

# Who is going to rescue the rescuers? Post-traumatic stress disorder among rescue workers operating in Greece during the European refugee crisis

Dimitra Sifaki-Pistolla<sup>1</sup> · Vasiliki-Eirini Chatzea<sup>1</sup> · Sofia-Aikaterini Vlachaki<sup>2</sup> · Evangelos Melidoniotis<sup>3</sup> · Georgia Pistolla<sup>4,5</sup>

Received: 15 June 2016 / Accepted: 20 October 2016 / Published online: 26 October 2016  
© Springer-Verlag Berlin Heidelberg 2016

## Abstract

**Purpose** During the European refugee crisis, numerous Greek and international rescue workers are operating in Lesvos, offering search, rescue, and first aid services. Exposure to stressful life events while engaging in this rescue work can result in developing Post-Traumatic Stress Disorder (PTSD). The study aimed to assess the prevalence of PTSD and explore potential differences between different categories of rescuers.

**Methods** A cross-sectional study was conducted among 217 rescue workers. Participants were grouped according to affiliation: “Greek Professionals Rescuers/GPR”, “International Professionals Rescuers/IPR” and “Volunteer Rescuers/VR”. The PTSD Checklist-Civilian Version (PCL-C) was utilized. All tests were two-tailed ( $\alpha = 0.05$ ). Mann–Whitney, Kruskal–Wallis, and multivariate logistic regression were performed.

**Results** Overall probable PTSD prevalence found was 17.1%. Rates varied significantly per rescuer’s category; 23.1% in GPR, 11.8% in IPR, and 14.6% in VR ( $p = 0.02$ ).

GPR demonstrated the highest risk compared to IPR and VR ( $p < 0.001$ ). Females had approximately two times higher risk. Other significant risk factors included marital status, age, and number of children. Lack of previous experience, longer operation period, longer shift hours, and handling dead refugees and dead children were also considered major risk factors.

**Conclusions** Rescue workers providing substantial aid to the refugees and migrants at Lesvos experience significant psychological distress. The present findings indicate the urgent need for targeted interventions. Further studies are needed to address long-term effects of the refugee crisis on rescuers, and explore effective measures to prevent PTSD.

**Keywords** Post-traumatic stress disorder · PTSD · Prevalence · Rescue workers · Refugee crisis

## Introduction

Greece is in the frontline of the European refugee crisis. During the first quarter of 2016, more than 145,000 refugees disembarked at the Greek islands. The majority of them reached at the small island of Lesvos that shoulders around 70% of the total refugee arrivals in Greece. Furthermore, the estimated number of refugees and migrants that entered Greece in 2015 exceeded the 855,000 [1]. Most of them travel by boats and dinghies from Turkey to the Greek islands of the Aegean Sea (Lesvos, Chios, Samos, Leros, Simi, Kos and Tylos), aiming to traverse the mainland [2] in their effort to reach northern and central European countries. The vast amount (49% from the Syrian Arab Republic, 26% from Afghanistan and 16% from Iran) [1] fled war and persecution to seek a better life. Nevertheless, many times the journey is equally horrifying

---

D. Sifaki-Pistolla and V.-E. Chatzea contributed equally.

✉ Dimitra Sifaki-Pistolla  
spdimi11@gmail.com

<sup>1</sup> Clinic of Social and Family Medicine, Faculty of Medicine, University of Crete, Office 4D10, P.O. Box: 2208, 71003 Heraklion, Crete, Greece

<sup>2</sup> Department of Sociology, University of the Aegean, Mytilene, Lesbos, Greece

<sup>3</sup> University Hospital of Heraklion, Heraklion, Crete, Greece

<sup>4</sup> Health Region of Crete, Heraklion, Crete, Greece

<sup>5</sup> Faculty of Medicine, University of Crete, Heraklion, Crete, Greece

and dangerous with what they left behind: shipwrecks, drownings, dehydration, exhaustion, starvation and serious injuries that can result in death in the sea or ashore are lurking. Those are common phenomena faced by refugees and migrants, as well as the rescue workers who aid individuals in danger and help bring them in safely [3].

The terms “rescue workers” or “rescuers” refer to individuals that on professional or voluntary basis engage in stressful activities targeted at providing assistance to people in emergency circumstances. Numerous rescue workers are currently operating in Lesvos sharing a common mission; to aid refugees arriving by sea and to offer search, rescue, and first aid services. As a consequence of their duties, they are exposed to several physical and emotional traumatic events on an almost daily basis [4, 5]. Rescue workers witness terrifying scenes of dead, dying or severely wounded people of all ages, screams of people reaching for help and the mourning or agony of people whose relatives or beloved persons are under danger [6]. The repeated exposure to these stressful and/or traumatic experiences can result in lasting negative health effects (such as depression, burnout or substance use), while can also impact on developing Post-Traumatic Stress Disorder (PTSD) [7].

### PTSD and rescue workers in the literature

Although some studies have shown that the majority of rescuers cope well emotionally after the exposure to potentially traumatic events [8–10], PTSD is considered a relatively common mental condition among them. Rescue workers who are involved in high-risk missions and interventions, such as wars or natural and human-made disasters, are exposed to numerous chronic and traumatic stressors [11, 12]. This often increases the risk of PTSD [13].

In addition, the risk of developing PTSD increases proportionally with the number of traumatic events. Therefore, rescuers are considered a high risk group for PTSD [14]. According to the literature, the prevalence of PTSD is much higher in rescuers comparing to that of the general population (4%) [11, 15, 16]. A recent systematic review and meta-analysis showed that the pooled current worldwide prevalence of PTSD among different types of rescue workers is 10% [17]. In addition, significant variation in PTSD development between professional and volunteer rescuers has been observed in the literature [18].

The aim of this study was to assess the prevalence of PTSD among the rescue workers operating in the island of Lesvos, Greece during the European refugee crisis. Secondary objectives were to explore the potential differences in PTSD prevalence between the different categories of rescue workers (e.g., professionals vs. volunteer rescuers, Greek vs. international professional rescuers) and to

identify the variables that could explain possible observed variations.

## Methods

### Setting and participants

This cross-sectional study was conducted in Lesvos, Greece from 20th February to 20th April 2016. The survey was performed among the rescue workers that were operating in the island at the time. The following inclusion criteria were adopted: (a) professional or volunteer rescuers operating in Lesvos during the under study period, (b) operating in the island for at least four weeks before the survey, (c) being affiliated as official members of a Greek or an international foundation or committee of rescuers, (d) offering search and rescue services to boat refugees coming ashore and/or first aid services to those rescued and may be in urgent need (e.g., traumatized, dehydrated, etc.) or assisting the vulnerable groups (e.g., physically disabled, children, etc.). Offering other types of services, such as provision of food or cloth, was considered as major exclusion criterion.

Five different foundations were officially vying in Lesvos. Among them were: the OXFAM America (<http://www.oxfamamerica.org>), the Boat Refugee Foundation (BRF) (<http://bootvluchteling.nl>), the Hellenic Red Cross (HRC) (<http://www.redcross.gr>), the Greek Rescue Team (GRT) (<http://www.hrt.org.gr>) and the United Nations High Commissioner for Refugees (UNHCR) (<http://www.unhcr.org>). All rescuers operating in Lesvos during the study period were asked to participate in the study. The response rates were: (a) OXFAM: 88% ( $N = 40$ ), (b) BRF: 90% ( $N = 45$ ), (c) HRC: 95% ( $N = 48$ ), (d) GRT: 90% ( $N = 43$ ), (e) UNHCR: 83% ( $N = 41$ ). Summarizing, a total of 217 participants were enrolled in the study. Participants were grouped in three main categories according to their affiliation: “Greek Professionals Rescuers/GPR” (HRC, GRT), “International Professionals Rescuers/IPR” (OXFAM, BRF), and “Volunteer Rescuers/VR” including both Greek and international volunteers (UNHCR).

### Procedures and tools

After literature review, the Post-traumatic Stress Disorder Checklist-Civilian Version (PCL-C) [19, 20] was selected to assess the development of probable PTSD in the selected rescue workers. The PCL-C is considered to be a validated tool, with good psychometric properties that is easy to administer. It is commonly used when a clinical interview is not feasible to take place [21]. This tool uses the DSM-IV criteria [22].

More specific, the PCLC-C is a self-reported 17-item tool that uses a 5-point likert scale (1. Not at all, 2. A little bit, 3. Moderately, 4. Quite a bit, 5. Extremely). The scores range from 17 to 85, while participants with a score of 50 or greater are classified as having probable PTSD. This cut-off provides a sensitivity of approximately 80% [23]. PCLC-C assesses the full domain of PTSD symptoms categorized in three groups: Group B—intrusive and re-experiencing, Group C—numbing and avoidance, and Group D—hyper-arousal.

In our study, each symptom was assessed as event-specific (“as a result of operating in Lesvos during the refugee crisis”) and current (“within the last 21–30 days”). According to the suggestion of North and Pfefferbaum [24], which was also followed by another similar study [11], the outcome is mentioned as probable PTSD to acknowledge the fact that symptoms derived via the use of a screening tool such as PCL-C do not necessarily indicate psychopathology.

Permission was obtained by the original developers for research purposes only. Both the English and the Greek version of the questionnaire were provided, to address all rescue workers in their native language or language of understanding. Both versions were already validated [19, 25], nevertheless were additionally tested by the authors. To achieve that, a small focus group of ten rescuers (five Greek and five international) was formed to identify any further cultural particularities in this population group. No comments or suggested changes were reported by the participants.

Subsequently, the PCL-C was administered to the rescue workers along with a biographical cover sheet in relation to demographic information such as age, gender, nationality, family status, parenting, and educational level. The occupational parameters covered included occupation/volunteer affiliation, previous experience in rescue interventions during emerging events, operation period in Lesvos, duration of shifts, participation in collecting dead refugees and children from the sea, and the provision of psychological support. Furthermore, behavioral factors were explored regarding smoking habits and alcohol consumption.

### Statistical analysis

The analysis was conducted in the SPSS 21, while all tests were two-tailed and performed at a confidence level of 95%. The frequency of different PTSD symptoms (Groups B, C, D) per rescuers category (GPR, IPR, VR) and the total prevalence of probable PTSD were estimated. The Kolmogorov–Smirnov normalization test was conducted to test normality of data. Mann–Whitney and Kruskal–Wallis tests were used to explore any association between post-

traumatic stress and occupation/volunteer affiliation. Additionally, a multivariate logistic regression model was performed to assess the risk of high probable PTSD in volunteers and professionals.

The probable PTSD was used as the dependent variable in the regression model, while the independent variables were identified after testing for fitness to the model by performing both univariate and multivariate analysis ( $\alpha < 0.05$ ).

### Ethical standards

The study was approved by the Board of Trustees of the 2nd Health Region of Piraeus and Aegean Islands (Protocol: 7947) and the Scientific Committees of Greek Rescue Team (protocol: 3216). Information letters were sent to all five foundations and upon receiving their approval, participants were informed of the aim of this study and signed an individual’s consent form.

### Results

Socio-demographic characteristics and selected parameters regarding the working conditions of the enrolled rescuers are presented in Table 1. The majority of the participants were males ( $N = 180$ ; 82.9%), with mean age ranging from 35 to 45 years old depending on rescuers’ category (GPR, IPR, VR). The 39.6% of the GPR, the 51.8% of the IPR, and the 61% of the VR were married and had two children on average. Most of the rescuers had participated in more than nine interventions in the past (GPR: median = 13, IPR: median = 15, VR: median = 9). GPR presented the highest values as regards the operation period time in Lesvos (median = 29 days; SE = 2.4), the duration of shifts (median = 9 h/day; SE = 2.8), and the number of dead refugees collected per rescue intervention (median = 12 bodies; SE = 4.2). Furthermore, GPR’s smoking status and alcohol consumption was found higher than the other groups (78% smokers and 14.3% alcohol consumers).

Table 2 presents the proportion of probable PTSD per participants’ characteristics for each rescuer’s category. A total of 37 (17.1%) participants reported symptoms consistent with probable PTSD. The average probable PTSD proportion per rescuer’s category varied significantly; 23.1% in GPR, 11.8% in IPR, and 14.6% in VR ( $p = 0.02$ ). Females, participants over 38 years old, single/divorced/widowed individuals, and those who had no or one child presented significantly higher probable PTSD proportions among all rescuer’s categories ( $p < 0.05$ ).

Frequency of previous experience in similar operations was a significant parameter for probable PTSD in both IPR and VR ( $\leq 4$ ;  $> 4$  events: 19.3%, 10.7%;  $p = 0.03$

**Table 1** Participants' characteristics and behavioral factors per rescuers' category

Characteristics	Greek professional rescuers	International professional rescuers	Volunteer rescuers
	<i>N</i> (%)		
Gender			
Males	83 (91.2)	68 (80.0)	29 (70.7)
Females	8 (8.8)	17 (20.0)	12 (29.3)
Family status			
Married	36 (39.6)	44 (51.8)	25 (61.0)
In relationship	22 (24.2)	29 (34.1)	10 (24.4)
Single/divorced/widower	33 (36.2)	12 (14.1)	6 (14.6)
Educational level			
No education	–	–	–
Less than high school diploma	44 (48.4)	30 (35.3)	12 (29.3)
High school diploma	42 (46.2)	31 (36.5)	19 (46.3)
Bachelor's or advanced degree	5 (5.4)	24 (28.2)	10 (24.4)
Smoking status			
Non-smoker	20 (22.0)	52 (61.2)	20 (48.8)
Smoker	71 (78.0)	33 (38.8)	21 (51.2)
Current frequency of smoking comparing to the time before the event			
Same as before	25 (35.2)	19 (57.6)	12 (57.1)
Less than before	3 (4.2)	11 (33.3)	5 (23.8)
More than before	43 (60.6)	2 (9.1)	4 (19.1)
Alcohol consumption			
No	78 (85.7)	82 (96.5)	37 (90.2)
Yes	13 (14.3)	3 (3.5)	4 (9.8)
Current frequency of alcohol consumption comparing to the time before the event			
Same as before	5 (38.5)	3 (100)	4 (100)
Less than before	1 (3.7)	–	–
More than before	7 (57.8)	–	–
	Median (SD)		
Age (years)	45 (3.2)	36 (2.7)	35 (4.1)
Number of children	2 (0.5)	2 (1.8)	2 (0.6)
Frequency of previous experience (mean number of events)	17 (3.1)	15 (2.8)	9 (4.2)
Operation period in Lesvos (days)	29 (2.4)	16 (1.9)	16 (1.3)
Duration of shifts (mean hours/day)	9 (2.8)	7 (1.8)	6 (1.5)
Collection of dead refugees per rescue intervention (mean number)	12 (4.2)	10 (3.5)	11 (2.1)
Collection of dead children per rescue intervention (mean number)	3 (1.6)	3 (1.1)	2 (1.8)

and  $\leq 4$ ;  $> 4$  events: 19.8, 12.3%, respectively;  $p = 0.04$ ). In contrary, GPR presented similar probable PTSD scores regardless of their previous experiences ( $\leq 4$ ;  $> 4$  events: 25.2, 26.3%;  $p = 0.371$ ). An operation period of more than 14 days and the collection of more than one dead child per rescue contributed significantly to higher probable PTSD proportions ( $p = 0.01$ ). Furthermore, daily shifts of more than 4 h and the collection of more than six dead refugees per rescue resulted in higher probability of probable PTSD in the GPR and the VR categories ( $p = 0.03$  and  $p = 0.02$ , respectively).

The frequency of PTSD symptoms among rescuers that were diagnosed with probable PTSD is presented in Table 3. Percentages of positive symptoms varied significantly among the different rescuers categories ( $p < 0.03$ ). Overall, higher percentages were met in Group B and D (intrusive re-experiencing and hyper-arousal, respectively). The highest item for Group B regarded the “intense psychological distress to cues” (GPR = 80.9%, IPR = 60%, VR = 83.3%). As regards items of Group C, the highest percentages were observed in “sense of a foreshortened future” (GPR = 57.1%, IPR = 50%, VR = 50%) and

**Table 2** Proportion of probable PTSD per participants' characteristics

Characteristics	Greek professional rescuers		International professional rescuers		Volunteer rescuers	
	Probable PTSD proportion (%)	<i>P</i> value	Probable PTSD proportion (%)	<i>P</i> value	Probable PTSD proportion (%)	<i>P</i> value
<b>Gender<sup>a</sup></b>						
Males	21.7	<0.001	10.3	0.02	10.4	0.01
Females	37.5		17.6		25	
<b>Family status<sup>b</sup></b>						
Married	19.4	0.01	9.1	0.02	12	<0.001
In relationship	13.6		10.3		10	
Single/divorced/widower	33.3		25		33.4	
<b>Educational level<sup>a</sup></b>						
Less than high school diploma	19.8	0.281	11.5	0.201	13	0.183
High school diploma or Bachelor's or advanced degree	18.8		8		10.5	
<b>Age<sup>a</sup>, years</b>						
≤38	19.5	<0.001	10.7	0.01	12	0.01
>38	35.4		18.1		20.2	
<b>Number of children<sup>a</sup></b>						
≤1	38.2	<0.001	19.7	0.01	26.8	<0.001
>1	13.7		10.2		9.4	
<b>Frequency of previous experience<sup>a</sup>, events</b>						
≤4	25.2	0.371	19.3	0.03	19.8	0.04
>4	26.3		10.7		12.3	
<b>Operation period in Lesvos<sup>a</sup>, days</b>						
≤14	12.2	<0.001	9.1	0.01	10.1	0.01
>14	38.1		17.2		22.5	
<b>Duration of shifts<sup>a</sup>, h/day</b>						
≤4	18.6	<0.001	13.1	0.371	14.6	0.03
>4	32.2		14.7		20.3	
<b>Collection of dead refugees per rescue intervention<sup>a</sup>, refugees</b>						
≤6	18.9	<0.001	12.3	0.285	12.4	0.02
>6	33.9		14.2		21.5	
<b>Collection of dead children per rescue intervention<sup>a</sup>, refugees</b>						
≤1	21.3	0.01	10.2	0.04	11.8	0.01
>1	35.2		21.3		27.3	

<sup>a</sup> Kruskal–Wallis test<sup>b</sup> Mann–Whitney test

“avoidance of thoughts, feelings, and conversation” (GPR = 52.4%, IPR = 50.0%, VR = 50.0%). Furthermore, Group D presented more intense variation among both items and rescuers categories. The highest item for GPR and IPR was the “exaggerated startle response” (61.9 and 60%, respectively), while it was the lowest among VR (0%).

Interaction between variables and their impact on probable PTSD was tested through a multivariate logistic regression model and is presented in Table 4. GPR demonstrated the highest risk for probable PTSD diagnosis

(OR 3.4, 95% CI 1.9–4.8). Females had approximately two times higher chance for probable PTSD diagnosis (95% CI 1.1–3.4). The risk also increased proportionally to age (OR 3.8, 95% CI 2.5–5.1). Other significant risk factors were the marital status (single/divorced/widower OR 3.5, 95% CI 2.3–4.7) and the number of children (≤1 OR 1.6, 95% CI 1.0–2.1). Low frequency of previous similar experience increased the risk of PTSD diagnosis (OR 1.8, 95% CI 1.1–2.5), and longer operation period (OR 2.3, 95% CI 1.4–3.2), longer shift hours (OR 3.9, 95% CI 3.1–4.7), collection of dead refugees (OR 3.4, 95% CI 2.3–4.5) and

**Table 3** Frequency of PTSD symptoms among rescuers with probable PTSD

PTSD symptoms	Greek Professional Rescuers ( <i>N</i> = 21; probable PTSD = 23.1%)	International Professional Rescuers ( <i>N</i> = 10; probable PTSD = 11.8%)	Volunteer Rescuers ( <i>N</i> = 6; probable PTSD = 14.6%)	<i>P</i> value <sup>a</sup>
	Positive answers <i>N</i> (%)			
Group B Intrusive re-experiencing (at least one required)				0.03
Recurrent and intrusive distressing recollections	13 (61.9)	6 (60)	4 (66.6)	
Recurrent distressing dreams	9 (42.8)	–	–	
Acting or feeling as if events recurring	12 (57.1)	–	–	
Intense psychological distress to cues	17 (80.9)	6 (60)	5 (83.3)	
Physiological reactivity to cues	16 (76.2)	–	6 (66.6)	
Group C Avoidance and numbing (at least three required)				0.03
Avoidance of thoughts, feelings and conversations	11 (52.4)	5 (50)	3 (50)	
Avoidance of reminders	10 (47.6)	4 (40)	3 (50)	
Psychogenic amnesia	8 (38.1)	–	2 (33.3)	
Markedly diminished interest in significant activities	6 (28.6)	–	–	
Detachment or estrangement feelings	6 (28.5)	–	–	
Restricted range of affect	9 (42.9)	4 (40)	2 (33.3)	
Sense of a foreshortened future	12 (57.1)	5 (50)	3 (50)	
Group D				0.02
Hyper-arousal (at least two required)				
Sleep difficulty	9 (42.9)	4 (40)	3 (50)	
Irritability or outbursts of anger	7 (33.3)	–	–	
Difficulty concentrating	8 (38.1)	–	–	
Hyper-vigilance	11 (52.4)	5 (50)	5 (83.4)	
Exaggerated startle response	13 (61.9)	6 (60)	–	

<sup>a</sup> Kruskal–Wallis test

collection of dead children (OR 3.2, 95% CI 1.9–4.4) were also considered as major risk factors.

In addition to the above results, it is worth mentioning that the significant majority of GPR, IPR, and VR diagnosed with probable PTSD (97%,  $p = 0.02$ ) stated that they felt the need for psychological support during their interventions in Lesvos. The majority of the IPR (95%) were offered psychological support (individually or as group therapy) within the context of their foundation ( $p = 0.03$ ). In contrary, GPR were not aware of (60%) or were not offered (38%) such services from their foundation ( $p = 0.03$ ).

## Discussion

The majority of the studies on PTSD development after traumatic events are focusing on victims, whereas limited research has been conducted on rescue workers. The current study is the first to assess PTSD prevalence among rescue workers that are operating in high-pressure spots during the European refugee crisis.

The overall probable PTSD prevalence found was 17.1% and ranged from 11.8% (IPR) to 23.1% (GPR). The rates observed were higher than the worldwide pooled prevalence of PTSD in rescue workers (10%) [17]. Nevertheless, the observed high frequency of probable PTSD in GPR is similar to the results of a previous study in a group of search and rescue workers in Turkey's earthquake, where PTSD estimation was 25% [6].

Results revealed that Greek rescuers presented higher risk for probable PTSD diagnosis, most likely due to their exhausting working conditions (longer operation period and longer duration of shifts or double shifts) and lack of continuous psychological support. IPR seemed to have a more organized, comprehensive, and continuous care provided by their foundation. These results come in accordance with previous studies [11, 18] identifying longer operation period and lack of mental health services as risk factors that are highly associated with PTSD development.

In all rescue workers categories, increasing age was associated with higher probable PTSD diagnosis. Similarly to the present study, a systematic review [17] highlighted increasing age as a variable that can affect PTSD



**Table 4** Risk factors for probable PTSD among rescuers in Lesvos

Covariates	Probable PTSD			
	$\beta$	SE	OR (95% CI)	<i>P</i> value
Rescuers' category				
International professionals			1	<0.001
Greek and international volunteers	0.7	0.3	1.8 (1.2–2.4)	
Greek professionals	0.8	0.2	3.4 (1.9–4.8)	
Gender				
Males			1	0.02
Females	0.6	0.3	2.2 (1.1–3.4)	
Family status				
Married			1	<0.001
In relationship	1.6	1.3	1.9 (1.3–2.5)	
Single/divorced/widower	2.4	1.1	3.5 (2.3–4.7)	
Age (>38 years)	1.9	1.0	3.8 (2.5–5.1)	0.01
Number of children ( $\leq 1$ )	2.3	1.0	1.6 (1.0–2.1)	0.04
Frequency of previous experience ( $\leq 4$ events)	0.6	0.3	1.8 (1.1–2.5)	0.04
Operation period in Lesvos (>14 days)	1.4	1.2	2.3 (1.4–3.2)	0.02
Duration of shifts (>4 h/day)	2.5	1.0	3.9 (3.1–4.7)	<0.001
Dead refugees per rescue intervention (>6 refugees)	1.6	1.0	3.4 (2.3–4.5)	0.01
Dead children per rescue intervention (>1 children)	1.8	1.1	3.2 (1.9–4.4)	0.01

$\beta$  partial regression coefficient, *SE* standard error, *OR* odds ratio, *CI* confidence interval

prevalence among rescuers. In our study, female rescue workers presented significantly higher probability of PTSD development. Although this finding is consistent with studies reporting PTSD prevalence in the general population [26–28] and a limited number of studies among rescue workers [29, 30], it is counterintuitive. Many studies on rescue workers have been unable to demonstrate this relationship [17, 31–33]. The lack of association could be influenced by the fact that males represent approximately 85% of the participants in the 3/4 of similar studies [17]. In the literature, it is supported that gender differences in developing PTSD is a result of differences in peri-traumatic emotion, which influence subsequent PTSD [34]. Our findings highlight the need to pay more attention to women rescuers and create targeted interventions to reduce their psychological burden.

Exposure to dead refugees and children were found to affect significantly probable PTSD levels among the enrolled rescue workers. Literature supports that rescue workers who encounter deceased victims are at greater risk of both acute and chronic PTSD [35, 36]. In addition, handling dead children bodies is considered a particularly traumatic event for rescue workers that relates to negative psychological effects and can trigger PTSD reactions [7].

The study findings revealed that living with no partner or having no or one child was identified as significant risk factor for probable PTSD. According to literature, social support from colleagues and family plays an important

protective role in the development of PTSD. More specifically, lack or low levels of perceived social support in people who have been exposed to traumatic events was found to be one of the strongest predictors of PTSD [7, 37]. Although many studies have highlighted the importance and substantial role of occupational social support (including sense of community, collaboration and cooperation) in combating PTSD [38–41], there is limited evidence on the effect of family support. A previous study on rescue workers operating at the World Trade Center site revealed that greater family support sources (including spouse/partner, children and parents) acted as protective factors to PTSD [42]. Likewise, other studies have concluded that increased support from family, perceived social support, and marital satisfaction were associated with less post-traumatic stress symptoms [43, 44]. Similar to our study, unmarried status among ambulance personnel have been associated with increased risk for PTSD [45].

In addition, lack of previous experience in similar rescue interventions, which is mainly encountered among volunteers, was significantly associated with higher risk of probable PTSD diagnosis. This result comes in accordance with previous studies indicating that volunteers with limited prior disaster training or experience are at greatest risk of PTSD [11, 18, 36, 46]. Although the present results agree partially with the literature (VR presented higher probable PTSD prevalence compared to IPR), it is of notice that GPR demonstrated the highest frequency of probable PTSD.

## PTSD prevention in rescue workers

Due to the nature of their occupation, rescue workers often acquire some important psychological resources and protective mechanisms that provide a buffer against potential stressors. This has a positive impact on rescuers who usually present high levels of occupational satisfaction, deriving from the knowledge of doing something useful to help other people [47]. In addition, individual characteristics such as occupational satisfaction, optimism and hardiness, as well as organizational protective factors including social support, post-traumatic growth, and adaptive flexibility impact on keeping post-traumatic risk under control [7, 48].

Nevertheless, even if rescue workers dispose some individual and organizational protective factors, it is important to determine whether they need psychological support. The main focus should be given in what can be done to boost effective performance of rescue workers, while at the same time reducing vulnerability to secondary trauma and increasing resilience to stressors.

Shift rotations that enable a shorter duration of service at the site, as well as disaster preparedness training could help reduce PTSD among professional and volunteer rescuers in the future on-going operations. There is also great need for enhancing pre-employment strategies to identify the most resilient individuals for rescue interventions, to implement comprehensive preventive measures and to raise awareness toward PTSD.

Special focus should be given on implementing continuous, accessible, and effective preventive measures for PTSD, prior to a traumatic event [49]. Toward this direction, incorporation of collaborative care along with cognitive behavioral therapy in the context of work environment is strongly suggested. Another essential intervention, especially among GPR, is to organize educational campaigns about PTSD to help rescuers become more aware of this disorder and make them more comfortable to talk about it and seek treatment.

## Strengths and limitations

To the best of our knowledge, this is the first study that attempted to explore factors that influence PTSD among three different categories of rescuers handling refugees and migrants in danger. The major strength of this study was that it achieved high response rates per rescuers' category and revealed probable PTSD prevalence rates that are strongly supported by the literature. This provided confidence in the prevalence estimates and enabled comparisons within the under study groups, as well as across similar studies. In addition, all interviews were conducted by a

specialized sociologist in quantitative research, while efforts were made to not affect rescuers' daily tasks.

Nevertheless, results should be interpreted within the context of some limitations. The current study did not perform clinical interviews rather utilized a validated and worldwide used tool (PCL-C) to identify probable PTSD. This was an unavoidable limitation since clinical interviews were not feasible due to the participants' workload. Although this method is often used in the literature [50], it is considered not to have optimal specificity, leading to overestimations.

Additionally, the findings may not be applicable to all disaster scenarios, due to the fact that the present study was conducted in a single geographical area that suffers from a specific event. Nevertheless, no major deviations are expected to be observed in events similar to the refugee crisis, since rescue workers at Lesbos have handled a vast number of victims.

## Conclusions

The present study supports that rescue workers who operate at the island of Lesbos, providing substantial aid to the refugees and migrants, experience significant psychological distress. The excess burden of probable PTSD among rescue workers and the identified risk factors indicate the urgent need for targeted interventions, especially among GPR. The results are expected to contribute to the development and implementation of appropriate interventions that will reduce the psychological burden. Further studies are necessary to address long-term effects of the refugee crisis to rescue workers, as well as other relevant issues such as the prevalence of partial PTSD and burnout, and explore the most effective measures to prevent PTSD among this population.

**Acknowledgements** The authors would like to thank Calbari E and Anagnostopoulos F, the developers of the Greek version of the PCL-C questionnaire, for providing permission to use the tool; and the original developers of the tool for their approval and support. Additionally, the authors would like to acknowledge the significant contribution of all participating rescuers and foundations in the current study, during the most crucial period of the European refugee crisis.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

## References

1. United Nations High Commissioner for Refugees (UNHCR) (2016) Refugees/Migrants Emergency Response—Mediterranean.



- UNHCR website. <http://data.unhcr.org/mediterranean/country.php?id=83>. Accessed 19 April 2016
2. Anagnostopoulos DC, Triantafyllou K, Xylouris G et al (2016) Migration mental health issues in Europe: the case of Greece. *Eur Child Adolesc Psychiatry* 25:119–122
  3. Gkionakis N (2016) The refugee crisis in Greece: training border security, police, volunteers and aid workers in psychological first aid. *Intervention* 14:73–79
  4. Marmar CR, Weiss DS, Metzler TJ et al (1996) Stress responses of emergency services personnel to the Loma Prieta earthquake Interstate 880 freeway collapse and control traumatic incidents. *J Trauma Stress* 9:63–85
  5. Norris FH, Friedman MJ, Watson PJ (2002) 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. *Psychiatry* 65:240–260
  6. Ozen S, Sir A (2004) Frequency of PTSD in a group of search and rescue workers two months after 2003 Bingol (Turkey) earthquake. *J Nerv Ment Dis* 192:573–575
  7. Setti I, Argentero P (2015) Traumatization and PTSD in rescue workers: prevention, assessment, and interventions. Comprehensive guide to post-traumatic stress. Disorder Springer International Publishing, Switzerland
  8. Gjerland A, Pedersen MJB, Ekeberg Ø et al (2015) Sick-leave and help seeking among rescue workers after the terror attacks in Norway, 2011. *Int J Emerg Med* 8:31
  9. Thoresen S, Tonnessen A, Lindgaard CV et al (2009) Stressful but rewarding: Norwegian personnel mobilised for the 2004 tsunami disaster. *Disasters* 33:353–368
  10. International Association of Fire Fighters (2000) International Association of Fire Fighters 2000 death and injury survey. International Association of Fire Fighters, Washington DC
  11. Perrin MA, DiGrande L et al (2007) Differences in PTSD prevalence and associated risk factors among World Trade Center disaster rescue and recovery workers. *Am J Psychiatry* 164:1385–1394
  12. Lopes Cardozo B, Gotway Crawford C, Eriksson C et al (2012) Psychological distress, depression, anxiety, and burnout among international humanitarian aid workers: a longitudinal study. *PLoS One* 7:e44948
  13. Silove D, Liddell B, Rees S et al (2014) Effects of recurrent violence on post-traumatic stress disorder and severe distress in conflict-affected Timor–Leste: a 6-year longitudinal study. *Lancet Glob Health* 2:e293–e300
  14. Neuner F, Schauer M, Karunakara U et al (2004) Psychological trauma and evidence for enhance vulnerability for posttraumatic stress disorder through previous trauma among West Nile refugees. *BMC Psychiatry* 4:34
  15. Kessler RC, Chin WT, Demler O et al (2005) Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry* 62:617–627
  16. De Vries GJ, Olff M (2009) The lifetime prevalence of traumatic events and posttraumatic stress disorder in the Netherlands. *J Trauma Stress* 22:259–267
  17. Berger W, Coutinho ES, Figueira I et al (2012) Rescuers at risk: a systematic review and meta-regression analysis of the worldwide current prevalence and correlates of PTSD in rescue workers. *Soc Psychiatry Psychiatr Epidemiol* 47:1001–1011
  18. Hagh-Shenas H, Goodarzi MA, Dehbozorgi G et al (2005) Psychological consequences of the bam earthquake on professional and nonprofessional helpers. *J Trauma Stress* 18:477–483
  19. Blanchard EB, Jones-Alexander J, Buckley RC et al (1996) Psychometric properties of the PTSD Checklist (PCL). *Behav Res Ther* 34:669–673
  20. Ruggiero KJ, Del Ben K, Scotti JR et al (2003) Psychometric properties of the PTSD Checklist-Civilian Version. *J Trauma Stress* 16:495–502
  21. Dobie DJ, Kivlahan DR, Maynard CR et al (2002) Screening for post-traumatic stress disorder in female veteran's affairs patients: validation of the PTSD Checklist. *Gen Hosp Psychiatry* 24:367–374
  22. Watson P, McFalls M (2002) Best practice manual for posttraumatic stress disorder (PTSD). Compensation and Pension Examinations, Washington, DC
  23. Forbes D, Creamer M, Biddle D (2001) The validity of the PTSD checklist as a measure of symptomatic change in combat-related PTSD. *Behav Res Ther* 39:977–986
  24. North CS, Pfefferbaum B (2002) Research on the mental health effects of terrorism. *JAMA* 288:633–636
  25. Calbari E, Anagnostopoulos F (2010) Exploratory factor analysis of the Greek adaptation of the PTSD Checklist-Civilian version. *J Loss Trauma* 15:339–350
  26. Tolin DF, Foa EB (2006) Sex differences in trauma and post-traumatic stress disorder: a quantitative review of 25 years of research. *Psychol Bull* 132:959–992
  27. Ditlevsen DN, Elklit A (2012) Gender, trauma type, and PTSD prevalence: a re-analysis of 18 nordic convenience samples. *Ann Gen Psychiatry* 11:26
  28. Breslau N, Davis GC, Andreski P et al (1997) Sex differences in posttraumatic stress disorder. *Arch Gen Psychiatry* 54:1044–1048
  29. Bowler R, Han H, Gocheva V et al (2010) Gender differences in probable posttraumatic stress disorder among police responders to the 2001 World Trade Center terrorist attack. *Am J Ind Med* 53:1186–1196
  30. Kang P, Lv Y, Hao L et al (2015) Psychological consequences and quality of life among medical rescuers who responded to the 2010 Yushu earthquake: A neglected problem. *Psychiatry Res* 230:517–523
  31. Armagan E, Engindeniz Z, Devay AO et al (2006) Frequency of post-traumatic stress disorder among relief force workers after the tsunami in Asia: do rescuers become victims? *Prehosp Disaster Med* 21:168–172
  32. Fullerton CS, Ursano RJ, Wang L (2004) Acute stress disorder, posttraumatic stress disorder, and depression in disaster or rescue workers. *Am J Psychiatry* 161:1370–1376
  33. Marmar CR, McCaslin SE, Metzler TJ et al (2006) Predictors of posttraumatic stress in police and other first responders. *Ann N Y Acad Sci* 1071:1–18
  34. Lilly MM, Pole N, Best SR et al (2009) Gender and PTSD: What can we learn from female police officers? *J Anxiety Disord* 23:767–774
  35. McFarlane AC (1986) Long-term psychiatric morbidity after a natural disaster. *Med J Aust* 145:561–563
  36. Skogstad L, Heir T, Hauff E, Ekeberg Ø (2016) Post-traumatic stress among rescue workers after terror attacks in Norway. *Occup Med* (ahead of print)
  37. Brooks SK, Dunn R, Amlôt R et al (2016) Social and occupational factors associated with psychological distress and disorder among disaster responders: a systematic review. *BMC Psychol* 4:18
  38. Cardozo BL, Crawford C, Petit P et al (2013) Factors affecting mental health of local staff working in the Vanni Region, Sri Lanka. *Psychol Trauma Theor Res Pract Policy* 5:581–590
  39. Boscarino JA, Figley CR, Adams RE (2004) Compassion fatigue following the September 11 terrorist attacks: a study of secondary trauma among New York City social workers. *Int J Emerg Ment Health* 6:1–10
  40. Skogstad M, Skorstad M, Lie A et al (2013) Work-related post-traumatic stress disorder. *Occup Med (Lond)* 63:175–182
  41. Leffler CT, Dembert ML (1998) Posttraumatic stress symptoms among U.S. navy divers recovering TWA flight 800. *J Nerv Ment Dis* 186:574–577

42. Pietrzak RH, Schechter CB, Bromet EJ et al (2012) The burden of full and subsyndromal posttraumatic stress disorder among police involved in the World Trade Center rescue and recovery effort. *J Psychiatr Res* 46:835–842
43. Regehr C, Hill J, Glancy GD (2000) Individual predictors of traumatic reactions in firefighters. *J Nerv Ment Dis* 188:333–339
44. Alvarez J, Hunt M (2005) Risk and resilience in canine search and rescue handlers after 9/11. *J Trauma Stress* 18:497–505
45. Berger W, Figueira I, Maurat AM et al (2007) Partial and full PTSD in Brazilian ambulance workers: prevalence and impact on health and on quality of life. *J Trauma Stress* 20:637–642
46. Guo YJ, Chen CH, Lu ML et al (2004) Posttraumatic stress disorder among professional and non-professional rescuers involved in an earthquake in Taiwan. *Psychiatry Res* 127:35–41
47. Argentero P, Setti I (2011) Engagement and vicarious traumatization in rescue workers. *Int Arch Occup Environ Health* 84:67–75
48. Westphal M, Bonanno GA (2007) Posttraumatic growth and resilience to trauma: different sides of the same coin or different coins? *Appl Psychol Int Rev* 56:417–427
49. Feldner MT, Monson CM, Friedman MJ (2007) A critical analysis of approaches to targeted PTSD prevention: current status and theoretically derived future directions. *Behav Modif* 31:80–116
50. Terhakopian A, Sinaii N, Engel CC et al (2008) Estimating population prevalence of posttraumatic stress disorder: an example using the PTSD checklist. *J Trauma Stress* 21:290–300