

RELATIONSHIPS BETWEEN **POST-EVENT DISTRESS** AND GROWTH AMONG  
FIREFIGHTERS

**Relationship between firefighters' post-event distress and growth at different times after  
distressing incidents**

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## Relationships between firefighters' post-event distress and growth at different times after distressing incidents

### Abstract

As a consequence of exposure to distressing work-related incidents, firefighters may experience negative symptomatic responses, i.e. post-event distress. As well as negative outcomes, empirical studies have documented the experience of growth, i.e. positive psychological changes, among first responders after encountering distressing work-related incidents. Post-event distress and growth may evolve independently at different times following a distressing event yet are likely to influence each other. In the present study the impact of distressing work-related incidents on firefighters was investigated, examining the relationship (linear, quadratic and cubic) between post-event distress and growth. To see what this relationship looked like in the immediate and in the more distant aftermath of distressing incidents, participants were split into two groups: those with more recent exposure (i.e. their distressing incident occurred within the past 12 months) and those with more distant exposure (i.e. their distressing incident occurred 13-24 months ago). A sample of 927 firefighters from eight predominantly European countries completed the Impact of Event Scale – Revised (IES – R) and the Posttraumatic Growth Inventory – Short Form (PTGI – SF) with reference to an incident they perceived to be most stressful. Time since this incident occurred was not significantly associated with growth, but was negatively associated with post-event distress. The relationship between post-event distress and growth at different times was first explored using the loess statistical method. Subsequent multivariate regression analyses produced evidence of both linear and curvilinear relationships between post-event distress and growth. Nevertheless, the cubic model appeared to be the best fit of the data for recent distressing incidents and the quadratic model for more distant distressing incidents. The regression

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results were consistent with the results of the loess smoothing. Implications for clinical practice are discussed.

Keywords: distress, stress symptoms, posttraumatic growth, relationship, firefighters

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As a consequence of exposure to distressing work-related incidents, firefighters may experience stress symptomatology, i.e. post-event distress (e.g., Bryant & Harvey, 1996; Marmar, Weiss, Metzler, Ronfeldt, & Foreman, 1996). As well as negative outcomes, empirical studies have documented the experience of growth, i.e. positive psychological changes, among first responders after encountering distressing work-related incidents (Moran & Colless, 1995; Paton, 2005; Shakespeare-Finch, Smith, Gow, Embelton, & Baird, 2003), which is thought to result from the struggle with a highly challenging situation (Tedeschi & Calhoun, 1995, 1996). These positive outcomes include a greater sense of personal strength, a greater appreciation of life, a greater sense of closeness in interpersonal relationships, and developing new priorities in life (Calhoun & Tedeschi, 2006; 1995).

Differing results regarding the relationship between growth and current post-event distress have been revealed. A review by Zoellner and Maercker (2006) reported studies which suggested a positive linear association or no relationship between the two. Other studies suggest a curvilinear relationship, i.e. an intermediate level of post-event distress being associated with the greatest level of growth (Butler et al., 2005; McCaslin et al., 2009). Linear and quadratic effects of post-event distress on growth have been observed by other researchers (Levine, Laufer, Hamama-Raz, Stein, & Solomon, 2008; Solomon & Dekel, 2007). Several explanations have been proposed for the mixed results in cross-sectional studies. First, the inconsistency in results could be due to the analysis of data with a limited range of either psychopathology or posttraumatic growth (PTG) (McCaslin et al., 2009). Second, there were differences in the study designs, including the operationalization of the investigated constructs and the types of distressing events under investigation (Helgeson, Reynolds, & Tomich, 2006; Zoellner & Maercker, 2006). Kunst (2010) highlighted that the impact of distressing events at different time points, both in the immediate and more distant aftermath, has so far not been investigated with respect to the relationship between distress

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and growth. Furthermore, we found no published work except a very recent paper by Leykin, Lahad and Bonne (2013) that had examined the relationship between post-event distress and growth specifically with firefighters. In their sample were 65 male firefighters from a single fire department in Israel and these participants were asked about their responses to a single event, a particularly severe wildfire incident, occurring three and a half weeks earlier. Post-event distress and growth were assessed with the Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1996) and the Posttraumatic Growth Inventory-Short Form (PTGI-SF; Cann et al., 2010) respectively. Leykin et al. (2013) found both a quadratic curvilinear relationship (i.e. an intermediate level of post-event distress being associated with the greatest level of growth) and a linear relationship between post-event distress and growth using curve estimation regression analysis, but the results indicated that the curvilinear relationship was not significantly stronger than the linear one.

But how does time affect the relationship between post-event distress and growth in response to distressing events? The work of Calhoun, Tedeschi and colleagues (e.g. Calhoun, Cann, & Tedeschi, 2010; Calhoun, Cann, Tedeschi, & McMillan, 2000; Calhoun & Tedeschi, 2006; Taku, Calhoun, Cann, & Tedeschi, 2008) has attempted to provide some theoretical explanation. Tedeschi and Calhoun propose that experiencing a highly challenging situation may lead an individual to engage in cognitive processes in the immediate aftermath of the event, in the form of automatic rumination such as (negative) intrusive thoughts and images (Calhoun & Tedeschi, 2006), and this rumination is likely to be positively associated with emotional distress and disruption of beliefs, goals and narrative (Calhoun et al., 2010; Taku et al., 2008). As the individual moves onto more deliberate, constructive rumination, reflecting on a wide variety of content and trying to make sense out of what happened, distress can keep the cognitive process active and motivate the person to work towards an understanding, which can, in turn, affect the distress (Calhoun et al., 2010). Research by Taku et al. (2008), using a

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translated version of the 14-item rumination scale developed by Calhoun, Cann, Tedeschi, and McMillan (2000), indicated that recent (within the last two weeks) automatic (intrusive) rumination led to distress while deliberate rumination soon after the highly challenging situation led to growth, with distress and growth coexisting. These findings are in accordance with the model of PTG by Tedeschi and Calhoun (2010; 2006; 2004). However, Ehlers and Clark (2000) suggest in their cognitive model of posttraumatic stress disorder (PTSD) that negative appraisals of the event and/or its sequelae lead to a sense of current threat and contribute to persistent PTSD. Indeed, Calhoun and Tedeschi (2006) acknowledge that individuals with an extremely high level of post-event distress might not produce growth because their psychological resources might be overwhelmed. This notion has been supported by the research finding that post-event cognitive engagement lasting for years showed no association with growth (Calhoun, Tedeschi, Fulmer, & Harlan, 2000; as cited in Tedeschi & Calhoun, 2004), yet other research found a significant association between such engagement and negative outcomes (Tait & Silver, 1989).

In the present study the impact of distressing work-related incidents on firefighters was investigated, examining the relationship between post-event distress and growth. As we were interested in what this relationship looked like in the immediate and in the more distant aftermath of the event, the firefighters were split into two groups: those whose exposure to their distressing incident was more recent (i.e. within the past 12 months) and those whose exposure was more distant (i.e. 13-24 months ago). This study assessed a larger and more diverse firefighter sample than that previously studied. Moreover, rather than dictating the event of interest, the researchers allowed participants to choose for themselves the work-related incident that had particularly affected them. Based on the theory and research findings reviewed above, it was assumed that an event a firefighter perceived to have been a particularly stressful one might have disrupted their beliefs, goals and narrative, thereby

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initiating the development of stress symptoms after the event and the cognitive engagement that produces growth (Calhoun & Tedeschi, 2006). Moreover, it was assumed that a firefighter suffering from stress symptoms long after the distressing event (persisting stress symptomatology) will be less likely to have developed growth because their psychological resources will probably have been overwhelmed (Calhoun & Tedeschi, 2006). The cognitive process might not have been effective, not led to disengagement from thoughts of threat occurring following the original disruptive experience, and therefore only distress might be evident (Tedeschi & Calhoun, 2004). Finally, it was assumed that if a chosen stressful event did not, in fact, have an especially strong effect, with the exposure failing to yield a disruption in beliefs, goals and narrative, then the firefighter will probably not have developed signs of distress or growth (Calhoun & Tedeschi, 2006; Tedeschi & Calhoun, 2004). As such, the following two hypotheses were derived:

1. Firefighters with recent exposure to distressing work-related incidents, compared to firefighters with more distant exposure, will display a stronger positive linear association between post-event distress and growth (i.e. as distress increases, growth will increase and vice versa).
2. Firefighters with more distant exposure, as opposed to more recent exposure, will display a stronger curvilinear association between post-event distress and growth (more specifically, an inverted U-shape relationship; i.e. participants who report intermediate levels of distress will experience higher levels of growth than those reporting low or high levels of distress).

The relationship between post-event distress and growth was studied in a population which has a heightened chance of experiencing distressing incidents. The examination of the impact of such incidents on firefighters is important for their personal well-being, as well as

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for the general public's well-being (e.g. if fire brigades are short staffed due to firefighters taking sick leave as a result of **distressing experiences**).

## Method

### Sample

Participants were from a sample of 1916 firefighters who had taken part in the BeSeCu study (Behaviour, Security, and Culture; Schmidt, Knuth, & Kehl, 2011); this sample had all experienced a **distressing work-related** incident within the last 10 years and had fully completed the BeSeCu **incident**-related measures. In the present study only those firefighters whose **distressing** incident was in the last two years ( $n = 927$ ) were considered. Only on three characteristics did the excluded firefighters differ to at least a small effect size from the included sample: they were older,  $F(1, 1912) = 63.14, p < .001, \eta = .18$ , had more years of service,  $F(1, 1912) = 91.40, p < .001, \eta = .21$ , and more worked as leading operational personnel than as operational personnel,  $\chi^2(1) = 80.43, p < .001, \text{Cramer's } V = .21$ .

The study was carried out in eight predominantly European countries (i.e. Czech Republic, Germany, Italy, Poland, Spain, Sweden, Turkey and UK) between May 2008 and April 2011. Ethical approval for the study was obtained in each country. Participants could be included if they gave their informed consent and were at least 18 years of age. Participation was voluntary and confidential. Each consortium partner was responsible for the nationwide recruitment of their sample and used strategies that were most effective locally (Knuth, Kehl, Stegemann, & Schmidt, 2013). A field study manual was developed including instructions regarding recruitment. A BeSeCu website was created with information about the study in the participating countries' respective languages. The study was advertised on websites designed especially for first responders, in social networks like Facebook and through national and local media. A further strategy was top down recruitment via fire brigades.

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The sample's demographic and work characteristics plus the number of years since the incident of interest occurred are provided in Table 1. Country samples differed significantly with respect to all personal characteristics except gender. Time since the incident also differed significantly between countries (see Table 1). Regarding their country, 10.0% ( $n = 92$ ) of the firefighters were from the Czech Republic, 24.8% ( $n = 229$ ) from Germany, 23.2% ( $n = 214$ ) from Italy, 17.0% ( $n = 157$ ) from Poland, 5.0% ( $n = 46$ ) from Spain, 4.4% ( $n = 41$ ) from Sweden, 8.2% ( $n = 76$ ) from Turkey, and 3.8% ( $n = 35$ ) from the UK. Only 3.7% ( $n = 34$ ) of participants had a migrant background.

<Please insert Table 1 about here>

### **Instruments**

**Behaviour, Security and Culture – First Responder.** The Behaviour, Security and Culture – First Responder (BeSeCu-FR) is a self-report **questionnaire** for firefighters developed via a multi-step development process, including a literature review, expert input, focus groups and pilot testing activities (Kehl et al., *in press*). The BeSeCu-FR 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. Relevant for the current study were items regarding demographic and work characteristics as well as the final part **where participants were asked to recall the most stressful emergency incident 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 this was and then provide some description of the event and its circumstances. Moreover, they were asked to describe what distressed them most about this situation.** The questionnaire was available in online and paper-pencil versions.

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**Impact of Event Scale – Revised.** The Impact of Event Scale – Revised (**IES-R**; 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 symptomatic **response** in the past seven days related to the recalled incident; **in other words, post-event distress**. The IES-R comprised 22 items assessing the level of intrusion, avoidance and hyperarousal symptoms with the three subscales reported to have very high internal consistency (Weiss & Marmar, 1996). 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: Czech (Preiss et al., 2004), English (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 most stressful **incident** were measured with the **Posttraumatic Growth Inventory – Short Form (PTGI-SF)**; Cann, et al., 2010). The PTGI-SF is a self-report measure based on the 21-item Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996). The 10 PTGI-SF items were administered using a Likert scale from 0 (I did not experience this change as a result of my crisis) to 5 (I experienced this change to a very great degree as a result of my crisis) with the responses summed to create a total score (possible range: 0-50). Coefficient alpha for the PTGI-SF total score was .86 (Cann et al., 2010). 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 (Weiss & Berger, 2006), Swedish (Norlander, von Schedvin, & Archer, 2005), Polish (Cieslak et al., 2009), and Turkish (Dirik & Karanci, 2008).

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### Data Analysis

To investigate the relationship between firefighters' post-event distress and growth at different time points, participants were classified into one of two groups based on their recalled incident being more recent (0 – 12 months ago;  $M = 5.16$ ,  $SD = 3.79$ , range: 0 – 12) or more distant (13 – 24 months ago;  $M = 17.91$ ;  $SD = 3.35$ , range: 13 – 24). The recent exposure group was selected to cover a period of up to a year since the incident due to the fact that symptomatic responses may take several weeks or months to manifest. Internal consistency (Cronbach's  $\alpha$ ) was .93 for the IES-R scale and .92 for the PTGI-SF scale.

The loess procedure – *locally weighted scatterplot smoother* (Cleveland, 1979) – was used to fit nonparametric smooth curves to the scatterplots of PTGI-SF and IES-R scores (cf., McCaslin et al., 2009). Loess is a strategy to fit smooth curves to empirical data to depict relationships between variables without requiring an a priori specification of the relationship with respect to shape or form of the curve (Jacoby, 2000). With respect to the smoother parameters, the normal kernel (default option) and the default size of the bandwidth with a multiplier of 3 was used. The same bandwidth was administered for all smoothers. Loess-enhanced scatterplots were made for participants who experienced a distressing work-related incident (a) within the last 12 months and (b) within 13 to 24 months.

Two hierarchical multivariate regression analyses, one for each time point, were carried out to predict growth by post-event distress controlling for personal characteristics. These personal (i.e. demographic and work) characteristics were entered in model 1. In subsequent models, the mean centered IES-R scores were entered first as a linear term and then as a curvilinear term. Models were entered using blockwise entry. Within the models, predictors were entered using the simultaneous/enter method. Multicollinearity was not

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observed since the tolerance statistic of each item was not below .1 and the VIF values were less than 10 (Field, 2005). Data analyses were carried out using SPSS 18 (Windows).

### Results

#### Reported experience of distressing work-related incidents

Firefighters had either personally experienced or witnessed the distressing incident. The majority reported a house fire (36.2%) or a transport accident, the latter including emergencies with vehicles other than just cars such as a train, boat or plane (33.0%). A natural disaster (e.g. flood, earthquake or landslide) was reported by 19.1% and 11.7% reported other operations such as: first aid to a person with a sudden physical illness (e.g., resuscitating someone following a heart attack); search and rescue operations (i.e. work accidents, trapped persons); a collapse of a building; an emergency involving gas, another hazardous substance or an explosion; or other types of fire situation emergencies. All of the incidents were negative in nature: i.e. they posed a threat to lives/property, and in many cases that threat was actualized and the participants observed the resultant harm or damage incurred. Moreover, these events were demanding (e.g. in terms of the complexity of the required professional response or physical effort expended by the firefighting personnel), and a number involved vulnerable populations such as young children. When asked what they found most distressing about their incidents, participants made reference to circumstances evoking horror, fear, helplessness, guilt, anger, and so forth. Type of incident was not significantly associated with time since incident,  $F(7, 877) = 1.32, p = .24, \eta = .10$ .

#### Post-event distress and growth

At least some degree of positive change was reported by 53.6% of the participants, as reflected by a mean PTGI-SF total score above 10 ( $M = 13.68, SD = 11.35$ , range: 0 – 50). The average of the IES-R total score was 12.84 ( $SD = 12.59$ , range: 0 – 71). In total, 8.3% ( $n$

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= 77) of the sample reached the critical cutoff IES-R total score of at least 33 for possible PTSD (Creamer, Bell, & Failla, 2003). The time since the incident occurred was not significantly associated with the PTGI-SF total score ( $r = -.01, p = .79$ ) but was negatively associated with the IES-R total score ( $r = -.12, p < .001$ ).

### Relationship between post-event distress and growth at different time points

The impact of time (since the distressing incident) was first explored using the loess statistical method. The Figure shows the smoothed curves of the corresponding scatter plots of PTGI-SF total scores and IES-R total scores for the different time points, i.e. 0 – 12 months (A) and 13 – 24 months (B) after the incident. Curve A appears to be more linear than quadratic, but also seems more cubic in its form. Curve B appears to be less linear and more quadratic (inverted U form). Although no hypothesis had been made regarding curvilinear relationships between post-event distress and growth that were other than quadratic, it was decided, on the basis of the loess smoothing, that the analysis should assess post-event distress in three terms: linear, quadratic curvilinear (i.e. the mean centered IES-R scores squared) and cubic curvilinear (i.e. the mean centred IES-R scores cubed).

<Please insert Figure about here>

Table 2 presents the results of the regression analysis. For the recent exposure (0 – 12 months) group, there was a significant  $R^2$  change as each successive post-event distress term was added and the final, cubic model was significant,  $F(9, 497) = 12.55, p < .001$ . In that cubic model, the coefficients for all three post-event distress terms were significant, albeit extremely small in the case of the cubic term (linear  $b = .421, p < .001$ ; quadratic  $b = -.022, p < .001$ ; cubic  $b = .000, p < .01$ ). For the more distant exposure (13 – 24 months) group, the final, cubic model was also significant,  $F(9, 404) = 5.14, p < .001$ . However, the addition of

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the cubic term did not produce a significant  $R^2$  change and the coefficients for the two curvilinear terms were not significant in the cubic model. Thus, the quadratic model seemed the better fit of the data,  $F(8, 405) = 5.61, p < .001$ . In that quadratic model both the linear ( $b = .348, p < .001$ ) and the quadratic ( $b = -.007, p = .014$ ) coefficients were significant. **Please note, the negative signs alongside the quadratic coefficients indicate that the shape of the relationship in those cases was always an inverted-U, not a U.**

To summarize then, both linear and curvilinear **post-event distress** terms were found to be significant predictors of **growth** at each time point (linear, quadratic and cubic terms for the recent **exposure** group and just linear and quadratic terms for the more distant **exposure** group) but the cubic model seemed to represent the data best for more recent **exposure** in this sample and the quadratic model was best for more distant **exposure**. These regression results are consistent with the results of the loess smoothing.

<Please insert Table 2 about here>

### Discussion

First responders may experience **post-event distress** (e.g. Bryant & Harvey, 1996; Marmar et al., 1996) and **growth** (e.g. Paton, 2005; Shakespeare-Finch et al., 2003) as a consequence of exposure to **distressing** work-related incidents. The present study supports this by finding signs of positive as well as negative outcomes among a particular – and, to date, understudied – group of first responders, i.e. firefighters. In this sample, close to a tenth of the participants reached the critical cutoff score for possible PTSD. **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).** Over half of our firefighters reported at least some degree of positive change. The negative association between the time since the **recalled** incident and

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post-event distress that has been found in previous research (e.g. Norman et al., 2011) was further supported by the findings of this study with firefighters. The present study also supported the results of a meta-analytic review revealing no association between time since the distressing event and growth (Helgeson et al., 2006).

To address gaps in the literature (Kunst, 2010), this study investigated the relationship between post-event distress and growth at different times after exposure to the distressing incident. The relationship was studied among firefighters because they have a heightened chance of experiencing a distressing incident and because the examination of the impact of time (since the incident) on firefighters is important for their personal well-being and for the general public's well-being (e.g. if long-term or delayed-onset-prompted sick leave due to stress results in fire brigades being left short staffed). Like earlier studies (e.g., Levine et al., 2008), the present study – analyzing cross-sectional data with multivariate regression analysis – found evidence for both linear and curvilinear relationships between post-event distress and growth. The current paper's findings also somewhat complement those reported recently by Leykin et al. (2013) who noted both a linear and a curvilinear relationship between post-event distress and growth among firefighters. The Leykin et al. (2013) findings were based on a smaller sample of male firefighters, from the same district fire department in Israel, and on reactions to a single incident. The present study was able to sample a much larger number of firefighters from across eight different, predominantly European countries, and from across multiple fire departments within those countries, as well as including female firefighters and looking at various types of emergency incident. The current results therefore advance and lend credence to what is known about this particular group of first responders and the kinds of responses these workers may have to incidents they encounter in their line of duty. Moreover, some researchers have argued that examining a variety of events perceived as stressful through to severely traumatic might actually be beneficial or necessary as it may lead to

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sufficient variability in the data to be able to uncover the relationship between **post-event distress** and **growth after distressing events** (Shakespeare-Finch & Armstrong, 2010).

Leykin et al. (2013) assessed **post-event distress and growth** within one month of the incident in question. The current study was able to look at outcomes spanning a longer period of time since the **distressing** incident. As **event** outcomes may take some months to manifest, it was believed that this approach would better allow responses to be captured as well as allow a comparison of responses at different time points. Leykin et al. (2013) concluded from their results that, for a recent **distressing** event, the (quadratic) curvilinear relationship between **post-event distress** and **growth** was not significantly stronger than the linear relationship. In contrast, the present study indicated that, for a **distressing** incident occurring in the past 12 months, a (cubic) curvilinear relationship between **post-event distress** and **growth** might in fact be the better representation. The results run contrary to the first hypothesis as well as Leykin et al.'s conclusions. However, they may not be entirely inconsistent with the theory behind the hypothesis. It might be that when the severity of **post-event distress** begins to go beyond an intermediate level, psychological resources begin to become overwhelmed. How this affects individuals might depend on how far beyond an intermediate level the severity is. For example, if the severity was very high, it might actually force individuals into pushing through and confronting the issue as it would be having such a disabling effect on their daily lives (i.e. work functioning, social relationships, etc.), thus although distress would continue as they face their problems head on, they would also reap benefits from taking action. In contrast, if the severity was not quite as high above an intermediate level, individuals might (mis)attribute all the distress to thinking about the event and thus decide to “close the door” on the issue, i.e. try to (mentally) put the event behind them. Such action would likely result in a continuation of **symptomatic responses** (e.g. intrusions) due to the source of distress not being addressed but also **growth** would be stymied because individuals would no longer be

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engaging in more deliberate rumination. These individuals might therefore represent the negative turn of the cubic curve seen in the recent **exposure** group and, over time, would represent the negative turn of the quadratic curve observed with the more distant **exposure** group. However, with symptomatic **responses** generally fading with time there would be some individuals whose symptom severity levels would now recede to an intermediate level or below, thereby releasing psychological resources and allowing them some opportunity for growth, and thus they would represent the initial positive incline in the quadratic curve. A quadratic relationship between **post-event distress and growth** later in time was hypothesized in this study.

It may be that a longitudinal study would be able to provide some elucidation regarding the nature of the relationship between the **post-event** outcomes, possibly being able to record the time of **distress** and **growth** onset and tracking the development of each. However, such a study with firefighters would pose several logistical challenges and would likely require support at the profession's senior management level which could threaten officers' perception of confidentiality and, consequently, retention rates. Nevertheless, it is clear that additional research is needed to provide enhanced understanding of the complex relationship between **growth** and **post-event distress** within models of **growth**, taking the timeframe into account.

Some limitations regarding the current study should be noted. With a convenience sample, a self-selection bias is a possibility. It may be that the firefighters who volunteered to take part and fully completed the measures represent a subgroup that was more willing and/or able to disclose their experience. Thus, it might be that firefighters who were more strongly affected emotionally or who felt unable to articulate their condition are under-represented here. In addition, the current study did not probe participants about their trauma history before or since the incident **in question**; although participants were explicitly asked to answer the

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IES-R and PTGI-SF items in relation to the **incident** in question, it is still possible that any other professional and/or personal **distressing experiences** may have confounded the responses. As mentioned earlier, it would be of use to have details about the onset and progression of symptoms. However, estimation of delayed onset or persistent **stress symptomatology** was not part of the present study, thus the course of **stress** symptomatology over time could not be evaluated. Of interest, only 7.7% of the 927 firefighters sampled received professional support after their **distressing incident**, and there was no significant association between receiving professional support (yes/no) and the level of **post-event distress**.

### Conclusions for clinical practice

**Post-event distress** and **growth** are independent constructs representing separate continuous dimensions, yet are capable of existing concurrently (e.g. Ai & Park, 2005; Linley & Joseph, 2004; Tedeschi & Calhoun, 2003). They may not develop in every individual or after every event that might appear to be **highly challenging**. Nevertheless, the fact that the type of incident most firefighters in this study chose as being most stressful was one that they would typically be exposed to in their line of duty (i.e. a house fire or an accident involving vehicles) suggests that clinicians and firefighters should be vigilant for signs of **post-event distress** even after seemingly “regular” types of operation. Furthermore, the concept of **growth** needs to be integrated into clinical practice, as it is in line with the recent philosophical shift from a pathogenic to a salutary paradigm, which stresses positive (in this case positive changes **after encountering distressing events**) as well as negative outcomes (Morris, Shakespeare-Finch, Rieck, & Newbery, 2005). Recent attempts have already been made to consider both **post-event distress and growth** in trauma response models. Clinicians should be aware of the possibility of individuals deriving benefits from distressing situations, to assist clients to establish growth in the aftermath of a **distressing** event. The present study revealed

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that the potential in firefighters to experience growth after distressing incidents is present, especially among firefighters with a high number of symptomatic responses and following more recent distressing incidents. In the past, clinicians may have failed to support the process and to identify growth due to focusing only on reducing post-event distress. Moreover, they might not have recognized that a client's struggle with stressful events and the distress of disbelief can be a precursor to growth (Zoellner & Maercker, 2006). That being said, the absence of growth should not be viewed as a failure by clinicians; there is currently little evidence that growth is necessary for recovery from symptomatic responses (Zoellner & Maercker, 2006).

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Table 1

*Personal characteristics and time since incident compared across country samples (n = 927)*

	<i>N</i>	<i>%</i>	<i>M%</i>	$\chi^2$	<i>df</i>	<i>p</i>	Cramers' <i>V</i>
Male	887	95.7	0.0	9.22	7	.24	.10
Education level			0.0	226.48	14	< .001	.49
Lowest formal	35	3.8					
Intermediary secondary	210	22.7					
Higher secondary	682	73.6					
Working arrangement			0.2	391.26	7	< .001	.65
Employed	720	77.8					
Honorary member (unpaid)	205	22.2					
Rank			0.3	20.33	7	< .01	.15
Operational	671	72.6					
Leading	253	27.4					
	<i>M</i>	<i>SD</i>	<i>M%</i>	<i>F</i>	<i>df1/df2</i>	<i>p</i>	$\eta$
Age (years) <sup>a</sup>	34.36	9.66	0.1	24.02	7/918	< .001	.39
Years of service <sup>b</sup>	11.02	8.53	0.0	4.82	7/919	< .001	.19
Months since incident <sup>c</sup>	10.70	7.28	4.4	11.22	7/875	< .001	.29

*Notes.* M% = Missing; <sup>a</sup> range: 18 – 64; <sup>b</sup> range: 1 – 52; <sup>c</sup> range: 0 – 24.

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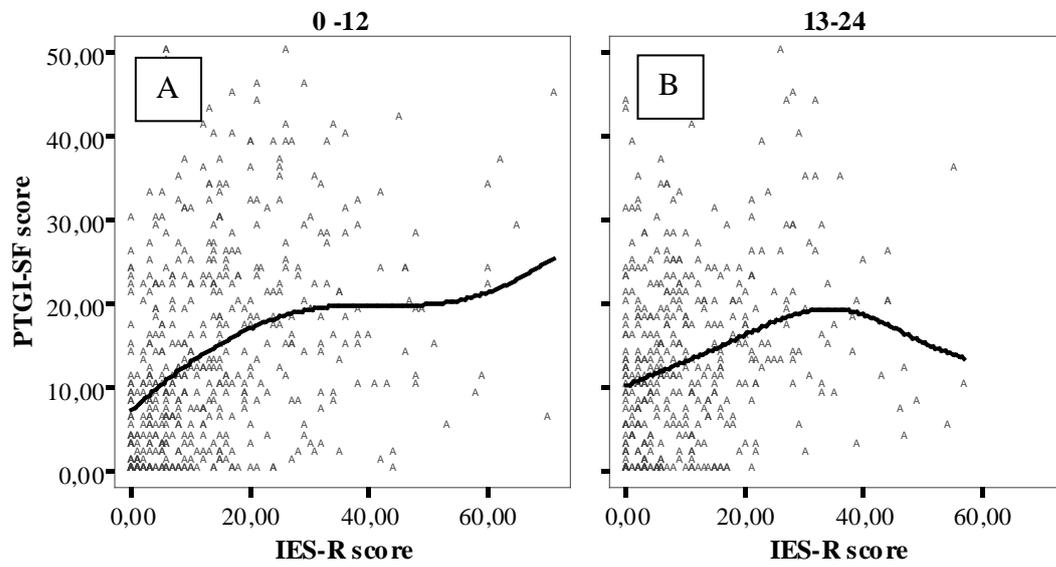


Figure. Loess-enhanced scatter plots of **post-event distress and growth** at different time points

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Table 2

*Predicting growth at different time points after distressing work-related incidents*

	0 – 12 months (n = 510)						13 – 24 months (n = 417)					
	B	SE B	β	p	ΔR <sup>2</sup>	R <sup>2</sup>	B	SE B	β	p	ΔR <sup>2</sup>	R <sup>2</sup>
<b>Step 1 – Personal characteristics</b>					.026*	.026*					.024	.024
Female gender	0.07	2.42	.00	.978			-0.26	2.43	-.005	.915		
Age (in years)	0.22	0.10	.18	<.05			0.07	0.12	.065	.539		
Education	-1.80	0.71	-.12	<.05			-1.90	0.71	-.135	<.01		
Honorary member (Employed=ref.)	0.81	1.40	.03	.563			-0.80	1.56	-.030	.601		
Leading operational (Operational=ref.)	-0.61	1.23	-.02	.623			1.55	1.38	.064	.260		
Years of service	-0.185	0.11	-.13	.101			-0.09	0.13	-.070	.501		
<b>Step 2 – Post-event distress (linear)</b>	0.42	0.05	.47	<.001	.110***	.137***	0.36	0.06	.386	<.001	.063***	.086***
<b>Step 3 – Post-event distress (quadratic)</b>	-0.02	0.01	-.67	<.001	.030***	.167***	0.00	0.01	.018	.919	.013*	.100***
<b>Step 4 – Post-event distress (cubic)</b>	0.00	0.00	.48	<.01	.018**	.185***	0.00	0.00	-.202	.243	.003	.103***

Note. ref. = reference category; \*p < .05, \*\*p < .01, \*\*\*p < .001.

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