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## Mental health problems among search and rescue workers deployed in the Haïti earthquake 2010: A pre–post comparison

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### ABSTRACT

Search and rescue workers play an important role in rescuing trapped disaster victims. However, it is unclear whether they are at risk for post-disaster mental health problems. For this purpose we prospectively examined pre- and post-deployment health among Dutch search and rescue workers (USAR NL) deployed in the devastating Haiti earthquake disaster (2010). The evening before departure (T1, response = 100%) and 3 months post-deployment (T2, response = 91%), search and rescue workers were administered standardized questionnaires assessing health (SCL-90-R, RAND-36), including use of substances and mental health services utilization ( $N = 51$ ). At T2 event-related PTSD-symptoms (IES) and coping self-efficacy (CSE), and experiences during and after deployment were examined. At both surveys health problems were almost absent and no significant increases in health problems and use of substances were found. PTSD-symptomatology was very low and coping self-efficacy rather high. Protective factors such as good team functioning, recognition and job satisfaction were clearly present, while risk factors such as sustained injuries or death of a co-worker were absent. Findings suggest that post-disaster health problems may (partly) be prevented by enhancing or restoring protective factors.

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### 1. Introduction

It is quite common today that countries have specialized and trained urban search and rescue forces. As part of an integrated disaster response, these forces can act within a very short period of time. The primary focus of these teams is to find and rescue victims trapped after a disaster including safely digging victims out of collapsed buildings, and giving medical care to victims during and after a rescue. In general, forces end their search and rescue work within approximately 10 days. The chance that trapped (and perhaps injured) victims survive without water and food, declines dramatically after 5–10 days.

Of course, urban search and rescue work – especially when trapped victims are rescued – can be very satisfying and rewarding. On the other hand, as shown in the review of McCaslin et al. (2009), critical exposure characteristics such as facing injured and dead adults and children, the smell of the deceased, destructed areas, danger, unsuccessful operations, and emotions of survivors (such as anxiety, grief, helplessness, anger) may put workers at risk for event-

related mental health problems such as posttraumatic stress disorder (PTSD). However, research has demonstrated that prevalence of post-traumatic distress and PTSD vary substantially across disasters and background of rescue workers. For example, in the study of Gabriel et al. (2007) 2 months after the Madrid bombing 1.3% of the police officers of an elite corps met the criteria of PTSD. Four months after the Ash Wednesday bushfire, 31% of the volunteer firefighters qualified for a diagnosis of PTSD (McFarlane and Papay, 1992).

Almost all disaster studies focused on rescue workers, were conducted after the disaster. Therefore it is unclear to what extent mental health problems (MHP) can be attributed to disaster-exposure or were already present before the event. For example, after the Oklahoma bombing North et al. (2002) found that the rate of post-event non-alcohol disorders among firefighters was four times higher in those with pre-disaster psychopathology (43% versus 11%). Similar findings were reported after the 9/11 terrorist attacks. Deployed canine and rescue handlers with a history of mental illness compared to colleagues without such a history reported more symptoms of depression, psychological distress and more often met criteria for a current disorder (Alvarez and Hunt, 2005). However, both of these studies were based on possible biased retrospectively collected data on previous MHP. Remarkably, one prospective study with pre–post measures among police officers (body handlers) found that affected

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officers had less anxiety 3 months post-disaster, while depression symptoms remained stable (Alexander and Wells, 1991). Further support for the importance of pre-event functioning is found in several prospective studies on critical incidents among officers (van der Velden et al., 2010). In addition, especially research among police officers has shown that organizational stressors are more likely sources of adverse psychological reactions, including PTSD, than critical incidents (Brown et al., 1999; Hartley et al., 2007; Huddleston et al., 2007; Liberman et al., 2002; van der Velden et al., 2010; Wang et al., 2010). To what extent specialized and trained urban search and rescue forces are at risk for post-disaster MHP remains unclear.

Because disasters occur suddenly, the relatively few prospective disaster studies that did conduct pre–post comparisons had this unique opportunity because researchers were already conducting a study when unexpectedly the disaster took place. To obtain reliable data about (mental) health before the disaster, an assessment just before rescue workers are deployed to the disaster site is optimal for this type of prospective investigation. With this goal in mind we designed the present study. In cooperation with the Dutch Urban Search and Rescue (USAR NL), study materials (letters, questionnaires, informed consent forms) were prepared in case of a new disaster where USAR NL would be deployed. According to plan, in case of a new disaster before departure workers would complete questionnaires and informed consent forms. Follow-up was scheduled approximately 3 months post-deployment. This pre-designed study was started soon after the first reports of the devastating Haiti earthquake (January 12, 2010).

## 2. Method

### 2.1. Background

On January 12 2010 around 5 P.M. local time Haiti, one of the poorest countries in the world (WHO, 2005) with a record of violence caused by the absence of State service (IRC, 2009), was struck by a massive earthquake registering 7.0 on the Richter scale. Many (governmental) buildings, airport and houses collapsed and the infrastructure was destroyed. Early after the disaster it was estimated that at least between 50,000 and 120,000 people had died and many more (severely) injured. It was within this context that the Search and Rescue Netherlands (USAR NL) team was activated.

### 2.2. Procedure and sample

A USAR NL team ( $N=60$ ) consisting of firefighters, police officers with trained dogs, nurses, a surgeon, and communication personnel were deployed to Haiti. On January 13 2010 at 3:15 P.M. local time, USAR NL formed the national operational team. Members were requested to gather after 6:00 P.M. on a military base nearby Eindhoven Airport, The Netherlands, to be able to fly to Haiti the same night (Dutch military personnel who provide support to USAR NL were excluded from this study). During the evening, all team members were medically examined before departure (i.e. general medical status by a physician (TE) of USAR NL). To prevent malaria, all received a packet of Malarone. Participants were briefed about the disaster and operation. In this period, all members ( $N=56$ ) were informed (orally and by letter) about the aim of this research project and asked to participate (T1). They all gave their written informed consent and then filled in a paper-and-pencil questionnaire (response = 100%).

On January 14 at 10:15 A.M local time, USAR NL departed. USAR NL first arrived at the Dominican Republic, because the airport of Haiti could not handle large numbers of (heavy) airplanes. Finally they flew to Haiti via Curaçao and arrived on January 15 at Port-au-Prince. They left Haiti on January 22, stayed for 2 days in Curaçao for debriefing aimed at the search and rescue work during the week in Haiti (not psychological debriefing) and prepared to fly back. One employee of the Institute for Psychotrauma (PL) joined the team at Curaçao to advise the team leaders in case of any psychosocial issues that needed care. They finally arrived at Eindhoven Airport at January 24. About 1 week later, all members received a letter from the IVP (PL) with his phone number in case a member wanted additional advice or help. In the following weeks all members were personally contacted, with the aim a.) of providing them support and advice in resuming their normal work and daily living, and b.) in a non-intrusive way monitor their post-event health (“watchful waiting”). Importantly, nobody needed help because of any consequences related to disaster exposure.

Three months after deployment, all respondents at T1 ( $N=56$ ) were invited to participate in a follow-up (T2). After a few weeks a reminder was sent. In total, 51 members gave their written informed consent and returned the completed questionnaires (response = 91%).

### 2.3. Measures

#### 2.3.1. Demographics

Demographic information concerning gender, age, years of USAR NL membership, search and rescue work during previous disasters such as Morocco (2004) and Pakistan (2005), was obtained at T1.

#### 2.3.2. Health

We administered the Symptom Checklist 90 (SCL-90-R; Arrindell and Ettema, 1986; Derogatis, 1983) at T1 and T2 to examine symptoms during the past 7 days, such as depression and anxiety. The Dutch norm tables for males and females were used to identify respondents with severe symptoms (i.e. with high or very high scores). The validity and reliability of the Dutch SCL-90-R has proven to be satisfactory (Arrindell and Ettema, 1986). We did not compute Cronbach's alpha for the SCL-90-R scales in this sample because of skewedness of the data, caused by extremely low scores (see results; Dunlap et al., 1994). However, previous trauma research among rescue workers showed that the SCL-90-R scales had high internal consistencies, i.e. high Cronbach's alpha's (van der Velden et al., 2006a, 2008, 2010). Disaster-related PTSD symptoms (i.e., intrusions and avoidance reactions) at T2 were assessed using the 15 item Impact of Event Scale (IES; 0 = not at all, 1 = seldom, 3 = sometimes, 5 = often; Horowitz et al., 1979). The validity and reliability of the Dutch IES has proven to be satisfactory (van der Ploeg et al., 2004). The IES assesses symptoms during the past 7 days (Cronbach's alpha = 0.77). In addition, we asked at T1 and T2 whether or not participants were currently using physician prescribed medicines for depressive feelings and/or emotional/sleeping problems. At both waves one standardized question from the RAND-36 (Aronson et al., 1998) was used to examine perceived general health (1 = excellent, to 5 = bad).

#### 2.3.3. Substance use

Smoking at T1 and T2 was assessed using the Dutch Local and National Public Health Monitor (GGD, 2003). For this study we focused on current smoking (Do you ever smoke? (1 = yes, 2 = no, but in the past; 3 = no, I never smoked)) and amount of cigarettes. Alcohol consumption at T1 and T2 was examined using the Dutch Monitoring Project on Risk Factors for Chronic Diseases (Blokstra et al., 1998). In the present study we focus on general alcohol use per day assessed as the amount of glasses of beer, wine or hard liquor, during the past month.

#### 2.3.4. Mental health services utilization

Current use of MHS (local MHS, private psychiatrist, psychologist or psychotherapist; yes/no) was assessed at T1 and T2 (van der Velden et al., 2006b). In addition at both waves we examined so-called “un-met needs” (i.e., whether or not participants felt they needed professional help due to psychological problems, tension or the use of alcohol or drugs, but did not consult a physician or other professional helper; Bijl and Ravelli, 1998). Respondents answered yes or no at T1: during past 12 months, and at T2 since deployment in Haiti (see Table 2).

#### 2.3.5. Experiences with the disaster and aftermath

For the present study we developed a 24 item questionnaire aimed at the work and experiences in Haiti (13 items) and the aftermath (11 items), using 5 point Likert scales (1 = not, to 5 = much). They covered topics such as exposure (e.g., view/smell deceased, being threatened) and organizational stressors (e.g., job-satisfaction, team functioning), social support (e.g., rewarding, support), and problems resuming work once home (see Table 2).

#### 2.3.6. Coping self-efficacy

A 24-item version of the coping self-efficacy list (CSE; Benight et al., 2004; Hyre et al., 2008) was administered at T2. The CSE assesses to what extent participants feel they are capable of handling 20 situations since the Haiti earthquake, such as coping with emotions since their search and rescue work, accept what has happened, and concentrate on work and be effective. All items have 7-point Likert scales (1 = I am not at all capable, to 7 = I am totally capable, Cronbach's alpha = 0.94).

#### 2.3.7. Data analyses

Due to the non-normality of our data, pre–post comparisons were conducted using non-parametric chi-square tests (McNemar–Bowker and test for marginal homogeneity) and Wilcoxon's z. For correlation analyses we used the non-parametric Spearman's correlation.

## 3. Results

### 3.1. Health

The large majority of participants was male (92.2%) with a mean age of 44.7 years (S.D. = 6.4). The sample consisted of police officers ( $n=11$ ), firefighters ( $n=35$ ), ambulance personnel ( $n=4$ ) and one surgeon. Almost 3/4 of the sample were members of USAR NL for 2 years or longer. In total, 45.1% were deployed to previous disasters.

**Table 1**

Health problems, substance use, and mental health services utilization before and after search and rescue work in Haiti.

	N <sup>analyses</sup>	Pre-disaster (T1)		Post-disaster (T2)		Test	
		Mean	S.D.	Mean	S.D.	Wilcoxon z	p
<b>Mental Health problems</b>							
Anxiety symptoms range 10-50	50	10.08	.27	10.4	.20	-.816	.414
Depression symptoms range 16-80	51	16.29	.73	16.10	.30	-1,977	.048
Somatic problems range 12-60	51	12.37	.82	12.33	.68	-.291	.771
Sleeping problems range 3-15	51	3.37	.71	3.27	.75	-.726	.468
Hostility range 6-80	51	6.13	.55	6.10	.41	-.086	.931
Interpersonal sensitivity range 18-120	49	18.72	1.54	18.14	.35	-3,064	.002
<b>Disaster related posttraumatic stress symptoms</b>							
Intrusions/re-experiencing range 0-30	50			2.38	2.61	n.a.	
Avoidance range 0-35	50			.36	.83	n.a.	
IES Total score range 0-75	50			3.00	3.85	n.a.	
<b>Substance use</b>							
		N	%	N	%	McNemar-Bowker	
						$\chi^2$	df
General alcohol use per day past month:	51						
- None		5	9.7	5	9.6	1,800	4
- 1 glass per day		17	32.7	13	25.0		
- 2-3 glasses per day		24	45.1	28	53.8		
- 4 or more glasses per day		6	11.5	5	9.6		
Smoking:	51					2,333	3
- Yes		12	23.5	14	27.5		
- No, but in the past		13	25.5	13	25.5		
- No, never		26	51.0	24	47.0		
Cigarettes consumption among smokers T1, during past month	11	Mean	S.D.	Mean	S.D.	Wilcoxon z	p
		6.91	6.40	7.73	6.84	-1,461	.144
<b>Using physician prescribed drugs</b>							
		N	%	N	%	Marginal Homogeneity	
						$\chi^2$	df
For depressive feelings	51						
- Yes		0	0.0	1	2.0	1.00	1
- No		51	100	50	98.0		
For emotional/sleeping problems	51					n.a.	
- Yes		0	0.0	0	0.0		
- No		51	100	51	100		
<b>Use of mental health services</b>							
		N	%	N	%	Marginal Homogeneity	
						$\chi^2$	df
Current	51						
- Yes		0	0.0	1	2.0	1.00	1
- No		51	100	50	98.0		
Un-met needs	51					1.00	1
- Yes		1	2.0	0	0.0		
- No		50	98.0	51	100		
<b>&gt;General health</b>							
		N	%	N	%	McNemar-Bowker	
						$\chi^2$	df
Excellent	51					1,343	2
Very good		19	37.3	15	29.4		
Good		23	45.1	26	51.0		
		9	17.6	10	19.6		

Range = minimum and maximum score on sub scale/total score.

n.a. = not applicable.

Table 1 presents all health outcomes at T1 and T2. The results of the statistical analyses showed that there were no significant changes between T1 and T2 for each health outcome, except, importantly, for depression and interpersonal sensitivity where scores were lower at T2.

Furthermore, Table 2 shows that health problems among the participants were virtually non-existent. For instance, the mean score for anxiety symptoms at both waves was 10.8 (S.D. = 0.27) and 10.4 (S.D. = 0.20) respectively (minimum score = 10). Additional analyses showed that no participant had an above the mean, high or very high score on the SCL-90-R total score according to the Dutch norm tables (i.e. were lower than 131 and 150 for males and females respectively). The mean scores on the IES were very low and no participant had a higher score, i.e. total score > 25 (van der Velden et al., 2006a, 2006b).

With respect to smoking and alcohol use, and physician prescribed medicines, no significant changes were found. Only 1 person used

medicines for depressive feelings at T2. Two out of 51 participants (3.9%) used MHS in the 12 months before Haiti (not shown in table), but at the time of departure to Haiti nobody used MHS. One person used MHS at T2. Additional analyses showed that respondents, who were deployed in previous disasters, did not statistically differ ( $p < 0.05$ ) on any health outcome at T1 and T2 (see Table 1) from respondents who were not involved in previous disasters.

### 3.2. Experiences during and after deployment

In Table 2, the experiences during and after the search and rescue work in Haiti are presented. Team's functioning was perceived as (very) constructive. Nevertheless, about 35% found the work tiring (moderate to very), almost 30% experienced the work as mentally burdensome to a greater or smaller extent (a little to very), and

**Table 2**  
Experiences during and after search and rescue work in Haiti.

		N analyses	Not	A little	Moderate	Rather	Very
			%	%	%	%	%
<i>Experiences at Haiti</i>							
1	Atmosphere in own team in Haiti was good	51	0	0	0	17.9	82.4
2	Cooperation within the USAR NL team was good	51	0	0	0	25.5	74.5
3	Satisfied about what we have achieved in Haiti	50	0	0	3.9	25.5	68.6
4	Felt threatened outside airbase in Haiti	51	66.7	25.5	5.9	2.0	0
5	Found it frustrating that we could not do more	51	31.4	49.0	7.8	11.8	0
6	Could get enough sleep in Haiti	51	9.8	11.8	29.4	33.3	15.7
7	From the reactions of the Haitians it became clear that they were glad that we helped them	51	0	7.8	25.5	49.0	17.6
8	Found the work in Haiti very tiring	51	25.5	39.2	21.6	9.8	3.9
9	Found the work in Haiti mentally burdensome	50	26.0	46.0	20	6.0	2.0
10	Really suffered from the climate in Haiti	51	72.5	17.6	9.8	0	0
11	Found the view (or smell) of the deceased at a certain moment too much	51	74.5	23.5	2.0	0	0
12	Meetings within USAR NL about planning work came to a good end	51	0	0	5.9	49.0	45.1
13	Messages in the media caused that home front had more worries than necessary	51	29.4	29.4	15.7	15.7	9.8
<i>Experiences after work in Haiti</i>							
1	Stay in Curaçao after the work in Haiti did good	51	7.8	3.9	17.6	39.2	31.4
2	(Technical/operational) debriefing at Curaçao was enough	51	0	0	11.8	43.1	45.1
3	Needed more talks with members who also were involved in Haiti	50	64.0	30.0	2.0	4.0	0
4	Attention of USAR NL towards how I am doing since Haiti, is good	50	0	5.9	7.8	37.3	47.1
5	In case of problems due to Haiti know where can get help	51	2.0	0	0	15.7	82.4
6	In weeks after arrival had to get accustomed to normal work	51	0	35.3	33.3	9.8	21.6
7	During resuming normal work, could count on superior	50	9.8	11.8	5.9	29.4	41.2
8	During resuming normal work, could count on colleagues	50	4.0	8.0	8.0	30.0	50.0
9	After work in Haiti, received recognition and appreciation for what we have done in Haiti	51	0	0	2.0	17.6	80.4
10	Work in Haiti has enriched life	51	0	3.9	11.8	33.3	51.0
11	Looking forward to participating in a new USAR NL deployment	51	0	0	2.0	11.8	86.3

almost 20% reported feeling frustrated (moderate to very) that they could not do more during the stay in Haiti. However, more than 95% was rather to very satisfied about what USAR NL has achieved. The stay in Curaçao and debriefing was also rated as (very) positive. In addition, 98% reported that they received a lot of appreciation and recognition (rather to very) for their work in Haiti. Yet, 65% reported that they had to get accustomed to their normal work to a smaller or greater extent (a little to very). In this perspective, around 79% could count on their superiors and 88% on their colleagues when resuming normal work once home. And last, almost all participants (>95%) were really looking forward to participating in a new USAR NL deployment.

### 3.3. Coping self-efficacy

With respect to coping self-efficacy, all respondents had scores on the 24 items of the CSE of 5 or more, except three participants who had a score of 4 on 3 different items ( $M_{\text{total}} = 159.0$ ,  $S.D. = 5.5$ ), indicating very high coping self-efficacy perceptions. More specifically, these findings indicated that participants felt that they were very capable in handling emotions and thoughts about the disaster, offering help to others, concentrating on work and so on, 3 months post-disaster.

Because of the absence of important changes or differences in health outcomes and the finding that participants were very healthy at both waves, we only analyzed the bi-variate associations among seven pre-disaster health variables, i.e. the 6 SCL-90-R scales and general health at T1 (see Table 1) and coping self-efficacy at T2. Correlational analyses showed that general health at T1 was significantly associated with coping self-efficacy at T2 ( $r = -0.41$ ,  $p = 0.003$ ) and that the six other correlations were not significant. Thus, although pre-disaster general health was good to excellent and coping self-efficacy at T2 was rather high, they were still significantly associated.

## 4. Discussion

Findings from this prospective study clearly indicate that 3 months post-disaster, participants were as healthy as before deployment,

perhaps even more so. Depression symptoms and interpersonal sensitivity were even significantly lower 3 months post-event. Use of physician prescribed medicines, as well as alcohol use and smoking remained stable. PTSD-symptom scores at 3 months were very low, and as low as IES scores of firefighters and ambulance personnel in the studies of van der Velden et al. (2006a, 2008) 18 months after a major fireworks disaster in The Netherlands (firefighters:  $\text{mean}_{\text{intrusions}} = 3.1$ ,  $S.D. = 4.9$ ,  $\text{mean}_{\text{avoidance}} = 1.6$ ,  $S.D. = 3.9$ ; ambulance:  $\text{mean}_{\text{intrusions}} = 4.0$ ,  $S.D. = 5.8$ ,  $\text{mean}_{\text{avoidance}} = 3.1$ ,  $S.D. = 5.3$ ). In addition, 2 months following the Chi Chi earthquake, deployed firefighters (Chang et al., 2008) had a mean score on the IES (total scale) of 15.3 ( $S.D. = 14.0$ ) compared to 3.0 3 months post-event in our sample. In line with these findings event-related coping self-efficacy, that mediates the effects of peri- and post-traumatic risk factors on mental health (Luszczynska et al., 2009), appeared to be very high.

The strengths of our study are the pre-post design and the very high response rates at both surveys (100% and 91% respectively). We have no data on why non-responders at T2 did not participate at T2. Although we used well validated and often used self-report questionnaires in trauma research (SCL-90-R and IES), one limitation is that we did not conduct clinical or diagnostic interviews. We also did not administer the IES-R that includes items of the hyperarousal component of PTSD. The IES was used because we did not have IES-R data on rescue workers to compare our findings, which is important in interpretation of our outcomes. In addition, the IES-R is not as well validated in the Netherlands as the IES. In principle it is possible that arousal symptoms were high 3 months post event, but given all other outcomes this does not seem very likely. We expect that if that were the case, we would see other negative affect outcomes elevated. However, this remains a question for future research with rescue workers.

Nevertheless, the very low scores on both lists serve as a strong indication that none of the participants had a mental disorder (DSM Axis I disorders) such as PTSD and major depression. Another limitation of the study is that the second survey was conducted approximately 3 months post-event: perhaps an earlier assessment would have yielded greater variability in health assessments since symptoms may decline rapidly. For example, in the study of Yeh et al.

(2002) the prevalences of Acute Stress Disorder 2 and 4 weeks post-disaster among military rescue workers were 9 and 2–3% respectively. However, personal contacts in the weeks following deployment with all individual members ( $N=56$ ) demonstrated that nobody needed help because of any consequences related to disaster exposure.

In line with the study of Alexander and Wells (1991), we found no indications that the search and rescue work in Haiti severely affected the mental health of participants 3 months post-event (Cf. Gabriel et al., 2007). It is important to consider why our study demonstrated no indications of an increase of mental health problems, including substance use, and very low PTSD symptom severity following deployment in this major disaster in contrast to many other disaster studies (McCaslin et al., 2009; van der Velden and Kleber, 2009). Our results suggest that in this case potential pre-, peri- and post-event protective factors for post-event health problems were present and that important risk factors were absent.

#### 4.1. Pre-event factors

Research has shown that severe pre-event mental health problems are an important risk factor for post-event problems (Alexander and Wells, 1991; North et al., 2002; Alvarez and Hunt, 2005; van der Velden et al., 2010), but among this sample the health before the work in Haiti was very good. Everyone passed the general medical check before departure and no one was refused in departing to Haiti because of health problems. Furthermore, USAR NL is a professional elite corps: they are certified as a “Heavy Duty” team. Non-trauma research of Joensuu et al. (2010) has shown that high skill discretion (learn new things, develop competences) is associated with a reduced risk for depressive and non-depressive non-alcohol-related mental disorders. In addition, Thormar et al. (2010) showed that compared with volunteer rescue workers, professional workers are less at risk for post-event health problems. For example, 1 month after the Chi Chi earthquake non-professional rescue workers more often reported high levels of PTSD symptomatology (31.8%) than their (older) professional colleagues (19.8%; Guo et al., 2004). Furthermore, in contrast to rescue workers involved in other disasters, they had much more time to mentally prepare themselves and had not experienced the disasters themselves (Cf. Ehring et al., 2011).

#### 4.2. Peri-event factors

USAR NL was able to rescue trapped victims, which most likely was uplifting. In addition, they were involved in the body handling of deceased Dutch who were in Haiti at the time of the disaster. Organizational stressors (e.g. problems in team functioning such as conflicts during deployment), which increase the risk for severe post-event symptoms (van der Velden et al., 2010), were not reported by participants. Indeed, participants reported team functioning as good, which may have prevented post-event disturbances (Alexander and Wells, 1991).

An overload of exposure to dead bodies (and smell), injured victims, frustrations about not being able to rescue (more) injured victims, negative reactions from victims may place rescue workers at risk (McCaslin et al., 2009; Brackbill et al., 2009). However, in this case a minority reported that the view (or smell) of the deceased was a little too much at certain moments although about 30% reported that the work was mentally burdensome. We assume that the policy to end the search and rescue work each day around 6 P.M. (local time), may have helped in preventing overload. On the other hand, this policy may – among other factors – partly explain why almost one out of five felt frustrated that they could not do more. The possible negative effects of these feelings may have been neutralized by the reactions of the Haitians: participants reported

that they felt that Haitians were glad that USAR NL helped them. In addition, deployment in Haiti was restricted to 1 week, and perhaps a longer deployment may have yielded other results.

No one of USAR NL was injured and no one died during the rescue work indicating that an important risk factor (Brackbill et al., 2009) for mental health problems was absent. All international search and rescue teams (about 40) had their base camp in a secured area at the airport. It is our impression that the members enjoyed contacts with the other teams which provided an opportunity to relax and put aside their search and rescue experiences.

#### 4.3. Post-event factors

In general, not receiving any appreciation and recognition for accomplished tasks or lack of social support is associated with post-event mental health problems (Ozer et al., 2003; Guay et al., 2006; Brackbill et al., 2009; van der Velden et al., 2010; Ehring et al., 2011). However, our findings showed that team members received significant recognition and appreciation for the work in Haiti. Presumably the positive attention in the media and the fact that the Queen of the Netherlands had a meeting with the participants after their work in Haiti also may have contributed to our findings (such special meetings tend to take place when people have demonstrated exceptional work or outstanding performances such as Olympic winners). In comparison, an earlier disaster study in The Netherlands 4 years post-event among rescue workers showed that among those confronted with the deceased the prevalence of high IES scores ( $>25$ ) with respect to negative messages in the media was as high (20%) as IES scores with respect to the disaster (16%; van der Velden and Kleber, 2000).

The majority reported that in the weeks after arrival they had to get accustomed to their normal work (Cf. Ben-Ezra and Soffer, 2010). The majority reported that they could count on their superiors and especially on their colleagues, suggesting that needed social support was present in most cases. Beside these aspects, participants were also very positive towards the attention of USAR NL about how they were doing post-deployment. We expect that the policy that all members were personally contacted during this period contributed to this positive evaluation. Furthermore, a substantial majority reported that the work in Haiti had enriched their lives and that they were looking forward to a new USAR NL deployment. All these positive evaluations suggest that job-satisfaction, which in general is negatively related to mental health problems (Kalliath and Morris, 2002), with respect to the Haiti deployment was good.

Our findings also suggest that the development of severe posttraumatic stress symptoms among search and rescue workers may partly be prevented by a number of organizational and managerial steps that actively enhance or restore these pre-, peri- and post-event protective factors (Alexander and Wells, 1991). Future research is warranted to examine the possible preventive effects of such a policy when deployed after another disaster.

For this reason we have prepared a similar prospective study to be conducted in case of a new disaster when USAR NL will be deployed. Finally, it may be important that individual perceptions of coping capability were predicted by pre-event general health. Such information is useful for pre-event screening and preparation as teams are assembled to respond to the next disaster setting.

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