

**Note: This is an accepted manuscript version of an article published by Taylor & Francis Group in the Journal of Aggression, Maltreatment and Trauma on 25/09/2014, available online:**

**<http://www.tandfonline.com/10.1080/10926771.2014.938143>**

**The final publication is available at Taylor & Francis via**

**<http://dx.doi.org/10.1080/10926771.2014.938143>**

**Citation: Kehl, Doris, Knuth, Daniela, Hulse, Lynn and Schmidt, Silke (2014) Posttraumatic reactions among firefighters after critical incidents: cross-national data. Journal of Aggression, Maltreatment and Trauma, 23 (8). pp. 842-853. ISSN 1092-6771 (Print), 1545-083X (Online) (doi:10.1080/10926771.2014.938143)**

Posttraumatic reactions among firefighters after critical incidents – Cross-national data

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#### **Acknowledgment**

The paper was written by the authors on behalf of the BeSeCu-group. The project BeSeCu (contract No.218324) is funded under the European Union Framework Programme 7 - **Security**. The authors acknowledge the collaboration of their project partners: Ernst-Moritz-Arndt University of Greifswald, Germany (Silke Schmidt – project co-ordinator, Daniela

Knuth, Doris Kehl); Hamburg Fire and Emergency Service Academy, Germany (Frank Seidler and Eberhard Diebe); University of Greenwich, UK (Ed Galea and Lynn Hulse); Institute of Public Security of Catalonia, Spain (Jordi Sans, Malin Roiha and Lola Valles); Prague Psychiatric Centre, Czech Republic (Marek Preiss, Marie Sotolarova, and Marketa Holubova); MTO Säkerhet AB (MTO Safety AB), Sweden (Lena Kecklund, Sara Petterson, and Kristin Andréé); Main School of Fire Service, Poland (Jerzy Wolanin and Grzegorz Beltowski); Association of Emergency Ambulance Physicians, Turkey (Zeynep Baskaya Sofuoglu and Turhan Sofuoglu); University of Bologna, Italy (Luca Pietrantonio and Elisa Saccinto); in undertaking this work and in allowing the project findings to be published.

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## Abstract

The presence of posttraumatic stress disorder (PTSD) symptoms and posttraumatic growth (PTG) following a critical incident were examined among firefighters from eight predominantly European countries. A sample of 1916 firefighters completed the Impact of Event Scale-Revised (IES-R) and the Posttraumatic Growth Inventory-Short Form (PTGI-SF) with reference to a critical incident they had experienced. Analyses **indicated** that both negative and positive posttraumatic outcomes could derive from experiencing critical incidents in the line of duty. The analyses **also** showed that country differences exist regarding firefighters' PTSD symptoms and PTG. **It is recommended that future researchers examine factors that could evoke such national differences.**

*Keywords:* trauma, posttraumatic stress disorder, posttraumatic growth, first responder.

Posttraumatic reactions among firefighters after critical incidents – Cross-national data

Firefighters attend a variety of emergencies including fires, traffic accidents and natural disasters. A “critical incident” is an emergency that may overwhelm a firefighter’s ability to deal with the situation, e.g. an exposure to threat of personal injury, dead bodies or severely injured victims (Harris, Baloglu, & Stacks, 2002). Firefighters may experience posttraumatic stress disorder (PTSD) symptoms as a consequence of exposure to critical incidents (Bryant & Harvey, 1996; Corneil, Beaton, Murphy, Johnson, & Pike, 1999; Marmar, Weiss, Metzler, Ronfeldt, & Foreman, 1996). However, there is evidence that people may perceive benefits from traumatic and stressful life events (T. Weiss & Berger, 2010) and this may include firefighters. Positive changes have been documented among first responders after critical incidents (Shakespeare-Finch, Smith, Gow, Embelton, & Baird, 2003).

Concepts such as posttraumatic growth (PTG) were established to assess positive outcomes (Tedeschi & Calhoun, 1996) and research into PTG has now been conducted across several different countries albeit often using different methods. Some country differences have been observed. For example, Taku, Cann, Tedeschi, and Calhoun (2009) found that the amount of PTG after traumatic events differed between a US and a Japanese sample, with US participants displaying more PTG than those from Japan. However, such differences may not necessarily reflect differences in the actual experience or degree of being affected. Individuals are influenced by their primary reference groups in terms of role models, social norms and rules (i.e. proximate influences), and by societal views and narratives (i.e. distal influences) (Calhoun, Cann, & Tedeschi, 2010). Proximate and distal sociocultural influences might affect self-disclosure (i.e. the willingness to talk and/or write about the trauma experienced) and, therefore, it is feasible that the level of reported PTG may differ across countries due – at least in part – to such influences on self-disclosure. It has been stated that cultures may vary

in the degree to which inhibitions regarding trauma disclosure exist (Calhoun et al., 2010). Following this argument, it is likely that reports of PTSD symptoms may also vary across countries. Results of the European Study of the Epidemiology of Mental Disorders Survey (ESEMeD) conducted across households in six western European countries revealed differences between countries, with PTSD being reported more frequently in France and the Netherlands (Darves-Bornoz et al., 2008). Though one cannot say whether these differences were due to self-disclosure issues, the results do suggest that posttraumatic reactions should be investigated across different countries to get a better understanding of their prevalence.

Although there is a growing body of research now that has examined posttraumatic reactions, fewer studies have focused on this from a cross-national perspective and even fewer have investigated the impact of work-related critical incidents from a cross-national perspective on first responders, particularly firefighters. Firefighters are an especially interesting and important population to study: their job makes them more likely to encounter the kinds of incidents that can evoke posttraumatic reactions yet working as part of a crew, having colleagues heavily depend on them, and often being labelled as “heroes” in the media and some communities, may make firefighters less willing to disclose being affected (negatively or positively) by such incidents. One study that did investigate posttraumatic reactions in firefighters from two different countries (Corneil et al., 1999) found no differences between US and Canadian firefighters with respect to PTSD symptomatology. However, these North American samples could be considered culturally similar at a national level. Less is known about firefighters’ reactions in other, arguably more culturally diverse continents such as Europe. The aims of the present study were to explore whether both positive and negative outcomes would be observed and whether firefighters in different, predominantly European countries would experience similar or diverging outcomes.

Employing the same measures of PTSD symptoms and PTG in each country would allow better for comparisons.

## Method

### Sample

A total of 3011 firefighters from eight countries volunteered for the BeSeCu (Behaviour, Security, Culture) study (Schmidt, Knuth, & Kehl, 2011). Participants were invited to take part if they were at least 18 years of age and their last operation was no longer than 10 years ago. Nationwide recruitment was required and each project partner used recruitment strategies that were considered most effective for their country (see Knuth, Kehl, Stegemann, & Schmidt, in press). These included: top down recruitment via fire brigades; promotional national and regional radio interviews; adverts in professional journals; posts and links on social network websites (e.g. Facebook, first responder forums).

Those firefighters whose most stressful incident was in the last ten years and who fully completed the trauma-related measures were included in the current analysis ( $n=1916$ ). Only on two characteristics did the excluded firefighters differ to at least a small effect size from the included sample: they were older,  $F(1, 2995)=71.80, p<.001, \eta=.15$ , and more worked on an employed basis than on an honorary (unpaid) basis,  $\chi^2(1)=30.28, p<.001$ , Cramer's  $V=.10$ .

Of the 1916 participants, 43.8% filled out a paper-and-pencil questionnaire and 56.2% the online version. The average age was 36.1 years ( $SD=9.5$ , range=18–66 years) and 96.9% were male. Most participants (74.2%) were educated to higher secondary/university level, 21.4% to intermediary secondary level, and 4.4% to the lowest formal qualification level. Over three-quarters (78.6%) were professional firefighters and 21.4% were honorary (unpaid) firefighters. Concerning rank, 62.3% were operational personnel and the remaining 37.7% had a leading rank. The average years of service was 12.9 years ( $SD=8.6$ , range=0–52).

Regarding their country, 11.3% were from the Czech Republic, 26.3% from Germany, 19.8% from Italy, 14.7% from Poland, 5.5% from Spain, 5.3% from Sweden, 6.9% from Turkey, and 5.7% from the UK. Only 4.7% of participants had a migrant background (Schenk et al., 2006).

### Instruments

**Behaviour, security and culture – first responder.** The Behaviour, Security and Culture – First Responder (BeSeCu – FR) is a self-administered questionnaire developed to investigate emergency-related factors that may impact firefighters' operational performance and interfere with procedures during threatening events and evacuations (Kehl et al., 2012). The questionnaire was developed via a multi-step development process, including a literature review, expert input, focus groups and pilot testing activities. The final draft was developed in English and afterwards translated into the languages of the other participating countries (i.e. German, Spanish, Italian, Swedish, Polish, Czech, and Turkish) using a forward-backward-forward-translation procedure. Both modes of administration (i.e. paper-and-pencil and online) had identical questions and the layout and response styles were as similar as possible. Questions and layout were identical across all languages also. The BeSeCu-FR comprised a total of 159 items (i.e. a battery of scales plus single items). Relevant for the current study were socio-demographic items and the final part of the questionnaire asking firefighters to recall and answer questions about the most stressful emergency they had attended in the last 10 years. The type and date of this incident were assessed.

**Impact of event scale – revised.** The Impact of Event Scale - Revised (D. S. Weiss & Marmar, 1996) is a self-report measure based on the Impact of Event Scale (IES) by Horowitz, Wilner and Alvarez (1979). It was used to assess the level of posttraumatic stress symptomatology in the past seven days using the recalled critical incident as the reference. The IES-R comprised 22 items assessing PTSD intrusion, avoidance and hyperarousal

symptoms with the three subscales reported to have very high internal consistency (D. S. Weiss & Marmar, 1996). Published translated versions of this measure were used: Czech (Preiss et al., 2004), English (D. S. Weiss & Marmar, 1996), German (modified version of Maercker & Schützwohl, 1998; from Pielmaier & Maerker, 2011), Italian and Swedish (Bergh Johannesson, Stefanini, Lundin, & Anchisi, 2006), Polish (Juczyński & Ogińska-Bulik, 2009), Spanish (Gargurevich, Luyten, Fils, & Corveleyn, 2009), and Turkish (Çorapçioğlu, Yargıç, Geyran, & Kocabaşoğlu, 2006).

**Posttraumatic growth inventory – short form.** Positive changes resulting in the aftermath of the recalled work-related emergency were measured with the 10-item Posttraumatic Growth Inventory-Short Form (Cann et al., 2010). Cann et al. (2010) documented a coefficient alpha of .86 for the PTGI-SF total score. The following published translated versions were used: Czech (modified version of Mareš, 2009; from Preiss, 2009), English (Cann et al., 2010), German (Maercker & Langner, 2001), Italian (Prati & Pietrantonio, 2006), Spanish (T. Weiss & Berger, 2006), Swedish (Norlander, von Schedvin, & Archer, 2005), Polish (Cieslak et al., 2009), and Turkish (Dirik & Karanci, 2008).

## Data Analyses

Data analyses were carried out using SPSS 18 (Windows). Descriptive statistics were calculated. Additionally, the IES-R and PTGI-SF's internal consistencies (Cronbach's  $\alpha$ ) and the correlation between IES-R and PTGI-SF scores were calculated. Also, ANOVAs and Chi-square tests were run to establish whether the different country samples were similar with regards to their personal characteristics. Differences between country samples were observed with regards to: age,  $F(7, 1906)=48.62, p<.001, \eta=.39$ ; education,  $\chi^2(14)=442.88, p<.001$ , Cramer's  $V=.34$ ; rank (operational vs. leading operational),  $\chi^2(7)=124.34, p<.001$ , Cramer's  $V=.26$ ; working arrangement (employed vs. honorary member),  $\chi^2(7)=768.85, p<.001$ ,

Cramer's  $V = .63$ ; and years of service,  $F(7, 1906) = 12.59, p < .001, \eta = .21$ . No differences were observed between country samples with respect to gender,  $\chi^2(7) = 7.50, p = .38$ , Cramer's  $V = .06$ . Hierarchical regression analyses were conducted with the IES-R and PTGI-SF total scores as dependent variables. Country was entered as a predictor after controlling for time since the incident and also personal characteristics. Models were entered using blockwise entry and, within the models, predictors were entered using the simultaneous/enter method. Multicollinearity was not observed since the tolerance statistic of each item was not below .1 and the VIF values were less than 10 (Field, 2005).

### Results

The majority of participants recalled incidents of a type encountered regularly in their line of work, i.e. house fires (37.9%) and traffic accidents (35.8%). The average time since the incident was 3.0 years ( $SD = 2.8$ , range: 1–10).

The IES-R and PTGI-SF's internal consistencies (Cronbach's  $\alpha$ ) were .93 and .92, respectively. Means and standard deviations for the IES-R and PTGI-SF scores per country are displayed in the Table. A significant association between IES-R scores and PTGI-SF scores was observed,  $r = .33, p < .001$ .

The final regression models (see Table) predicted around 11% of variance in IES-R scores,  $R^2 = .107, F(16, 1878) = 14.14, p < .001$ , and 15% of variance in PTGI-SF scores,  $R^2 = .148, F(16, 1878) = 20.44, p < .001$ . Time since incident was negatively associated with IES-R and PTGI-SF scores, while lower education was positively associated. Years of service was positively associated only with IES-R scores. After controlling for these factors, country differences were observed. Compared to the grand mean, Italian, Polish and Turkish IES-R scores were higher, while Spanish, UK and Swedish IES-R scores were lower. Regarding the

PTGI-SF, Czech and Turkish scores were higher, while Italian, Polish and UK scores were lower than the grand mean.

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### Discussion

This study supports findings that first responders experience both PTSD symptoms (Bryant & Harvey, 1996; Marmar et al., 1996) and PTG (Shakespeare-Finch et al., 2003) following exposure to work-related critical incidents. The majority of the firefighters in this study did not display much PTSD symptoms, i.e. of a level that might be expected to interfere with their performance at work; nevertheless, 7.6% had IES-R sum scores (0-88) on or above a proposed **cut-off** score of 33 indicating PTSD (Creamer, Bell, & Failla, 2003). A similar PTSD prevalence was found among US firefighters using a cutoff score of 44 on the PTSD Checklist (Del Ben, Scotti, Chen, & Fortson, 2006). Additionally, in the present study, at least some degree of positive change was reported by 51.7% of the participants, as reflected by a PTGI-SF score (0-50) above 10. These results indicate that while being a firefighter can expose a person to incidents that may evoke unpleasant or harmful states, there is the potential for benefits to be gained from such experiences also. Furthermore, these results demonstrate that some firefighters are willing to disclose being affected by work-related incidents, at least in an anonymous, research setting.

The positive and negative trauma outcomes, examined with the same measures of PTSD symptoms and PTG in each country, were experienced to different extents across countries but not in a straightforward fashion, i.e. countries experiencing greater PTSD symptoms did not necessarily experience greater (or lower) PTG. The next step will be to establish causes for country differences. They might derive from sociocultural factors (e.g.

shared national beliefs/practices relating to the experience, or expression, of trauma) but could also reflect diverging organizational and professional (safety) cultures. Future cross-national studies should attempt to examine the relative influence of such factors on firefighters' trauma-related outcomes. The latter issue in particular deserves greater scrutiny; improved understanding of the influence of safety cultures could perhaps lead to quicker improvements in the professional experiences of first responders.

**Although** the present study has been successful in noting the presence of, and identifying country differences in, firefighters' PTSD symptoms and PTG using data from a large predominantly European sample, there are nevertheless some limitations. First, the sample was a convenience sample and differences between country samples with respect to participants' demographic and work characteristics were present. However, personal characteristics were entered first in the regression analysis to control for these characteristics. Second, firefighters excluded in the current study were somewhat older and more often employed on a paid basis than those who were included. It is likely then that they would have had more practical experience, and of a wider range of events. This, in turn, might have affected what they considered "most stressful"; for instance, it is possible that some of the incidents they encountered in the last 10 years may well have been traumatic, if not more traumatic than those encountered earlier in their lives, but their experience might have meant that the firefighters perceived themselves as being better able to cope with these incidents – whether that was actually the case or not. Despite "losing" this group of firefighters, the analysis nonetheless contained a considerable proportion of paid firefighters who were not novices, nor very young, and so the sample could be considered an experienced one. It is interesting then that the recalled incidents tended to be of more recent origin ( $M=3.0$  years,  $SD=2.8$ ). Third, the IES-R and PTGI-SF scores suggest a low average level of trauma in this sample. Firefighters with very traumatic experiences might have not participated at all, to

avoid reminders. Even those who did participate in the study might have found that doing so triggered PTSD symptoms, which might have led them to avoid certain questions or prompted other forms of avoidance behaviour outside of the study. A further issue to bear in mind is that participants may have had their trauma treated in the time between the incident and participating in the study. Because of the cross-sectional study design, stages of recovery from PTSD could not be taken into account. Finally, future studies may need to seek clinical samples and test closer to the time of the incident, although it must be borne in mind that these types of outcome cannot usually be examined immediately after an incident due to the nature of their development.

### **Conclusions for Clinical Practice**

Although work-related critical incidents may evoke negative psychological outcomes in some firefighters, a larger proportion may potentially experience positive psychological benefits as a result of these incidents. Clinicians should be aware of the possibility of positive change, to assist clients in achieving growth in the aftermath of a traumatic event. The present data revealed country differences regarding firefighters' PTSD symptoms and PTG. Cultural influences may affect rumination processes and self-disclosure (Calhoun et al., 2010). Clinicians could provide an opportunity to offset culturally-based conceptions, including trauma-disclosure inhibitions that may hinder the experience of PTG in the aftermath of traumatic events (Calhoun & Tedeschi, 1999) and could also affect progress in treating PTSD. Even if disclosure issues are encountered, clinicians should nevertheless take encouragement from studies like this one which demonstrate that, in a setting where confidentiality is assured, some firefighters will be willing to reveal being affected by work-related incidents. Besides sociocultural influences, further factors that encourage or hinder the achievement of PTG

should be considered in clinical practice (Calhoun & Tedeschi, 1999), making positive outcomes as much a part of a practitioner's focus as negative outcomes.

**Conflict of interest:** None

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Table

*Regression results for country and other predictors of PTSD symptoms and PTG*

	IES-R score <sup>b</sup>		PTGI-SF score <sup>c</sup>	
	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$
<b>Step 1 – Time since incident</b>	-.073**	.008***	-.052*	.001
<b>Step 2 – Personal characteristics</b>		.017***		.020***
Gender	.004		.011	
Age (years)	-.035		.083	
Education: Low vs. High (ref)	.025		.068**	
Education: Medium vs. High (ref)	.059*		.092***	
Honorary vs. Professional (ref)	-.031		.033	
Leading vs. Operational (ref)	-.026		-.030	
Years of service	.16**		.034	
<b>Step 3 – Country origin<sup>a</sup></b>		.083***		.128***
Czech Republic	.009		.170***	
Germany	-.054		-.027	
Italy	.057*		-.126***	
Poland	.26***		-.169***	
Spain	-.084**		-.027	
Sweden	-.175***		-.048	
Turkey	.153***		.331***	
UK	-.067*		-.12***	

*Note.* <sup>a</sup> Migrant background (-1); <sup>b</sup> IES-R (0-88):  $M = 11.63$ ,  $SD = 12.36$  (Czech Republic:  $M=10.50$ ,  $SD=9.06$ ; Germany:  $M=9.73$ ,  $SD=10.99$ ; Italy:  $M=12.82$ ,  $SD=11.53$ ; Poland:  $M=17.96$ ,  $SD=15.74$ ; Spain:  $M=7.79$ ,  $SD=8.86$ ; Sweden:  $M=3.66$ ;  $SD=5.33$ ; Turkey:  $M=16.25$ ,  $SD=13.58$ ; UK:  $M=9.21$ ,  $SD=14.19$ ); <sup>c</sup> PTGI-SF (0-50):  $M=13.23$ ,  $SD=11.13$

(Czech Republic:  $M=17.28$ ,  $SD =10.67$ ; Germany:  $M=13.74$ ,  $SD=9.96$ ; Italy:  $M=11.40$ ,  $SD=10.15$ ; Poland:  $M=8.40$ ,  $SD=7.12$ ; Spain:  $M=13.34$ ,  $SD=10.48$ ; Sweden:  $M=11.77$ ,  $SD=10.62$ ; Turkey:  $M=24.59$ ,  $SD=16.96$ ; UK:  $M=9.61$ ,  $SD=9.29$ ); \* $<.05$  \*\* $p<.01$  \*\*\* $p<.001$ .