randomized controlled trial. *Molecular Psychiatry*, *23*(3), 674.

Marmar, C. R., McCaslin, S. E., Metzler, T. J., Best, S., Weiss, D. S., Fagan, J., ... & Mohr, D. (2006). Predictors of posttraumatic stress in police and other first responders. *Annals of the New York Academy of Sciences*, *1071*(1), 1-18.

McNally, R. J., Bryant, R. A., & Ehlers, A. (2003). Does early psychological intervention promote recovery from posttraumatic stress? *Psychological Science in the Public Interest*, *4*(2), 45-79.

Meichenbaum, B. (1985). *Stress inoculation training.* New York: Plenum Press.

Michie, S.m Van Stralen, M.M., & West, R. (2011). The behavior wheel: a new method for characterising and designing bahaviour change interventions. *Implementation Science; 6* (42), 1-11.

Mitchell, J. T. (1983). When disaster strikes: The critical incident stress debriefing process. *Journal of Emergency Medical Service, 1,* 36-39.

Mortimer, J. T., & Staff, J. (2004). Early work as a source of developmental discontinuity during the transition to adulthood. *Development and Psychopathology*, *16*(4), 1047-1070.

Mouthaan, J., Sijbrandij, M., De Vries, G. J., Reitsma, J. B., Van de Schoot, R., Goslings, J. C., ... & Olff, M. (2013). Internet-based early intervention to prevent posttraumatic stress disorder in injury patients: randomized controlled trial. *Journal of Medical Internet Research*, *15*(8), e165.

Newman, E., & Kaloupek, D. G. (2004). The risks and benefits of participating in trauma-focused research studies. *Journal of Traumatic Stress*, *17*(5), 383-394.

Norris, F. H., & Kaniasty, K. (1996). Received and perceived social support in times of stress: A test of the social support deterioration deterrence model. *Journal of Personality and Social Psychology*, *71*(3), 498.

Park, C. L., Mills, M. A., & Edmondson, D. (2012). PTSD as meaning violation: Testing a cognitive worldview perspective. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*(1), 66.

Prati, G., & Pietrantoni, L. (2010). The relation of perceived and received social support to mental health among first responders: a meta-analytic review. *Journal of Community Psychology*, *38*(3), 403-417.

Reifels, L., Pietrantoni, L., Prati, G., Kim, Y., Kilpatrick, D. G., Dyb, G., ... & O'donnell, M. (2013). Lessons learned about psychosocial responses to disaster and mass trauma: an international perspective. *European Journal of Psychotraumatology*, *4*(1), 1-9.

Rodríguez, H., & Aguirre, B. E. (2006). Hurricane Katrina and the healthcare infrastructure: a focus on disaster preparedness, response, and resiliency. *Frontiers of Health Services Management*, *23*(1), 13-23.

Schaufeli, W. B., Bakker, A. B., & Van Rhenen, W. (2009). How changes in job demands and resources predict burnout, work engagement, and sickness absenteeism. *Journal of Organizational Behavior*, *30*(7), 893-917.

Shultz, J. M., & Forbes, D. (2014). Psychological first aid: Rapid proliferation and the search for evidence. *Disaster Health*, *2*(1), 3-12.

Smid, G. E., Kleber, R. J., Rademaker, A. R., van Zuiden, M., & Vermetten, E. (2013). The role of stress sensitization in progression of posttraumatic distress following deployment. *Social Psychiatry and Psychiatric Epidemiology*, *48*(11), 1743-1754.

Smid, G. E., Van der Velden, P. G., Lensvelt-Mulders, G. J. L. M., Knipscheer, J. W., Gersons, B. P. R., & Kleber, R. J. (2012). Stress sensitization following a disaster: a prospective study. *Psychological Medicine*, *42*(8), 1675-1686.

Saunders, T., Driskell, J. E., Johnston, J. H., & Salas, E. (1996). The effect of stress inoculation training on anxiety and performance. *Journal of Occupational Health Psychology*, *1*(2), 170-189.

Stene, L. E., Wentzel-Larsen, T., & Dyb, G. (2016). Healthcare needs, experiences and satisfaction after terrorism: a longitudinal study of survivors from the Utøya attack. *Frontiers in Psychology*, *7*, 1809.

Impact (2012). *Richtlijn psychosociale ondersteuning geüniformeerden* [Guidelines Psychosocial Support for Uniformed Service Workers]. Diemen: Impact.

Impact (2014). *Multidisciplinaire richtlijn psychosociale hulp bij rampen en crisis* [Multidisciplinary guidelines psychosocial care concerning crises and disaster]. Diemen: Impact.

Taylor, S. E. (2011). Social support: A review. In H.S. Friedman, *The Oxford handbook of health psychology* (pp. 189-214). New York, NY: Oxford University Press.

Te Brake, H., & Schaap, R. (2016). *Informatie- en verwijscentrum vliegramp Oekraïne. Evaluatie onder gebruikers en betrokken partijen* [Information and referral center airplane disaster Ukraine. Evaluation with users and involved parties]. Diemen: Stichting Impact.

Van den Heuvel, M. (2013). *Adaptation to Organizational Change. The role of meaning-making and other psychological resources.* Utrecht: Universiteit Utrecht.

Van der Ploeg, E., & Kleber, R. J. (2003). Acute and chronic job stressors among ambulance personnel: predictors of health symptoms. *Occupational and Environmental Medicine*, *60*(1), i40-i46.

Van der Velden, P. G., Kleber, R. J., Grievink, L., & Yzermans, J. C. (2010). Confrontations with aggression and mental health problems in police officers: The role of organizational stressors, life-events and previous mental health problems. *Psychological Trauma: Theory, Research, Practice, and Policy*, *2*(2), 135.

Van der Velden, P. G. (2013). *Problemen groter dan gedacht* [Problems bigger than imagined]. Tilburg: Prisma Printing Tilburg University.

Van der Velden, P. G., Bosmans, M. W. G., Bouman, T., De Keijser, J., Kleber, R., & Schut, H. (2015). De belasting van longitudinaal trauma-onderzoek:: een prospectieve studie naar veronderstelde en onvermoede voorspellers [The burden of longitudinal trauma research: a prospective study on assumed and unsuspected predictors]. *De Psycholoog*, 45-54.

Van Wingerden, J., Derks, D., & Bakker, A. B. (2017a). The impact of personal resources and job crafting interventions on work engagement and performance. *Human Resource Management*, *56*(1), 51-67.

Van Wingerden, J., Bakker, A. B., & Derks, D. (2017b). The longitudinal impact of a job crafting intervention. *European Journal of Work and Organizational Psychology*, *26*(1), 107-119.

Wessely, S., Bryant, R. A., Greenberg, N., Earnshaw, M., Sharpley, J., & Hughes, J. H. (2008). Does psychoeducation help prevent post traumatic psychological distress?. *Psychiatry: Interpersonal and Biological Processes*, *71*(4), 287-302.

Yzermans, C.J. & B.P.R. Gersons. (2002). The Chaotic Aftermath of an Airplane Crash in Amsterdam: A Second Disaster. In J.M. Havenaar, J.G. Cwikel, and E.J. Bromet (Eds.), *Toxic Turmoil; Psychological and Societal Consequences of Ecological Disasters* (pp. 85–100). New York: Kluwer Academic/Plenum Publishers.

Summary

The rationale for this dissertation arises from three sources: a) prevalence studies showing that a minority of those affected by disasters or critical incidents at work is at risk of developing severe mental health problems, b) indications that groups who are exposed to stressful events, such as high-risk professionals or disasters victims, may benefit from psychosocial support as a secondary preventive intervention, and c) reports that psychosocial support guidelines are evidence-informed and need a more solid scientific basis, fueled by research studies on the support and identification of those at risk (**Chapter 1**). The first aim of this dissertation was to contribute to existing knowledge on support after crises by studying elements of a supportive work environment that facilitates the wellbeing of high-risk professionals. The second aim focused on identifying individuals with high levels of distress after crises. Early identification of those in need of support is essential for timely referral to professional aid.

A supportive work environment for high-risk professionals

To achieve a better understanding of support at work after critical incidents, we examined in **Chapter 2** which aspects of a supportive work environment were related to perceived psychological distress (symptoms of depression and anxiety) in pre-hospital providers (ambulance personnel). We surveyed 813 pre-hospital providers from 8 industrialized countries. The study showed that, regardless of national differences in work conditions, feeling supported by management and colleagues and perceiving to have sufficient time to recover after critical incidents were related to pre-hospital providers' wellbeing. Moreover, the availability of formal peer support systems after critical incidents (i.e., a formal organizational structure through which trained colleagues offer support after a critical incident) may be indirectly beneficial to the wellbeing of pre-hospital providers through increased feelings of perceived support from colleagues.

Exposure to critical incidents at work occurs and cannot be isolated from an organizational context with its unique organizational demands. Therefore, in **Chapter 3**, we studied the influence of exposure to critical incidents on wellbeing when organizational job demands, job resources and personal resources are taken into account. Using the Job Demands-Resources model as a framework, a questionnaire was developed specifically tailored to the work circumstances of police officers investigating sexual abuse and child pornography. Wellbeing was operationalized as (low) cynicism and exhaustion, overly protective behavior, a negative worldview, sexual problems, and (high) work engagement. In total, 480 police officers participated. The study showed that organizational demands were

related to all indicators of reduced wellbeing. Confrontation with (child) sexual abuse was only significantly related to a negative worldview and sexual problems. Important resources were work content (i.e., working with victims), autonomy, opportunities for professional development, being able to keep a distance from work and having a stable home environment. These findings led to the conclusion that investigators' wellbeing seemed to be best supported by creating a work environment which enables them to focus on solving cases of sexual assault and in which negative organizational aspects such as high work pressure are minimized.

The scientific and practical implications of chapters 2 and 3 are discussed in **Chapter 7.** It is stressed that guidelines on psychosocial support should pay more attention to the negative impact of daily organizational stress. Although its negative influence has been repeatedly demonstrated in various studies, it is a neglected topic in current guidelines on psychosocial support. Also, the protective impact of informal support from colleagues and management and the risk of relying predominantly on formal support systems are discussed. Finally, we strongly advocate studying the long-term effects of repeated exposure to critical incidents. Although exposure to stressful life events has been found to sensitize people to additional stressors, these negative cumulative effects have not yet been thoroughly studied in high-risk professionals.

Support and identification of civilians at risk of mental health problems after crises

Identification of mental health problems after an airplane crash

Traumatic event exposure is associated with taking a serious toll on the mental health in a minority of victims. Knowing who is at risk will help policy advisers and healthcare professionals with directing their professional care to the victims who need this the most. We studied the detection of those at risk after the airplane crash of Turkish Airlines near Amsterdam, the Netherlands, in 2009. Of the 135 occupants of the plane, 126 survived the crash. Most survivors were Dutch or Turkish.

To achieve a better understanding of groups at high risk of mental health problems after crises, **Chapter 4** aimed to investigate whether symptoms of posttraumatic stress disorder (PTSD) and depression were predicted by trauma characteristics (injury severity, hospitalization, duration of hospital stay and seating position) among survivors of the plane crash. Objectively measured physical injuries and hospitalization had no association with the course of the symptoms of either PTSD or depression between 2 months and 9 months after the crash. Seating

position was also not related to symptoms of PTSD or depression. This suggests that healthcare providers need to be aware that survivors could be at risk for PTSD or depression, regardless of the objective severity of their physical injuries. Victims' need for mental health care cannot be related to their often much more visible physical needs, so monitoring mental health care needs is particularly important, not only during the first days after an incident but also over the following weeks and months.

To remedy unmet mental health care needs after the airplane crash, active outreach was used to identify victims at risk for posttraumatic stress disorder (PTSD) and depression. In **Chapter 5**, this strategy was evaluated by examining: 1) the accuracy of screening methods in predicting PTSD and depression, 2) self-reported treatment needs, and 3) the extent to which perceived treatment needs predict trajectories of PTSD. The Trauma Screening Questionnaire accurately predicted PTSD 3.5 years after the crash (sensitivity ranged from 0.75 to 1.00 and specificity from 0.79 to 0.90), while the Patient Health Questionnaire-2 showed modest accuracy in predicting depression (sensitivity: 0.38 to 0.89, specificity: 0.67 to 0.90). The low Positive Predictive Values of both screeners proved to be problematic: 43% of participants who screened positive for PTSD and 50% of participants who screened positive for depression eventually did not develop a psychiatric diagnosis. Furthermore, the study showed that a substantial number of participants reported unmet treatment needs (declining from 33% 2 months after the crash to 11% 3.5 years after the crash). Participants reporting unmet needs 2 months after the crash were more often assigned to the chronic PTSD trajectory compared to those with no treatment needs. Given the risk of chronic PTSD in combination with unmet needs, we emphasized the importance of active outreach after the plane crash. At the same time, as a significant proportion of victims screening positive will not develop a PTSD diagnosis, additional research is needed to study the effects of screening on healthy people.

In **Chapter 7** we elaborate on possibilities to increase the accuracy of current screening methods and propose that research should focus on studying factors predicting unmet treatment needs instead of symptoms of psychopathology. We also discuss reconsidering active outreach after a disaster and recommend that authorities responsible for disaster response should not be reluctant to such an approach when barriers to healthcare are evident.

Psychosocial support after CBRN events

In **Chapter 6** it was studied whether a specific type of crisis, namely a Chemical, Biological, Radiological or Nuclear (CBRN) event, requires a distinctive

psychosocial response. Current guidelines do not differentiate between types of crises. However, especially CBRN events may warrant a different approach: its slow onset increases feelings of uncertainty and distrust towards experts. A systematic literature review was conducted. Although none of the 39 studies met the design criteria for effectiveness research, substantial consensus on aspects relevant to CBRN related psychosocial care exists. Recommendations are similar or complementary to general post-disaster psychosocial care guidelines. Notable differences are the emphasis on risk communication and specific preparation needs for health care systems. Accurate information from reliable experts regarding exposure to toxic agents is of utmost importance to diminish anxiety among the population. Due to uncertainty about contamination and health effects, people will overwhelm health care systems and professionals might be less likely to respond, due to fear of contamination risks. However, the lack of evidence on effectiveness of psychosocial responses to CBRN events, requires us to be cautious with providing recommendations. In **Chapter 7** we elaborate on possibilities to study the effectiveness of psychosocial support.

In conclusion

With this dissertation, we ultimately intended to give an impetus to the refinement of guidelines on psychosocial support after critical incidents and disasters by providing in-depth recommendations. These recommendations for research and practice are summarized in **Chapter 7** and are based on findings in this dissertation and on the many lessons learned from other evaluation studies in the field of psychosocial support.

Samenvatting

(Summary in Dutch)

Deze dissertatie heeft als doel een bijdrage te leveren aan de kennis over het ondersteunen en identificeren van getroffenen van schokkende gebeurtenissen die risico lopen op psychische klachten. Deze twee thema's, ondersteuning en identificatie, zijn bij twee relevante doelgroepen onderzocht: a) bij professionals die op het werk herhaaldelijk worden blootgesteld aan schokkende gebeurtenissen, en b) bij getroffenen van een vliegtuigongeval.

Schokkende gebeurtenissen zijn zeer ingrijpende, stresserende situaties die levensbedreigend zijn, ernstig lichamelijk letsel veroorzaken en/of een bedreiging van de fysieke integriteit vormen. Voorbeelden zijn het meemaken van een natuurramp of de confrontatie met een agressieve cliënt op het werk. Ook het ervaren dat een dergelijke schokkende gebeurtenis een ander overkomt, zoals gebeurt bij het bieden van eerste medische hulp aan een ernstig gewond slachtoffer van een auto-ongeluk, kan zeer stresserend zijn. Dergelijke gebeurtenissen kunnen allerlei stressreacties teweeg brengen in de eerste weken erna, zoals slecht slapen, concentratieproblemen en/of herbelevingen van het incident. De meeste mensen herstellen op eigen kracht hiervan en hebben geen professionele hulp nodig. Dit zelfherstellend vermogen in het omgaan met tegenslag wordt vaak 'veerkracht' genoemd. Een minderheid van de getroffenen ontwikkelt echter langdurige, ernstige psychische klachten, zoals een depressie, angststoornis of posttraumatische stressstoornis (PTSS).

Om getroffenen zo goed mogelijk te ondersteunen in het omgaan met de impact van een schokkende gebeurtenis en natuurlijk herstel te bevorderen, zijn diverse richtlijnen ontwikkeld (zie **Hoofdstuk 1** voor een overzicht van richtlijnen en aanbevelingen). Deze richtlijnen helpen gezondheidszorginstellingen, overheden en organisaties van beroepsgroepen als de politie en ambulance (de zogenaamde hoog-risico beroepen vanwege de herhaalde blootstelling van medewerkers aan schokkende gebeurtenissen) met het inrichten van de nazorg. Ze onderschrijven daarbij het belang van het aanbieden van 'psychosociale ondersteuning'. Psychosociale ondersteuning richt zich op het bieden van praktische en emotionele steun aan alle getroffenen, door bijvoorbeeld onderdak te bieden als dat nodig is en toegang te faciliteren tot sociale steun van vrienden/familie of collega's. Ook bevelen de richtlijnen aan in de eerste weken na de gebeurtenis diegenen die veel last hebben van stressreacties steun te bieden door hun klachten te normaliseren en ze aan te moedigen eigen, natuurlijke copingstrategieën te gebruiken. Vanwege het risico op langdurige klachten, wordt tevens geadviseerd getroffenen met stressklachten te monitoren en, wanneer ze veel last blijven houden van klachten die het functioneren belemmeren, tijdig door te verwijzen naar professionele hulp (zoals een huisarts of psycholoog).

Deze werkwijze van psychosociale ondersteuning wordt veel toegepast in de praktijk en ondersteund door onderzoeken die het belang van sociale steun voor de veerkracht en het zelfherstellend vermogen van mensen onderschrijven (zie **Hoofstuk 1** voor een uitwerking hiervan). Ook wordt deze werkwijze onderschreven door verschillende experts in het veld. Bewijs voor de effectiviteit van psychosociale ondersteuning is er echter nog niet. De aanbevelingen berusten voornamelijk op systematisch verkregen consensus onder experts uit het veld. Onderzoek is nodig om de huidige aanbevelingen verder te concretiseren en te onderbouwen. Zo is het bijvoorbeeld onduidelijk hoe de ondersteuning van getroffenen praktisch gezien het beste kan worden vormgegeven na een schokkende gebeurtenis. Wat helpt professionals binnen hoog-risico beroepen om met de incidenten om te gaan die hun werk kenmerken en in hoeverre draagt sociale steun van de leidinggevende en collega's bij aan hun welzijn? Welke methoden zijn geschikt om getroffenen met ernstige psychische klachten tijdig te signaleren? En hoe actief moet je precies zijn in het monitoren van getroffenen, wetende dat een groot deel veerkrachtig is en geen hulp behoeft?

Deze dissertatie streeft ernaar om een bijdrage te leveren aan de verdere concretisering van de richtlijnen door vanuit verschillende invalshoeken onderzoek te doen naar de ondersteuning en identificatie van getroffenen van schokkende gebeurtenissen.

Een ondersteunende werkomgeving voor hoog-risico professionals

Om kennis over de ondersteuning van professionals na schokkende gebeurtenissen te vergroten, onderzochten we bij ambulancemedewerkers welke aspecten van een steunende werkomgeving gerelateerd waren aan ervaren psychische stress (angstklachten en somberheidsklachten) zoals in **Hoofdstuk 2** uitgewerkt. In totaal namen 813 ambulancemedewerkers uit 8 verschillende geïndustrialiseerde landen deel aan een eenmalig vragenlijstonderzoek. De vragenlijsten richtten zich op (de perceptie van) sociale steun van collega's en van leidinggevenden, de aanwezigheid van formele collegiale ondersteuning en het ervaren van voldoende tijd om te herstellen na een incident. Het onderzoek wees uit dat, ondanks de nationale verschillen in werkomgeving, ervaren steun van leidinggevenden en collega's en het krijgen van voldoende tijd om te herstellen na een incident positief gerelateerd waren aan het welzijn van medewerkers. Bovendien bleek dat de aanwezigheid van formele collegiale ondersteuning (een veelgebruikt systeem in organisaties waarbij een getrainde collega formeel ondersteuning aanbiedt na vooraf vastgestelde ingrijpende gebeurtenissen) indirect gerelateerd was aan een verhoogd welzijn van

ambulancemedewerkers, doordat het samenhing met het gevoel gesteund te worden door collega's. Dit indirecte effect suggereert dat de aanwezigheid van formele steun kan bijdragen aan het welzijn doordat ambulancemedewerkers zich sterker gesteund voelen door collega's.

Ingrijpende gebeurtenissen op het werk vinden plaats en kunnen niet los gezien worden van de organisatiecontext. In **Hoofdstuk 3** focusten we daarom op de invloed van schokkende incidenten op het welzijn van medewerkers, rekening houdende met organisatorische stressoren (zoals een hoge werkdruk of moeilijke relatie met een leidinggevende), energiebronnen op het werk (zoals het ervaren van autonomie) en persoonlijke hulpbronnen (zoals steun van familie en vrienden). Dit onderzochten we bij politiemedewerkers die zich bezig houden met de opsporing van seksueel misbruik (zedenrecherche) en kinderpornografie (medewerkers van de Teams ter Bestrijding van Kinderpornografie en Kindersekstoerisme). Het Job Demands-Resources model fungeerde als theoretisch kader voor het opstellen van een vragenlijst specifiek voor deze groep medewerkers. Welzijn werd gemeten met vragen over cynisme, vermoeidheid, overdreven beschermend gedrag ten opzichte van de eigen familie, een negatief wereldbeeld, seksuele problemen en werk bevlogenheid. Er deden 480 politiemedewerkers mee aan het onderzoek. De studie liet zien dat organisatorische stressoren gerelateerd waren aan alle indicatoren van een verminderd welzijn. De confrontatie met seksueel geweld of kinderpornografie was enkel gerelateerd aan respectievelijk seksuele problemen en een negatief wereldbeeld. Belangrijke energie- en hulpbronnen waren de inhoud van het werk (het werken met, en iets kunnen betekenen voor, slachtoffers) en autonomie, mogelijkheden voor professionele ontwikkeling, in staat zijn om professionele afstand te houden tot het werk en een stabiele thuissituatie. Deze bevindingen leidden tot de suggestie om deze groep politiemedewerkers te ondersteunen door een werkomgeving te creëren die ze in staat stelt te focussen op het oplossen van een zaak en waarin negatieve organisatorische aspecten van het werk, zoals een voortdurend hoge werkdruk, geminimaliseerd worden.

De genoemde studies zijn cross-sectioneel. Om daadwerkelijk zicht te krijgen op de invloed van schokkende gebeurtenissen in combinatie met dagelijkse werkstress is longitudinaal onderzoek onontbeerlijk. In **Hoofdstuk 7** gingen we dieper in op mogelijkheden voor toekomstig onderzoek en formuleerden we tevens aanbevelingen voor de praktijk. We onderschreven daarbij het belang om in de huidige richtlijnen meer aandacht te besteden aan de impact van dagelijkse organisatiestress. Hoewel de negatieve invloed van organisatiestress herhaaldelijk in verschillende onderzoeken werd aangetoond, wordt het grotendeels genegeerd in huidige richtlijnen over psychosociale ondersteuning. Ook de beschermende

invloed van informele steun van collega's en leidinggevenden en het mogelijke risico om als organisatie teveel te leunen op formele collegiale ondersteuning, is onderwerp van discussie. Tot slot bepleitten we om in vervolgstudies de lange termijn effecten van herhaaldelijke blootstelling aan incidenten te onderzoeken.

De ondersteuning en detectie van getroffenen die risico lopen op mentale gezondheidsproblemen na rampen

Detectie na een vliegtuigongeval

Rampen en crises leiden bij een minderheid van de getroffenen tot ernstige psychische klachten. We onderzochten de identificatie van getroffenen met een verhoogd risico op mentale gezondheidsproblematiek in twee studies onder getroffenen van het ongeval met het Turkish Airlines vliegtuig bij Schiphol in 2009. Van de 135 inzittenden overleefden 126 mensen het ongeval. De meeste overlevenden waren van Nederlandse of Turkse afkomst.

Om beter te begrijpen welke groepen na een ramp een verhoogd risico lopen op klachten, onderzochten we in **Hoofdstuk 4** of symptomen van PTSS en depressie voorspeld konden worden door bepaalde specifieke kenmerken van de traumatische gebeurtenis, namelijk objectief gemeten ernst van fysieke verwondingen, ziekenhuisopnames, duur van ziekenhuisopnames en de zitplaats in het vliegtuig. Kennis over groepen die een verhoogd risico lopen op PTSS of depressie, helpt beleidsmakers en zorgprofessionals met het gerichter aanbieden van psychosociale ondersteuning. Objectief gemeten ernst van fysieke verwondingen en ziekenhuisopnames bleken het verloop van PTSS- en depressieklachten tussen 2 maanden en 9 maanden na het ongeval niet te voorspellen. Ook de mate van blootstelling aan de hand van iemands zitplaats in het vliegtuig (wel of niet dicht bij een mogelijke uitgang) bleek niet van invloed. We hadden wel relaties verwacht, omdat al deze variabelen een indicatie zijn voor de mate waarin iemand is blootgesteld aan de gebeurtenis, enerzijds doordat ze bijvoorbeeld meer fysiek geschonden zijn (ernst psychische klachten) of anderzijds doordat ze meer moeite hadden om te ontsnappen. De mate van blootstelling bleek in eerder onderzoek een belangrijke voorspeller van PTSS klachten. Mogelijk is niet de feitelijke ernst van fysieke klachten, maar de subjectief ervaren mate van doodsangst of dreiging van negatieve invloed op het psychische herstel geweest. Voor de psychosociale nazorg na rampen betekenen deze bevindingen dat men zich niet alleen dient te richten op hen die er fysiek ernstig aan toe zijn en/of zijn opgenomen in het ziekenhuis, maar ook op diegenen met mildere fysieke klachten.

Wetenschappers en beleidsmakers verschillen in mening over hoe actief interventies in het monitoren en identificeren van getroffenen met ernstige stressklachten dienen te zijn. Door gebrek aan onderzoek is ook onduidelijk of screeninginstrumenten ter identificatie van getroffenen met ernstige klachten zijn aan te bevelen. In **Hoofdstuk 5** werd een proactieve, ondersteunende interventie geëvalueerd die is ingezet na het vliegtuigongeval bij Schiphol. De evaluatie richtte zich op het in kaart brengen van: 1) de accuratesse van screeninginstrumenten in het voorspellen van PTSS en depressie, 2) ervaren, zelf-gerapporteerde, behoeften aan psychische hulpverlening, en 3) de mate waarin ervaren hulpbehoeften voorspellend waren voor het verloop van PTSS klachten. De Trauma Screening Questionnaire (TSQ) bleek accuraat in het voorspellen van PTSS 3.5 jaren na het ongeval (de sensitiviteit varieerde tussen de 0.75 tot 1.00 en de specificiteit varieerde tussen de 0.79 tot 0.90). De Patient Health Questionnaire-2 bleek minder adequaat in het voorspellen van depressie (sensitiviteit: 0.38 tot 0.89, specificiteit: 0.67 tot 0.90). Problematisch voor beide instrumenten was de lage Positieve Voorspellende Waarde: 43% van de participanten die positief scoorde op de PTSS screener en 50% van de participanten die positief scoorde op de depressie screener, werd uiteindelijk niet gediagnosticeerd met een daadwerkelijk PTSS of depressie. Daarnaast bleek uit deze studie dat een behoorlijk aantal participanten onvervulde hulpbehoeftes rapporteerde. Twee maanden na het ongeval gaf 33% psychische hulp nodig te hebben terwijl ze dit nog niet ontvingen. Dit percentage was 3.5 jaar na het ongeval verlaagd naar 11%. De participanten met onvervulde hulpbehoeftes 2 maanden na de ramp, bleken vaker een chronisch verloop van PTSS klachten te rapporteren vergeleken met participanten zonder hulpbehoeftes. Vanwege het risico op chronische PTSS klachten in combinatie met onvervulde hulpbehoeften, kan screening zinvol zijn. Tegelijkertijd zal een behoorlijk aantal getroffenen positief screenen op de instrumenten, terwijl ze geen PTSS diagnose hebben of zullen ontwikkelen. Meer onderzoek is daarom nodig naar het effect van screening op gezonde mensen.

In **Hoofdstuk 7** gingen we dieper in op mogelijkheden om de accuratesse van huidige screeningsinstrumenten te verbeteren. Hoewel de screeningsinstrumenten nog niet optimaal zijn, kan een proactieve houding in de nafase met betrekking tot de monitoring en identificatie van getroffenen met klachten van belang zijn om onvervulde hulpbehoeften tegen te gaan. Verschillende studies toonden aan dat een aanzienlijke groep met psychische klachten na rampen en crises tussen wal en schip dreigt te raken. We beargumenteerden in Hoofdstuk 7 dat voor de nazorg verantwoordelijke autoriteiten niet te terughoudend met een actieve benadering van getroffenen moeten zijn, vooral wanneer barrières naar zorg duidelijk aanwezig

zijn. We stelden daarnaast voor dat toekomstig onderzoek zich richt op factoren die onvervulde zorgbehoeftes voorspellen in plaats van op voorspellers van psychopathologie. Meer kennis over het voorspellen van onvervulde zorgbehoeften draagt bij aan het gerichter kunnen aanbieden van psychosociale ondersteuning.

Psychosociale ondersteuning na CBRN rampen

Huidige richtlijnen omtrent psychosociale ondersteuning differentiëren niet in hun aanbevelingen tussen type crisis. In **Hoofdstuk 6** bestudeerden we de vraag of een specifiek type crisis, namelijk een Chemische, Biologische, Radiologische of Nucleaire (CBRN) gebeurtenis, om een alternatieve psychosociale reactie vraagt. In tegenstelling tot de vaak acute chaos na bijvoorbeeld natuurramp, start een CBRN gebeurtenis vaak sluimerend en met groeiende gevoelens van onzekerheid en wantrouwen richting experts. Een systematische literatuurstudie werd uitgevoerd en leverde 49 relevante studies op. Geen voldeed echter aan de vooraf bepaalde criteria voor het design van effectiviteitsstudies. Wel heerste er consensus over de aspecten die relevant zijn voor psychosociale ondersteuning na CBRN gebeurtenissen. Hoewel de meeste aanbevelingen niet wezenlijk verschilden van de huidige generieke richtlijnen, legden de aanbevelingen in het geval van CBRN gebeurtenissen sterke de nadruk op risicocommunicatie en specifieke voorbereidingsmaatregelen voor de gezondheidszorg. Accurate informatie van betrouwbare experts wat betreft de blootstelling aan giftige stoffen is cruciaal om heersende angst onder de bevolking te verkleinen. Preparatie van de gezondheidszorg is nodig omdat mensen massaal zullen toestromen naar de gezondheidszorg vanwege de onzekerheid over besmetting en gezondheidseffecten. Bovendien is het gezondheidszorgpersoneel, vanwege de begrijpelijke angst voor besmetting van zichzelf en/of hun eigen familie, mogelijk minder gemotiveerd om te helpen. Echter, het gebrek aan bewijs voor de effectiviteit van psychosociale ondersteuning na een CBRN gebeurtenis, vraagt om voorzichtig te zijn met het formuleren van aanbevelingen.

Concluderend

Met deze dissertatie hebben we er naar willen streven een bijdrage aan de verdere verfijning en verdieping van de richtlijnen over psychosociale ondersteuning na rampen, crises en schrokkende gebeurtenissen op werk te leveren. In **Hoofdstuk 7** geven we een samenvatting van de aanbevelingen voor onderzoek en de praktijk. Deze zijn gebaseerd op de resultaten van deze dissertatie en de vele lessen die uit andere studies in het veld getrokken kunnen worden.

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About the author

About the author

Juul Gouweloos-Trines (1986) graduated with honors in 2009 from Utrecht University with a Master's degree in Clinical and Health Psychology. After graduation, she worked as a junior researcher at the Psychotrauma Center for Children and Adolescents (University Medical Center Utrecht) where she studied barriers to treatment in sexually abused girls with a Turkish or Moroccan background. Since 2010, she is a psychologist, policy advisor and researcher at Knowledge Centre Impact and the Institute for Psychotrauma (IVP), both partners in Arq Psychotrauma Expert Group. Ever since 2010, she has gained experience in setting-up and coordinating research projects on resilience in high-risk professionals and psychosocial consequences of large scale crises. In 2013, she began to combine this work with a PhD track at Utrecht University where she was affiliated with the Department of Clinical Psychology. As part of this track, she worked for 3 months at the Trauma Recovery Lab at Monash University in Melbourne, Australia.

Currently she leads a project commissioned by the National Coordinator Security and Counterterrorism (NCTV; Dutch Ministry of Justice and Security) focusing on the psychosocial consequences of being threatened as a politician and needing personal security. She is also involved in long-term research on suicide among police officers, to gain insight in possible preventive strategies for the Dutch National Police. As part of the Arq Crisis Team, which advises and assists the government after disasters, she was responsible for setting up and coordinating an (online) Support and Referral Point for victims with psychological complaints after the attack on Malaysian Airlines flight 17 in July, 2014.

What Juul drives in her work, is the combination between policy, research and clinical practice. She conducts Mental Check Ups with high-risk professionals (consultations that focus on resilience and staying healthy in a demanding work environment) and provides psychological aid to professionals with high levels of distress after recent exposure to critical incidents. Since 2018, she is in training to provide trauma therapy (Narrative Exposure Therapy and Brief Eclectic Psychotherapy) to undocumented refugees and victims of traumatic loss at Foundation Equator and Foundation Centrum '45.

Scientific publications

Gouweloos-Trines, J., Tyler, M. P., Giummarra, M. J., Kassam-Adams, N., Landolt, M. A., Kleber, R. J., & Alisic, E. (2017). Perceived support at work after critical incidents and its relation to psychological distress: a survey among prehospital providers. *Emergency Medicine Journal*, 34(12), 816-822.

Alisic, E., Tyler, M. P., Giummarra, M. J., Kassam-Adams, R., Gouweloos, J., Landolt, M. A., & Kassam-Adams, N. (2017). Trauma-informed care for children in the ambulance: international survey among pre-hospital providers. *European Journal of Psychotraumatology*, *8*(1), 1273587.

Van Loenen, T., van den Muijsenbergh, M., Hofmeester, M., Dowrick, C., van Ginneken, N., Mechili, E. A., ... & Zelko, E. (2017). Primary care for refugees and newly arrived migrants in Europe: a qualitative study on health needs, barriers and wishes. *The European Journal of Public Health*, *28*(1), 82-87.

Gouweloos, J., Postma, I., Te Brake, H., Sijbrandij, M., Kleber, R., & Goslings, J.C. (2016). Risk for PTSD and depression in survivors of an airplane crash: a longitudinal study. *Injury,* 47, 250-256.

Gouweloos, J., Dückers, M., Te Brake, H., Kleber. R., & Drogendijk, A. (2014). Psychosocial care to affected citizens and communities in case of CBRN incidents: A systematic review, *Environment International*: http://dx.doi.org/10.1016/j.envint.2014.02.009.

Smeets, M.A.M., Veldhuizen, M.G., Galle, S., Gouweloos, J., de Haan, A., Vernooij, J., Visscher, F., & Kroeze, J.H.A. (2009). Sense of Smell Disorder and Health-related Quality of Life. *Rehabilitation Psychology,* 54, 404-412.

Professional publications

Gouweloos, J. (2015). Vertrouwen op veerkracht. Toegang tot psychische zorg na rampen. In: P. van der Velden, T. Mooren, J. Knipscheer (Red), *Psychotrauma wel beschouwd.* Diemen: Stichting Arq.

Gouweloos, J., Dückers, M., Smid, G. E., & Drogendijk, A. N. (2015). Herken klachten na traumatisch verlies. *Medisch Contact*, (70), 1274-1276.

Gouweloos, J., Lesger, D., & Te Brake, H. (2014). *Onderzoeksrapport: ontwikkeling van een zelfscreener voor medewerkers werkzaam in de opsporing van zedendelicten en kinderpornografie.* Diemen: Stichting Impact.

Burger, N., Gouweloos, J., Mellink, R., … & De Groot, M. (2014). *Suïcide bij ambtenaren van de politie. Frequentie, oorzaken en preventiemogelijkheden.* Stichting Impact.

Dückers, M., Gouweloos, J., & Drogendijk, A (2014). Nazorg Contact Punt. Een ontbrekend puzzelstuk in de nazorg na rampen. *Magazine Nationale Veiligheid en Crisisbeheersing,* 6, 38-19.

Gouweloos, J., Ten Brinke, J.M., Sijbrandij, M., Boele, I. & Te Brake, H. (2013). *Bevindingen getroffenen Poldercrash. Resultaten van drie belrondes onder getroffenen van het vliegtuigongeluk met de TK 1951 op 25 februari 2009.* Diemen: Impact.

Sleijpen, M. & Gouweloos, J. (2012). Veerkracht in het heilige land. Verslag van een summerschool in Israël. *Cogiscoop,* 16-20.

Gouweloos, J., Kremers, A.H.A., & Bicanic, I.A.E. (2010). Zwijgen na seksueel geweld. Naar een toegankelijke en geschikte traumabehandeling voor meisjes en vrouwen van Turkse of Marokkaanse afkomst. *Cultuur Migratie Gezondheid,* 4, 192-201.

Gouweloos, J., Kremers, A.H.A., Sadat, A., & Bicanic, I.A.E. (2011). Traumabehandeling na eenmalig seksueel geweld. Hoe kan drop-out onder Turkse en Marokkaanse meisjes verminderd worden? *Psychologie en Gezondheid*, 39, 175-179.

Drogendijk, A.D. & Gouweloos, J. (2011). *Handreiking effectieve opvang na schokkende gebeurtenissen voor leidinggevende en management.* Programma Veilige Publieke Taak: Ministerie van Binnenlandse Zaken en Koninkrijksrelaties.