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Predictors of post-event distress and growth among firefighters after work-related emergencies – a cross-national study

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Appendix

- **Acknowledgement**

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Predictors of post-event distress and growth among firefighters after work-related emergencies – a cross-national study

Abstract (172 words)

Firefighters may experience posttraumatic stress symptomatology (i.e. post-event distress) as a consequence of exposure to work-related distressing incidents. However, positive psychological changes (i.e. post-event growth) should also be taken into account. The aim of this cross-national study was to investigate both post-event distress and growth in firefighters following distressing incidents. A sample of 1916 firefighters from eight predominantly European countries recalled a work-related distressing incident. Two hierarchical regression analyses were run to reveal predictors of post-event distress and growth, respectively.

Predictors included person pre-event characteristics, objective (e.g. type of incident, time since incident, fatalities) and subjective (e.g. perceived life-threat, peri-event distress, most distressing aspect) incident features, and the participant's country. Post-event distress was measured by the Impact of Event Scale-Revised (IES-R) and growth by the Posttraumatic Growth Inventory-Short Form (PTGI-SF). The final models explained 29% of the variation in post-event distress and 26% in growth. Post-event distress and growth were predicted by different variables. Country differences were found after controlling for all other variables. Further research is needed to explain these differences.

Keywords: distress, stress symptoms, posttraumatic growth, firefighter, cross-national comparisons

Introduction

Firefighters have a physically and psychologically demanding and hazardous occupation. Whereas in most hazardous work situations the goal is to avoid the hazard, firefighters have to actively engage with the hazard in order to save civilians (Kunadharaju, Smith, & DeJoy, 2011). Firefighters engage in a variety of emergencies including fighting fires, attending motor vehicle and train accidents, incidents involving gas or other hazardous/explosive substances, and natural disasters. An emergency that may overwhelm a firefighter's ability to deal with it could be, for example, an exposure to threat of personal injury, traumatic stimuli, contact with dead or severely injured children, or human error (Harris, Baloglu, & Stacks, 2002).

Research on the psychological reactions of first responders to work-related distressing incidents has largely focused on stress symptomatology (i.e. post-event distress) (e.g., Bryant & Harvey, 1996). Focusing only on negative outcomes can result in a biased understanding of posttraumatic reactions (Linley & Joseph, 2004) since the experience of growth – i.e. positive psychological changes such a greater sense of personal strength, a greater appreciation of life, and developing new priorities in life (Calhoun & Tedeschi, 2006) – have also been documented among first responders after work-related distressing incidents (Leykin, Lahad, & Bonne, 2013; Shakespeare-Finch, Smith, Gow, Embelton, & Baird, 2003). According to the functional descriptive model of posttraumatic growth developed by Tedeschi and Calhoun (2010; 2006; 1996), the following factors influence the process of growth: person pre-event characteristics, event features, styles of managing emotions, self-disclosure, distal (cultural/societal/religious themes) and proximate (role models/primary reference group) sociocultural influences, narrative development, and life wisdom (Calhoun et al., 2010).

Previous research into how person pre-event characteristics, event features and cultural context are associated with post-event distress or growth has revealed diverse relationships, summarized as follows:

Person pre-event characteristics

A recent meta-analysis found females report higher levels of growth than males in the general population (Helgeson, Reynolds, & Tomich, 2006). A similar gender effect has been found for post-event distress, although may be less detectable in emergency personnel than in the general population (Brewin, Andrews, & Valentine, 2000; Corneil, Beaton, Murphy, Johnson, & Pike, 1999). Peri-event distress has been revealed as an important predictor of post-event distress (Ozer, Best, Lipsey, & Weiss, 2003) and can also have a significant effect on growth (Linley & Joseph, 2004). However, previous research has shown that female police officers may report less peri-event distress in comparison to female civilians despite more trauma exposure overall (Lilly, Pole, Best, Metzler, & Marmar, 2009). Thus it could be that gender's effect on growth might also be less detectable among emergency personnel than among the general population. Findings to date regarding the effects of age on growth (Linley & Joseph, 2004; Stanton, Bower, & Low, 2006) and on post-event distress (Clohessy & Ehlers, 1999; Witteveen et al., 2007) have been mixed. Similarly, the effects of education on growth have been mixed: lower levels of education have been associated with higher levels of growth (Kinsinger et al., 2006; Urcuyo, Boyers, Carver, & Antoni, 2005; Widows, Jacobsen, Booth-Jones, & Fields, 2005), while in a study with cancer patients a positive association between education and growth was documented (Sears, Stanton, & Danoff-Burg, 2003). However, low education is believed to predict post-event distress (Brewin et al., 2000).

Regarding work characteristics, a supervisory rank has been associated with an increased risk of post-event distress in some firefighter samples, although not all (e.g., Corneil et al., 1999). Operational experience, i.e. years of service, has not been associated with growth (Chopko, 2010) but has been either positively associated (Corneil et al., 1999) or not associated at all (Clohessy & Ehlers, 1999; Corneil et al., 1999) with post-event distress. Investigations have failed to detect an association between the number of work-related distressing events experienced and growth (Chopko, 2010) but a cumulative effect of

traumatic experiences on post-event distress has been discovered in the general population (Ozer et al., 2003) and specifically among firefighters (Bryant & Harvey, 1996).

Objective and subjective incident features

Regarding the relationship between post-event distress and the time that has elapsed since the distressing event, some longitudinal studies have found the highest rates of stress symptoms shortly after the event and then noted rates decreasing over time (Norman et al., 2011). For growth, however, a meta-analysis found no association between that and time since the distressing event (Helgeson et al., 2006). Regarding the type of incident, Marmar et al. (1996) found that large-scale disasters (as compared to small-scale incidents) occurring in firefighters' routine line of duty were not associated with longer-term distress. Research with survivors, however, has revealed an effect of type of trauma on growth (McMillen, Smith, & Fisher, 1997; Shakespeare-Finch & Armstrong, 2010). Nevertheless, it has been argued that observed differences in growth and post-event distress may not be a function of event type per se but rather of more subjective features such as perceived life-threat and peri-event emotional distress (Briere & Elliott, 2000; Linley & Joseph, 2004). Certainly, these factors have been revealed as important predictors of post-event distress (Ozer et al., 2003) and may have a significant effect on growth (Linley & Joseph, 2004).

Cultural context

A European survey conducted in households across six Western-European countries revealed differences between countries regarding PTSD prevalence (Darves-Bornoz et al., 2008). One cross-national study with firefighters following work-related incidents revealed no differences between US and Canadian firefighters with respect to post-event distress (Corneil et al., 1999); this may have been due to these North American samples being too culturally similar at a national level. Another study revealed that growth after distressing events differed between US and Japanese university students, with the US students displaying more growth than those from Japan (Taku, Cann, Tedeschi, & Calhoun, 2009). This result might be related

to differences in disclosure (Taku, Tedeschi, Cann A., & Calhoun, 2009). Calhoun and Tedeschi (2006) highlighted that more cross-cultural or cross-national studies are needed to investigate whether national differences are present and to investigate the cultural factors that may differentially impact the process of growth.

Hypotheses

Findings reported above have shown that person pre-event characteristics, such as demographic and work characteristics, need to be considered and controlled for when investigating the impact of distressing events on post-event distress and growth. Accordingly, person pre-event characteristics were included first in the current analysis. Regarding incident features, it was hypothesized that time since the event would be negatively associated with post-event distress (H1) but not associated with growth (H2). Furthermore, it was hypothesized that event type would not affect post-event distress (H3) or growth (H4) but that at least some subjective incident features (such as perceived threat, peri-event distress) would be significantly associated with post-event distress and growth (H5). With a focus on making cross-national comparisons, it was hypothesized that at least some national samples would differ with respect to levels of growth and post-event distress (H6).

In conducting such an analysis, the present study sought to go beyond previous research by (re)examining how person pre-event characteristics and incident features relate to both post-event distress and growth, all as part of a large cross-national investigation among firefighters. Employing the same design and materials in each country would allow better for comparisons. Finally, these relationships would be studied in a population who, as outlined earlier, have a heightened chance of experiencing a work-related distressing incident and who could benefit greatly from a better understanding of what might lead to a positive and/or negative outcome following such an incident.

Method

Sample

Firefighters from eight predominantly European countries (i.e. Czech Republic, Germany, Italy, Poland, Spain, Sweden, UK, and Turkey) volunteered to participate in the international Behavior, Security, and Culture study (BeSeCu; Schmidt & Galea, 2013). These countries were included because, together, they would allow an investigation into the impact on post-event distress and growth of both small-scale incidents (such as house fires, traffic accidents, etc.) that are universally common and large-scale disasters (such as earthquakes, floods, terrorist attacks), which are more rare in terms of their frequency and geographical location but can have a greater impact when they do occur. Firefighters could be included if they were at least 18 years of age and their last operation was no longer than 10 years ago. Each consortium partner was responsible for recruiting in their own country and used strategies that were most effective locally, e.g., advertising through staff bulletins or online social networks for firefighters (Knuth, Kehl, Stegemann, & Schmidt, 2013). However, none of the partners offered firefighters payment for participation. Recruitment resulted in a convenience sample of 3011 firefighters. The study was carried out between May 2008 and April 2011. Ethical approval was obtained independently in the eight countries from the ethics committees of the data collection centers in the project consortium.

Only firefighters who recalled a single work-related distressing incident from the last 10 years and who fully completed the trauma-related measures were included in the analysis presented here ($n=1916$). Although there was a great range with respect to the time since the work-related incident (up to 10 years), the mean number of years since the event was just over three years ($M=3.01$, $SD=2.82$; see Table 1). Of the 1916 participants, 11.3% ($n=215$) were from the Czech Republic, 26.3% ($n=503$) from Germany, 19.8% ($n=379$) from Italy, 14.7% ($n=280$) from Poland, 5.5% ($n=105$) from Spain, 5.3% ($n=101$) from Sweden, 6.9% ($n=131$) from Turkey, and 5.7% ($n=108$) from the UK. Only 4.7% ($n=89$) of participants had a migrant

background, i.e. they were born in another country to the one in which they currently worked, or their mother or father was born in another country, or they were a citizen of more than one country.

Instruments

Behaviour, Security and Culture – First Responder (BeSeCu – FR). The BeSeCu–FR is a self-report questionnaire for firefighters to identify emergency-related human factors that might impair firefighters' professional performance and interfere with procedures during threatening events and evacuations (Kehl et al., 2014). The BeSeCu – FR was developed via a cross-national multi-step development process, including a literature review, expert input, focus groups and pilot testing activities. The questionnaire was developed in English and translated into the languages of the other participating countries (i.e. Czech, German, Italian, Polish, Spanish, Swedish, and Turkish) using a forward-backward-forward-translation procedure.

The questionnaire comprised six scales plus single questions and was available in online and paper-pencil versions. Internal consistency estimates of the six scales ranged from $\alpha = .77$ to $.80$. When measurement invariance was tested for each scale using multigroup confirmatory factor analyses with the two administration modes (online and paper-pencil versions) as groups, the global fit measures were good and suggested that the configural (CFI = 0.961–1.000; RMSEA = 0.000–.095; ECVI = 0.097–0.175), metric (CFI = 0.968–1.000; RMSEA = 0.000–0.070; ECVI = 0.088–0.162), and scalar invariance (CFI = 0.970–1.000; RMSEA = 0.000–0.069; ECVI = 0.075–0.154) models were supported by the data (Kehl et al., 2014). Consequently, it is justifiable to pool the data collected with these two methods (Davidov & Depner, 2011). When measurement invariance was tested for each scale with the eight countries inserted as groups, fit indices revealed that configural invariance (CFI = 0.997–1.000; RMSEA = 0.013–0.016; ECVI = 0.097–0.143) and metric invariance (CFI = 0.973–0.983; RMSEA = 0.022 –0.039; ECVI = 0.106 –0.151) were supported, but scalar

invariance (CFI = 0.661–0.888; RMSEA = 0.048–0.085; ECVI = 0.183–0.371) was not (Kehl et al., 2014). Consequently, this allows comparisons of correlates (covariances and regression coefficients) across national groups within each scale but not comparisons of means across these national groups. Using a quality of life measure, the WHOQOL8-item index (Power, 2003; Schmidt, Mühlan, & Power, 2006), divergent validity was confirmed for all scales in all national samples because all scales either did not correlate or only had a small correlation (Kehl et al., 2014).

Relevant for the present study were items regarding person pre-event characteristics and the section where participants were asked to recall the most stressful emergency situation they had attended in the last 10 years. Once they had called to mind the incident they (individually) perceived to be most stressful, participants were asked to state what type of incident it was and when the incident was. Moreover, firefighters were asked for the number of fatalities and whether they knew these persons. In addition, they were asked to describe what the most distressing aspect of the situation was (“What distressed you most in this situation?”). Peri-event emotional distress was assessed with the question “*How emotionally affected were you in the worst moment of this situation?*”, which was rated on a 5-point Likert scale ranging from 1 to 5 (1 = not at all, 2 = a little bit, 3 = moderately, 4 = quite a bit, and 5 = extremely). The subjective evaluation of threat was assessed with the question “*At the time, how would you have rated the risk to your own life during the most dangerous moment of this situation?*”, which was rated on a 5-point Likert scale (1 = very low, 2 = low, 3 = neither low nor high, 4 = high, and 5 = very high).

Impact of Event Scale – Revised (IES-R). The IES-R comprised 22 items assessing the level of intrusion, avoidance and hyperarousal symptoms in the past seven days related to the recalled incident. Weiss and Marmar (1996) reported high internal consistency for the three subscales. The IES-R items were administered using a Likert scale from 0 (not at all) to

4 (extreme) and responses were summed to create a total score (possible range: 0-88).

Published translated versions of this measure were used.

Posttraumatic Growth Inventory – Short Form (PTGI-SF). The PTGI-SF (Cann et al., 2010) measured positive changes resulting from the distressing incident. The 10 PTGI-SF items were administered using a Likert scale from 0 (I did not experience this change) to 5 (I experienced this change to a very great degree). Cann et al. (2010) documented a coefficient alpha of .86 for the PTGI-SF total score. Published translated versions of this measure were used.

Data Analyses

Data analyses were carried out using SPSS 22 (Windows). ANOVAs and χ^2 tests were run to establish whether the included sample and excluded participants' characteristics differed. Comparisons revealed a few significant differences. However, only on two characteristics did group differences equate to at least a small effect size (regardless of significance): age, $F(1, 2995)=71.80, p<.001, \eta=.15$, with the included participants being generally younger than those excluded; and working arrangement (professional vs. honorary member), $\chi^2(1)=30.28, p<.001$, Cramer's $V=.10$, with the included sample containing fewer professional firefighters than the excluded group. ANOVAs and χ^2 tests were run to establish whether demographic and work characteristics, time since incident, post-event distress and growth differed across countries.

Two hierarchical regression analyses were carried out to reveal predictors of post-event distress and growth using the IES-R total score and the PTGI-SF total score respectively as dependent variables. Blocks of predictor variables were formed based on the literature reviewed in the Introduction. It was desirable to control for person pre-event characteristics and so these were entered in the first model (or "step"). Incident features were entered next, with objective features included in model 2 and subjective features in model 3. The participant's country was entered in the last model to reveal whether this explained additional

variance after controlling for all previously entered variables. 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.

A qualitative content analysis, based on the method of Mayring (2002), was conducted on the answers (from 1278 [66.7%] participants) to the open-ended question about what, for them, was the incident's most distressing aspect. Where inter-rater disagreement existed, categories were discussed by both raters and coding rules were clarified. Nine answer categories were established (see Table 2, Step 3 of hierarchical regression analysis).

Results

Sample and type of incident

Demographic and work characteristics are provided in Table 1. Country samples differed significantly with respect to all person pre-event characteristics except gender. Time since the incident also differed significantly by country (see Table 1).

<Please insert Table 1 about here>

Firefighters had either personally experienced or witnessed the incident. The incident the majority of firefighters reported was a house fire (37.9%) or a transport accident, the latter including emergencies involving vehicles other than just cars such as trains, boats or planes (35.8%). A natural disaster (i.e. a flood, earthquake, or landslide) was reported by 13.9% of firefighters while 4.3% reported either the collapse of a building, an emergency involving gas or another hazardous/explosive substance, or other types of fire situation. Search and rescue operations (e.g., for trapped persons) were reported by 3.0% of firefighters, 2.1% reported an underwater rescue/search or an emergency involving drowning, 1.4% reported providing first aid to a person with a sudden illness, and 0.4% reported a terrorist attack. There was no effect of type of incident on time since the incident, $F(8, 1907) = 1.83, p = .07$, Cramers' $V = .09$.

Post-event distress and growth

Cronbach's α was .93 for the IES-R scale and .92 for the PTGI-SF scale. Means and standard deviations for the IES-R and PTGI-SF scores per country are displayed in Table 1. A medium effect of country on post-event distress and growth was observed, as was a low overall presence of post-event distress in this sample. Of the firefighters tested here, 7.7% had an IES-R total score on or above 33 – this score has been found to be the best diagnostic cutoff for PTSD (Creamer, Bell, & Failla, 2003). The percentage of firefighters meeting or exceeding the cutoff varied across countries, ranging from 0.0% in Sweden to 19% in Poland (see Table 1). An association between post-event distress and growth was observed, with a higher level of post-event distress being linked with a higher level of growth, $r=.33, p < .001$.

Predictors of post-event distress and growth

Table 2 presents the results at the final step of the two hierarchical regression analyses predicting post-event distress and growth, respectively. The final model explained 29% of the variance in post-event distress, $R^2_{\text{IES-R-t}} = .292, F(38, 558) = 6.04, p < .001$, and 26% of the variance in growth, $R^2_{\text{PTGI-SF-t}} = .264, F(38, 558) = 5.27, p < .001$.

<Please insert Table 2 about here>

Person pre-event characteristics. As shown in Table 2, there were a few person pre-event characteristics which impacted post-event distress and/or growth, i.e. education (negatively associated with both outcomes), years of service and the number of life-threatening work-related incidents experienced (both positively associated with post-event distress only). No effects of gender, age, working arrangement or rank were detected.

Incident features. In terms of incident features, no type of incident predicted post-event distress. However, one type, namely natural disasters, was positively associated with growth. Time since the incident was negatively associated with post-event distress, but not

associated with growth. The number of fatalities resulting from the incident was not associated with post-event distress or with growth, but the more participants knew the deceased, the lower was the level of growth reported. Regarding the most distressing aspect of the incident, witnessing death was associated with higher post-event distress. Peri-event emotional distress and perceived life-threat were positively associated with both post-event distress and growth.

Cultural context. After controlling for all other variables, the participant's country explained an additional 8.6% of the variance in post-event distress and 12.7% of the variance in growth. Polish and Turkish firefighters' post-event distress was higher than the grand mean while UK and Swedish firefighters' post-event distress was lower. In contrast, Czech and Turkish firefighters' growth was higher than the grand mean while UK, Polish and Italian firefighters' growth was lower.

Discussion

The present study supports findings that emergency workers experience post-event distress (Bryant & Harvey, 1996; Marmar et al., 1996) and growth (Shakespeare-Finch et al., 2003) as a consequence of exposure to work-related distressing incidents. Furthermore, the study has been successful in (re)examining how person pre-event characteristics and incident features relate to both post-event distress and growth, all as part of a cross-national investigation involving firefighters.

Person pre-event characteristics

The present study attempted to control for the effects of person pre-event characteristics in its analysis. Nevertheless, some of the results involving person pre-event characteristics merit comment. No effect of gender was detected on post-event distress. However, previous research had suggested that an effect of gender on post-event distress would be less detectable in samples of emergency and also military personnel than in the general population (Brewin et al., 2000; Corneil et al., 1999). Indeed, a recent study with

civilian fire survivors revealed that females reported experiencing higher distress levels during the event than their male counterparts (Knuth, Kehl, Hulse, & Schmidt, 2013). Additionally, the present study detected no gender differences with respect to peri-event distress, $F(1, 1909) = 0.52, p = .47, \eta = .02$, a factor that has previously been identified as an important predictor of post-event distress (Ozer et al., 2003) and is believed to significantly impact growth (Linley & Joseph, 2004). Is it possible then that gender differences in peri-event distress are also harder to detect in populations that are more likely to encounter distressing incidents? Lilly et al. (2009) found that female police officers reported less peri-event distress plus less post-event distress in comparison to female civilians despite having more trauma exposure overall. Perhaps the fact that our female and male firefighters reported the same amount of peri-event distress might provide an explanation for our non-significant results concerning post-event distress and growth. It may also be possible that firefighter training or socialization in fire brigade culture moderates gender and emotional distress effects.

A relationship between the number of life-threatening incidents experienced and post-event distress was revealed, supporting Bryant and Harvey's (1996) findings. No such relationship was observed for growth, supporting Chopko's (2010) findings with police officers. When discussing their posttraumatic growth framework, Calhoun and Tedeschi (2006) proposed that multiple experiences with distressing events might produce different outcomes for different people with regards to growth. For example, an initial distressing event might destabilize an individual's psychological foundations and, as a result, produce positive changes. This might leave the individual more psychologically prepared to deal with subsequent distressing events, more resilient to the impacts of (objectively) distressing events (Calhoun & Tedeschi, 2006). As such, subsequent stressful events might not set in motion the cognitive process involved in establishing growth and therefore might not produce any

additional growth (Calhoun & Tedeschi, 2006). A lack of an association would thus be in accordance with the model of posttraumatic growth.

Objective and subjective incident features.

The present findings not only supported hypotheses (H1) and (H2), which stated that time since the event would be negatively associated with post-event distress but not associated with growth, they were also in line with previous research (Helgeson et al., 2006; Norman et al., 2011). The current study allowed for incidents occurring further back in time (up to 10 years ago). However, the mean number of years since the participants' distressing events was just over three years.

The countries included in the study offered the potential to examine large-scale disasters as well as small-scale incidents and indeed a range of incident types were recalled. Nevertheless, the majority of firefighters recalled incidents of a type encountered more regularly in their line of work (e.g., house fires, traffic accidents) and ones where the number of casualties tends to be lower than in major emergencies. Our hypothesis (H3), which stated that the type of incident would not be associated with the level of post-event distress, was supported. However, one incident type, namely natural disasters, was positively associated with growth, which ran contrary to hypothesis (H4). A study by McMillen (1997) revealed that survivors of a tornado had higher growth levels, compared to survivors of a shooting and survivors of a plane crash. Natural disasters affect a large community and the people have to face the consequences caused by the hazard every day for a long time (e.g., damaged or disrupted infrastructure, ruined homes, etc.). However, these affected persons do not have to endure their tragic fate alone; many people will have lost their property, etc. and these people are likely to be known, e.g., one's neighbors, work colleagues or friends from the area. The shared plight might strengthen solidarity in a community and, from a sense of collective fate, unity might emerge. This is likely to promote positive changes. Furthermore, sympathy for the survivors expressed by the general public and first responders in the form of social and

material support (such as housing and food) after such an event is likely to promote a positive outlook and positive relations. Research has documented that levels of growth can be higher in persons who disclose to others their experience of an distressing event, more so when disclosure is reciprocal (Taku, Tedeschi, et al., 2009), which means growth might be more likely when the incident is of a type that affects a whole community. Finally, although people can prepare for natural disasters, they cannot cause them nor prevent them. Therefore, given the lack of blame, affected people might find it easier to disclose, which in turn might aid growth.

Our findings were in line with hypothesis (H5), which stated that at least some subjective incident features would be significantly associated with post-event distress and growth. Consistent with previous research (Helgeson et al., 2006; Linley & Joseph, 2004; Ozer et al., 2003), perceived life-threat and emotional distress were positively related to post-event distress and growth. Regarding the most distressing aspect of the incident, witnessing death was associated with higher post-event distress. It might be harder for firefighters, certainly long-term, if they witness death during incidents given their main role in attending emergencies is to save lives and reduce risk to others. The distress is two-fold: seeing someone suffers but also perhaps a sense that they have failed in their duty. If firefighters know those deceased, the distress will only be magnified. Furthermore, experiencing a lack of resources was associated with lower post-event distress while experiencing operational stress was associated with lower growth. These results seem counter-intuitive at first. For example, one would expect that lacking resources would make work more difficult and cause resentment to build towards the employer, thereby increasing distress. However, perhaps if the lack of resources is attributed to others (i.e. the employer, an external source) then firefighters might be more accepting of negative outcomes and apportion less responsibility to themselves for that outcome, thereby lowering distress. Operational stress might lower growth if the conditions prompting it occur more commonly; there would be less chance to get over it

and grow. Whatever the explanations, the present results provide further evidence that it is not the type of incident per se that is so important but rather certain other incident features or the individual's response to the incident.

Cultural context

In the present study, the majority of firefighters reported low post-event distress and they might therefore be able to remain functional at work. However, close to a tenth of the firefighters had IES-R total scores on or above a proposed cut-off score of 33, indicating PTSD (Creamer et al., 2003). Del Ben, Scotti, Chen, and Fortson (2006) found a similar PTSD prevalence among US firefighters using a cutoff score of 44 on the PTSD Checklist. However, in the present study, differences between PTSD prevalence rates were noted across the international firefighter samples, with 19.4% of Polish firefighters being at risk of PTSD compared to 0% of Swedish firefighters. With respect to growth, 51.7% of the firefighters reported at least some degree of positive change, as reflected by a PTGI-SF score (0-50) above 10. However, again, the prevalence varied across countries: among Turkish firefighters, 70.7% reported some degree of positive change while the percentage was a lot lower among firefighters from the UK (37.6%). Remember, differences in post-event distress and growth between countries were analyzed and revealed after taking into account person pre-event characteristics and incident features. This could suggest sociocultural influences, for instance some cultures might encourage adoption of a "macho" image or "stiff-upper lip", thereby causing distress to be bottled up and growth to be stifled (see Calhoun et al., 2010). Also differences in management and organisation (e.g., organizational and professional culture) could be involved (Gray, 2009; Paton, 2005) and might explain the country differences found here. Findings by Paton (2005) indicate that organizational difficulties, such as a lack of consultation, poor communication and administrative burden, directly affect post-event distress but not growth. Such difficulties might exacerbate the stresses encountered at the attended incidents or stifle the satisfaction gained from successful operations. As with

operational stresses, such organizational difficulties might occur constantly, depriving firefighters the opportunity to begin the process of growth. In contrast, more positive organizational features such as being given responsibility and receiving recognition for good work, promote growth, especially when emergency personnel have been exposed to a high number of distressing events (Paton, 2005). Future studies should attempt to examine such factors.

Limitations of the study

The present study has been successful both in replicating some previous associations between certain factors and post-event distress and growth and in revealing new associations. Nevertheless, there are some limitations. First, the national samples might not be representative; convenience samples were collected. Moreover, country differences were found for demographic and work characteristics. However, to address this, person pre-event characteristics were entered first in the regression analyses to control for these characteristics. Nonetheless, it should be borne in mind that the person pre-event characteristics of the firefighters at the time of assessment might not represent the characteristics at the time of the distressing incident. This needs to be considered when interpreting the influence of person characteristics on post-event distress and growth. Furthermore, it must be acknowledged that not all work-related incidents occurred in each country. Another issue is that a large variation existed with respect to levels of post-event distress and growth among firefighters, but the distribution of both was skewed to the right. This means that most of the post-event distress and growth scores were towards the lower end of the scale. However, the possibility of a self-selection bias needs to be considered. Firefighters with very traumatic experiences might have refused to complete the BeSeCu-FR to avoid reminders. It has also been mentioned earlier that some of the recalled incidents occurred as far back as 10 years ago. However, the mean number of years since the event was just over three years, with many events being of more recent origin.

Perspectives

Exposure to work-related distressing incidents can result in both negative and positive outcomes for firefighters. This means researchers should now attempt to identify and examine fire brigade organizational variables that reduce the former type of outcome and encourage the latter. Furthermore, sociocultural influences should be addressed in future studies. Findings from such lines of enquiry could provide worldwide benefits.

Table 1

Personal characteristics, time since incident, post-event distress and growth compared across countries

	N	% ^a	M% ^b	D	UK	CZ	PL	E	S	TR	I	χ^2	df	p	Cramer's
				% ^a				V							
Male	1854	96.9	0.1	96.4	97.4	98.2	98.6	97.2	95.0	96.2	95.9	7.50	7	.38	.06
Education level			0.1									442.88	14	<.001	.34
Lowest formal	85	4.4		11.2	0.9	0.4	0.0	4.7	5.0	8.3	0.3				
Intermediary secondary	409	21.4		39.5	35.9	0.0	0.3	24.3	3.4	7.5	29.4				
Higher secondary/university	1421	74.2		49.3	63.2	99.6	99.7	71.0	91.6	84.2	70.3				
Working arrangement			0.3									768.85	7	<.001	.63
Professional	1503	78.6		37.3	100.0	99.1	93.4	89.7	100.0	100.0	89.3				
Honorary member (unpaid)	408	21.4		62.7	0.0	0.9	6.6	10.3	0.0	0.0	10.7				
Rank			0.2									124.34	7	<.001	.26
Operational	1192	62.3		52.2	34.2	66.4	70.6	81.3	47.9	65.2	74.4				
Leading operational	720	37.7		47.8	65.8	33.6	29.4	18.7	52.1	34.8	25.6				
Migrant background	89	4.7%	0.3	6.0	7.7	4.9	2.8	0.9	12.9	1.5	2.8	33.97	7	<.001	.13

Table 1 Continued

Personal characteristics, time since incident, post-event distress and growth compared across countries

		M% ^b	D	UK	CZ	PL	E	S	TR	I	F	df1/df2	p	η	
Age (years) ^c	<i>M</i>	36.12	0.1	31.91	40.98	35.88	32.93	39.97	40.98	36.49	40.28	48.62	7/1906	<.001	.39
	<i>SD</i>	9.54		10.12	8.07	7.55	7.25	8.94	10.76	8.63	8.11				
Years of service ^d	<i>M</i>	12.91	0.1	12.65	17.09	12.19	10.48	13.97	15.59	10.29	14.03	12.59	7/1906	<.001	.21
	<i>SD</i>	8.60		9.19	8.75	6.77	7.03	8.66	11.01	7.12	8.48				
Years since incident ^e	<i>M</i>	3.01		3.14	3.68	3.60	2.24	3.29	3.84	1.99	2.89	10.12	7/1908	<.001	.19
	<i>SD</i>	2.82		2.82	2.86	3.07	2.46	2.77	2.96	2.39	2.81				
PTGI-SF (0–50) ^f	<i>M</i>	13.23	0.0	13.74	9.61	17.28	8.40	13.34	11.77	24.59	11.40	40.73	7/1908	<.001	.36
	<i>SD</i>	11.13		9.96	9.29	10.67	7.12	10.48	10.62	16.96	10.15				
IES-R (0–88) ^g	<i>M</i>	11.63	0.0	9.73	9.21	10.50	17.96	7.79	3.66	16.25	12.82	27.69	7/1908	<.001	.30
	<i>SD</i>	12.36		10.99	14.19	9.06	15.74	8.86	5.33	13.58	11.53				
IES-R \geq 33	<i>N%</i>	7.6	0.0	5.6	9.4	2.7	19.4	2.8	0.0	9.0	7.7	$\chi^2(7)=85.51, p<.001, C^2V=.21$			

Note. D=Germany ($n=535$); UK=United Kingdom ($n=117$); CZ=Czech Republic ($n=226$); PL=Poland ($n=288$); E=Spain ($n=107$); S=Sweden ($n=119$); TR=Turkey ($n=133$); I=Italy ($n=391$); ^a valid percent; ^b M%=percentage missing; ^c Range: 18–66; ^d Range 0–52; ^e Range: 0–10; ^f Range: 0–50; ^g Range: 0–71.

Table 2

Hierarchical regression analysis predicting post-event distress and growth

Predictors	<i>IES-R</i>		<i>PTGI-SF</i>	
	β	ΔR^2	β	ΔR^2
Step 1 – Person pre-event characteristics		.036**		.036**
Female	-.014		.034	
Age (years)	-.121		.062	
Education	-.122**		-.132**	
Honorary member (Professional=ref.)	-.028		.027	
Leading rank (Operational=ref.)	-.010		-.048	
Years of service	.207*		.088	
No. life-threatening incidents	.096*		-.029	
Step 2 – Objective incident features		.044**		.052**
Type of incident				
House fire	-.029		-.061	
Natural disaster	-.016		.106*	
Terrorist attack	-.092		-.142	
Traffic accident	.007		.028	
Suicide attempt	.025		.048	
Hazardous/explosive substances	.029		.040	
Underwater rescue	.097		.009	
First aid	-.020		.011	
Other operation (-1)				
Years since incident	-.115**		-.016	
No. fatalities	.009		.061	

Table 2 Continued

Hierarchical regression analysis predicting post-event distress and growth

Predictors	<i>IES-R</i>		<i>PTGI-SF</i>	
	β	ΔR^2	β	ΔR^2
No. deceased known	-.055		-.123**	
Step 3 – Subjective incident features		.126***		.049**
Most distressing aspect				
Life threatening emergency	-.034		-.051	
Victims were young	-.010		.029	
Personal thoughts/rumination	.077		.031	
Lack of control	-.017		-.020	
Death	.164***		.060	
Harmed/suffering humans	-.038		.065	
Operational stress	.035		-.091*	
Lack of resources	-.126**		-.013	
Contact with victims' relatives	.009		.039	
Overall situation	-.089*		-.017	
Rescue difficulties (-1)				
Peri-event emotional distress	.225***		.148***	
Perceived life-threat	.173***		.160***	
Step 4 – Country^a		.086***		.127***
Czech Republic	-.017		.132**	
Germany	-.023		-.018	
Italy	-.006		-.249***	
Poland	.327***		-.169***	

Table 2 Continued

Hierarchical regression analysis predicting post-event distress and growth

Predictors	<i>IES-R</i>		<i>PTGI-SF</i>	
	β	ΔR^2	<i>B</i>	ΔR^2
Spain	-.032		-.004	.
Sweden	-.125**		.044	
Turkey	.110*		.305***	
UK	-.124*		-.133**	
Migrant background (-1)				

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

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