


RESEARCH ARTICLE

Stressful life events and posttraumatic growth among police officers: A cross-sectional study

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Abstract

Police officers often continue to face numerous threats and stressors in the aftermath of a disaster. To date, posttraumatic growth (PTG) has been studied primarily in the context of significant trauma; thus, it is not known whether stressful life events are associated with PTG. This study investigated the development of PTG among 113 police officers working in the New Orleans area following Hurricane Katrina. Hierarchical regression was used to evaluate if gratitude, social support, and satisfaction with life moderated the relationship between stressful life events (as measured by the total life stress score) and PTG, after adjustment for age, sex, race, level of involvement in Hurricane Katrina, and alcohol intake. Results indicate that stressful life events are independently associated with PTG. Gratitude, satisfaction with life, and social support were seen to moderate this relationship; as stressful life events increased so too did PTG—particularly among officers with higher levels of gratitude ($B = 0.002, p \leq .05$), satisfaction with life ($B = 0.002, p \leq .05$), and social support ($B = 0.001, p \leq .05$). These findings suggest that promoting satisfaction with life, interpersonal support, and gratitude may be beneficial to those who are regularly at risk of trauma exposure.

KEYWORDS

job stress, psychological well-being, stress coping, post-traumatic growth

1 | INTRODUCTION

Hurricane Katrina marked the worst natural disaster recorded in the U. S. history when it struck the Gulf Coast in 2005, requiring the largest emergency response effort ever recorded (Knabb, Rhome & Brown, 2005). First responders and law enforcement officials present during and after the disaster experienced extraordinary levels of physical and psychological distress (Center for Disease Control [CDC], 2006). Although research shows that the rate of posttraumatic stress disorder (PTSD) in police officers following Hurricane Katrina was about three times that of the general population (Agaibi & Wilson, 2005; CDC, 2006; West, Bernard, Mueller, Kitt, Driscoll, & Tak, 2008), psychological growth appears to be more common than psychological disorders following a traumatic event (Agaibi & Wilson, 2005; Tedeschi &

Calhoun, 2004). The construct of posttraumatic growth (PTG) is still not well understood (Maercker & Zoellner, 2004; Zoellner & Maercker, 2006), but it may be an important factor for first responders who must regularly cope with stressful events. To date, PTG has been studied primarily in the context of significant trauma such as breast cancer (Cordova, Cunningham, Carlson, & Andrykowski, 2001), disasters (McMillen, Smith, & Fisher, 1997), and sexual assault (Frazier et al., 2004). However, it is not known whether more ordinary stressful life events are also associated with PTG. In light of the American Psychiatric Association's (2013) broadened definition of stressor as a prerequisite for a diagnosis of PTSD in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*, it may be useful to gain greater understanding of the relationship between stressful events and PTG.

Although Hurricane Katrina was a significant traumatic event, police officers faced numerous threats and stressors in the aftermath of the disaster. In addition to law enforcement, police officers were involved in search and rescue efforts and violence related to crowd control. Moreover, hurricane damage required the use of temporary facilities, impeded communication, and isolated police officers from

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their families and colleagues. In addition, they were required to work longer hours, experienced sleep loss, lived in temporary and inclement housing, and were under constant media scrutiny (Baum, 2006; West, Bernard, Mueller, Kitt, Driscoll, & Tak, 2008). Thus, regardless of whether police officers experienced the hurricane, resultant conditions continued to provide stressors.

Studies have shown that moderate levels of stress lead to the highest levels of growth, whereas too little or too much stress are less likely to lead to growth in the wake of trauma (e.g., Dekel, Mandl, & Solomon, 2011; Joseph, Murphy, & Regel, 2012). Other studies reveal a positive relationship between posttraumatic stress and PTG, without mention of a particular point at which too much stress is detrimental (e.g., Kashdan & Kane, 2011; Pietrzak et al., 2010). Some of these findings may be due to differences in the types of stressors (e.g., health, work, and social) or the types of participants (e.g., veterans, parents, and patients) examined in each study. It is also likely that modifying variables that either hinder or promote PTG and associated cognitive processes are responsible for the variation observed between posttraumatic stress and PTG. Researchers have been paying more attention to these potential modifying factors, with a focus on uncovering what facilitates PTG. To date, researchers have viewed PTG as a process that follows a traumatic event (e.g., exposure to physical attack, natural disaster, and severe accidents), rather than more moderate stressful life events (e.g., illness, promotion, and death of a loved one). However, because of the evolutionary benefits of growth following stress (Christopher, 2004), in the present study, we were interested in exploring whether stressful life events (positive and negative) were associated with PTG in the aftermath of Hurricane Katrina.

From a biopsychosocial-evolutionary standpoint, Christopher (2004) stated that growth is a natural outcome from experiencing stressful events. He further identified three factors that determine whether a stress response becomes adaptive or maladaptive. These are biological resilience (i.e., the ability to balance the nervous system and emotion regulation), quality of social support, and the ability to transform an experience into learning and meaning. However, the stress response is complex and is not a dichotomy between adaptive and maladaptive (Christopher, 2004). Although stress resulting from life events can either exacerbate psychological problems or promote well-being (Tedeschi & Calhoun, 2004), stressful life events in general have varying effects on well-being and life satisfaction, regardless of whether they are positive (e.g., promotion, birth of a child, and marriage) or negative life changes (e.g., death of a loved one, injury, and serious illness; Luhmann, Hofmann, Eid & Lucas, 2012). Early successes in coping with stressors often relate to the experience of growth following a stressful life event (Ashokan, Sivasubramanian, & Mitra, 2016; Tedeschi & Calhoun, 2004). Thus, optimistically speaking, the greater number of stressful life events one endures the more potential for PTG. Tedeschi and Calhoun (2004) posit that PTG may occur after an event of "seismic proportions." However, other researchers (e.g., Christopher, 2004; Joseph et al., 2012; Joseph & Linley, 2006) suggest that growth occurs as a normal process of dealing with stressors throughout life. According to Joseph (2004; 2006), growth can also occur through a gradual breakdown and rebuilding of one's worldview.

2 | POSTTRAUMATIC GROWTH

PTG describes a process in which positive and profound change occurs in one or more aspects of an individuals' life following a traumatic event (Lindstrom, Cann, Calhoun, & Tedeschi, 2013; Tedeschi & Calhoun, 2004). Tedeschi and Calhoun (1996) theorize that PTG occurs as a result of struggling with a changing worldview following a traumatic event through the challenging of fundamental life schemas and core beliefs (Lindstrom et al., 2013; Tedeschi & Calhoun, 2004). The growth occurs as a result of grappling with the "new reality in the aftermath of trauma" (Tedeschi & Calhoun, 2004, p. 5). Moreover, the cognitive rebuilding that occurs during the process of PTG is more resistant to future trauma (Tedeschi & Calhoun, 2004).

However, it may be that the type of growth described by the construct of PTG also occurs as a result of more common life events that may engender feelings of stress. In examining growth from a biopsychosocial-evolutionary perspective, Christopher (2004) suggested three positive adaptations to stress: improved relationships, increased self-confidence, and a greater appreciation for life. These align with the construct of PTG, which is theorized to include the following five factors: (a) increased appreciation of life and change in priorities, (b) closer personal relationships, (c) increased sense of resilience and personal strength, (d) awareness of new directions and possibilities for one's life, and (e) spiritual development and/or a sense of meaning (Tedeschi & Calhoun, 1996).

Despite the intuitive view that PTG describes positive adaptation to crises, there has been discussion in the literature questioning whether PTG is a positive outcome or if there are also negative aspects. (PTG has also been examined as a coping process rather than as an outcome. See Zoellner and Maercker [2006] for a review.) Research investigating relationships between PTG and both positive and negative psychological variables is inconclusive (Zoellner & Maercker, 2006). Accordingly, Marker and Zoellner (2004) proposed the Janus face model of PTG, which suggests that PTG has a constructive side, but it also has a deceptive and illusory side that serves as a short-term balm to manage the after-effects of trauma. This illusory side functions as a form of denial or avoidance and is often associated with psychological maladjustment (Maercker & Zoellner, 2004). Therefore, further research is needed to better understand the construct of PTG. There is, however, ample evidence that positive growth can occur following a traumatic event. In addition, longitudinal research indicates that positive PTG occurs after some time has passed (Zoellner & Maercker, 2006). Researchers agree that PTG seems to be a multidimensional construct wherein personal variables, social support, and the experience of distress affect the development of PTG (Tedeschi & Calhoun, 2004; Zoellner & Maercker, 2006). The current study examines personal variables of gratitude, satisfaction with life, social support, and stressful life events in relation to PTG. In the present study, the moderating variables of gratitude, social support, and satisfaction with life are factors that would suggest the positive, functional aspect of PTG (Zoellner & Maercker, 2006).

3 | PROTECTIVE FACTORS: POSITIVE EMOTIONS AND SOCIAL SUPPORT

According to the broaden-and-build theory of positive emotions (Fredrickson, 2003), positive emotions (e.g., joy and gratitude) buffer

against stress and help to increase resilience. Positive emotions also appear to “undo” the negative physiological effects of stress (Fredrickson, 2003). Several researchers have provided support for the broaden-and-build theory. For instance, in a study of postdoctoral research fellows ($N = 200$), Gloria and Steinhardt (2014) found that positive emotions had both a direct and indirect relationship with resilience to stress. In addition, Zoellner, Rabe, Karl, and Maercker (2008) found that among the 102 motor vehicle accident survivors, the positive emotions of openness and optimism accounted for 19% of the variance in PTG. Finally, Fredrickson, Tugade, Waugh, & Larkin (2003) found that positive emotions, following the terrorist attacks in the United States on September 11, 2001, fully accounted for the relationship between resilience before the crisis and growth (i.e., life satisfaction, optimism, and tranquility) postcrisis. The most common positive emotion people reported after September 11 was gratitude (Fredrickson, 2003). Thus, gratitude may be an important personality variable influencing the process of adaptive PTG.

Gratitude is a feeling of deep appreciation or thankfulness. Individuals with a grateful disposition consistently feel this emotion of appreciation and thankfulness over time and across situations (Emmons & Crumpler, 2000). Furthermore, people with grateful dispositions appear to possess higher prosociality, well-being, and spirituality, as well as have more positive emotions and less depression and anxiety (McCullough et al., 2002). Researchers have just begun to examine gratitude in relation to PTG. Ruini and Vescovelli (2013) illustrated a positive relationship between gratitude and PTG among a sample of breast cancer patients ($N = 67$). Chun and Lee (2013) also observed benefits to appraising traumatic life events with gratitude among individuals with spinal cord injuries ($N = 15$). Finally, Zhou and Wu (2016) found that gratitude was a stable predictor of PTG among 315 adolescents who had survived an earthquake. However, gratitude has not been assessed among police officers within the context of their stressful life events nor has it been evaluated as a potential moderator between stressful life events and PTG.

Although gratitude is related to satisfaction with life, they are distinct constructs (McCullough, Emmons, & Tsang, 2002). Satisfaction with life is a person's self-assessment that his or her life is meeting expectations (Diener, Emmons, Larsen, & Griffin, 1985). It is strongly associated with the experience of positive emotions. Kuppens, Realo, and Diener (2008) found in a study across 46 countries that positive emotions were twice as strongly related to satisfaction with life than negative emotions. Satisfaction with life has also been found to be positively associated with self-esteem and sociability and negatively associated with factors such as neuroticism, emotionality, impulsivity, and symptoms of PTSD (Diener et al., 1985; McCanlies, Mnatsakanova, Andrew, Burchfiel, & Volanti, 2014). Triplett, Tedeschi, Cann, Calhoun, and Reeve (2012) posited an indirect association between life satisfaction and PTG based on the process of meaning-making. Studies demonstrate positive correlations between meaning and life satisfaction (Park & Gutierrez, 2013; Park, Park, & Peterson, 2010). Thus, the association between life satisfaction with indices of positive emotionality may be an indication of PTG. Moreover, gratitude and satisfaction with life are theorized to represent the PTG domain of greater appreciation of life, with gratitude representing the affective aspect and satisfaction with life

representing the cognitive aspect. (Frazier, Tennen, Gavian, Park, Tomich, & Tashiro, 2009).

Social support is a well-documented buffer against stress and is a factor related to PTG in the literature. Most studies demonstrate the benefit of social support for trauma survivors within the context of disclosing and talking through traumatic experiences (Ullman, 2014; Tedeschi & McNally, 2011; Frazier, Tashiro, Berman, Steger, & Long, 2004). Confiding in a close friend, colleague, or relative may assist trauma survivors in the process of transforming their experience into one of learning and meaning as well as prevent them from feeling completely overwhelmed with posttraumatic stress (Paton & Norris, 2014). However, the research regarding social support and PTG among police officers is not as clear. In a qualitative study ($N = 19$), Evans, Pistrang, and Billings (2013) found that police officers expressed ambivalence about seeking social support after experiencing distressing events; although, they valued the perceived availability of supportive persons. And, in a sample of 233 police officers, Patterson (2003) found that social support moderated the relationship between life events and stress. Authors of both studies suggested that social support may help to reduce distress; thus, social support may contribute to the PTG process in police officers.

Previous research has investigated PTG among various populations and in the context of many different traumas. However, research is lacking in empirical examination of the development of PTG in relation to more common stressful life events. Moreover, much of the research has explored cognitive processes involved in PTG. Zoellner and Maercker (2006) suggested in their literature review that emotional processes may play a larger part than cognitive process in the development of PTG. Finally, little is known about the relationship between stressful life events and PTG in police officers.

Therefore, the purpose of the present study was to explore the development of PTG in police officers located in the New Orleans geographic area post Hurricane Katrina. Our overarching goal was to provide further understanding of the construct of PTG within a unique population. More specifically, our aim was to investigate the relationship among police officers between stressful life events (positive and negative) and PTG and whether this relationship was moderated by satisfaction with life, gratitude, and/or interpersonal support. Our hypotheses were as follows:

1. After controlling for level of involvement in Hurricane Katrina, a higher total life stress score since the hurricane will predict higher PTG.
2. Social support, gratitude, and satisfaction with life will moderate the relationship between stressful life events and PTG.

4 | METHOD

4.1 | Study population

This cross-sectional study involved police officers from a department in the New Orleans, Louisiana geographic area. In April 2012, the officers ($N = 250$) received packets that contained instructions, a consent

to participate, and questionnaires. All officers in the district were surveyed; there were no exclusion criteria. The participants completed questionnaires on personal history, their work during Hurricane Katrina, and medical information. The officers also completed psychosocial instruments designed to collect information on recent stressful life changes, PTG, resilience, social support, and gratitude. One hundred twenty-three officers returned their surveys and consent forms. Participants who did not complete either or both of the Recent Life Changes or Posttraumatic Growth questionnaires were excluded from analyses, leaving a final sample size of 113 officers (86 males and 27 females).

All participants completed an informed consent that was approved by the State University of New York at Buffalo Health Sciences Internal Review Board and the National Institute for Occupational Safety and Health Human Subjects Review Board.

4.2 | Assessment of demographic characteristics and alcohol use

Officers reported information on age, sex, race, and the number of alcoholic drinks consumed per day. Race was reported as "Caucasian," "African American," "Asian," and "Other." Due to small numbers, officers who listed Other were combined with Caucasian. The number of alcoholic beverages drank per day was reported as "Never or 1–2," "3 or 4," to "≥ 5."

4.3 | Assessment of involvement in Hurricane Katrina

Officers reported whether they worked in the New Orleans, Louisiana geographic area, as a sworn officer during the Hurricane Katrina storm as "yes" or "no." Level of involvement was reported as "heavy involvement," "moderate involvement," "light involvement," or "does not apply, did not work during Hurricane Katrina." Due to the extreme stress associated with working both during and after the hurricane, all officers were included in this study regardless of their response to level of involvement; however, level of involvement was a covariate in the current study.

4.4 | Recent stressful life changes

The Recent Life Changes Questionnaire is used to assess the occurrence of a wide range of common stressful life events that can be perceived as being either positive or negative, but may result in stress. For this study, we used the 74 life change events as described in Miller & Rahe (1997), which consist of health, work, family, home, personal, social, and financial questions. Participants were asked to mark either "yes" or "no," to indicate if they had experienced any of the events within the last 6 years, the time period since Hurricane Katrina. Examples of health events are "Major dental work" and "An illness or injury that kept you in bed for more than a week or sent you to the hospital." Examples of work events include "Change to a new type of work," "Trouble with your boss," and "Laid off." Examples of family/home events are "Move within same city or town," "Birth of child," and "Death of child." Examples of personal/social events are "Change in personal habits," "Change in social activities," and "Falling out of a close

personal relationship." Lastly, examples of financial events are "Major loss of income," "Loss/damage to personal property," and "Major purchase." Miller and Rahe (1997) used proportionate scaling to measure the magnitude of each event and then assigned each event a specific value, which is referred to as a "life change unit" (LCU; Miller and Rahe; 1997). The LCU values for each positive response were summed to calculate a total life stress score. The mean total life stress score for this population was 659.3 ($SD = 385.4$).

4.5 | Posttraumatic Growth Inventory (PTGI)

The PTGI is a 21-item inventory utilizing a 6-point scale, ranging from 0 (*I did not experience this*) to 5 (*I experienced this change to a very great degree*). This scale measures how successfully an individual adapts to and grows following a traumatic incident (Tedeschi & Calhoun, 1996). Growth is determined by positive change in five subfactors that include relating to others, new possibilities, personal strength, spiritual change, and appreciation for life. Sample questions include "I changed my priorities about what is important in life," "I can better appreciate each day," and "I discovered that I'm stronger than I thought I was." An overall score was determined by summing the individual scores. The mean PTG score in this population was 42.5 ($SD = 28.2$).

4.6 | Interpersonal Support Evaluation List (ISEL)

Social support was measured using the ISEL (Cohen & Hoberman, 1983). It is used to assess the availability of four different types of support including tangible support, belonging, self-esteem, and appraisal support. Tangible support measures the perceived availability of material assistance. Belonging assesses the presence of social connections and availability of people with whom one can spend time. Self-esteem assesses an individual's ability to think positively about oneself in comparison to others, and the appraisal subscale measures the availability of others with whom one can talk to about issues or problems. The responses were given on a 4-point scale ranging from 0 (*Definitely False*) to 3 (*Definitely True*). Twenty questions are reverse coded. Sample questions include "There are several people that I trust to help solve my problems," "I feel like I'm not always included by my circle of friends," and "There is someone I can turn to for advice about handling problems with my family." An overall score was calculated by summing the scores. The mean ISEL score in this population was 88.2 ($SD = 21.4$).

4.7 | Satisfaction with Life Scale

The Satisfaction with Life Scale is designed to measure global cognitive judgements of one's satisfaction with their life (Diener, Emmons, Larsen, & Griffen, 1985). It is a 5-item inventory utilizing an 8-point scale ranging from 0 (*strongly disagree*) to 7 (*strongly agree*). Sample questions include "In most ways my life is close to my ideal," "I am satisfied with my life," and "If I could live my life over, I would change almost nothing." The scores are summed, and an overall score is then used to evaluate an individual's satisfaction with life. A score of 5–9 indicates *extremely dissatisfied*, 10–14 indicates *dissatisfied*, 15–19 indicates *slightly below average life satisfaction*, 20–24 indicates *generally satisfied*, 25–29 indicates *things are mostly good*, and 30–35

indicates “*highly satisfied*.” The mean satisfaction with life score in this population was 23.2 ($SD = 7.6$) with a Cronbach's α of 0.91.

4.8 | Gratitude

Gratitude, or the expression of appreciation for people or things in one's life, was measured using the Gratitude Questionnaire-6 (McCullough, Emmons, & Tsang, 2002). It is a 6-item Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) designed to measure dispositional gratitude. Sample questions include “I have so much in life to be thankful for,” “When I look at the world, I don't see much to be grateful for,” and “Long amounts of time can go by before I feel grateful to something or someone.” A total score was calculated by summing the scores (scores for Items 3 and 6 are reverse coded). Higher scores reflect more gratitude and positive emotions such as hope and optimism. The total score was used in this study. The mean gratitude score in this population was 34.8 ($SD = 7.3$) with a Cronbach's α of 0.88.

5 | STATISTICAL METHODS

Descriptive statistics were used to characterize the study population. Pearson correlation analysis was used to evaluate associations between study variables. Because certain demographic variables are associated with coping strategies that may influence PTG in police officers' (Hall, Hobfall, Canetti, Johnson, Palmieri, & Galea, 2010; Linley & Joseph, 2004; Maitlis, 2011; Stanton, Bower & Low, 2006) age, race, and sex were controlled for in the analyses. Haarr and Morash (1999) found that level of stress and coping strategies differed among police officers based on sex and race. In addition, it is well documented that alcohol abuse is common within the field of law enforcement and is related to ineffective coping skills, higher levels of stress, and higher involvement in Hurricane Katrina (Heavey et al., 2015; Swatt, Gibson & Piquero, 2007; Violanti et al., 2011; Willman, 2012). Therefore, alcohol use was also controlled for in the analyses. Finally, in order to evaluate stressful events that occurred post Katrina, we controlled for level of involvement in Hurricane Katrina.

Prior to conducting the regression analyses, a test of multicollinearity was conducted. None of the variance inflation factors were higher than two, indicating that multicollinearity was not a problem in this study. Hierarchical multiple regression was then used to evaluate the moderating effects of gratitude, satisfaction with life, and social support on the association between stressful life events, as measured by the total life stress score (sum of LCUs), and PTG. Hierarchical regression consists of three steps. In the first step, the covariates (i.e., age, race, sex, alcohol use, and level of involvement) were entered in the regression model. In the second step, total life stress score and one of the moderators were entered in the regression model. In the third step, the interaction term between the total life stress score and the moderator was entered into the regression model. These three steps were repeated for each of the moderators resulting in a hierarchical multiple regression that evaluated the association between total life stress score and PTG with gratitude as the moderator, another series of regression models evaluating the total life stress

score and PTG with satisfaction with life as a moderator, and lastly three that evaluated social support as a moderator. All analyses were performed using SAS version 9.2 (SAS Institute, Cary, NC).

6 | RESULTS

Of the 113 participants, most were male ($n = 86$) and Caucasian/Other (57.8%; Table 1). The average age for this population was 43.2 years old ($SD = 9.1$), and the majority (57.3%) had fewer than two alcoholic drinks per day. Most of the officers were married (58.9%) and had attended at least some college (58.9%). Approximately, 37% of the officers reported heavy involvement in Hurricane Katrina and 25% reported moderate involvement, whereas 18% reported light involvement. Twenty percent of the officers reported no involvement in Katrina.

Mean satisfaction with life scores among female officers was 23.9 ($SD = 6.9$). Mean gratitude scores and social support scores were 36.9 ($SD = 5.3$) and 92.9 ($SD = 19.0$), respectively. Mean total life stress scores among female officers was 675.1 ($SD = 396.9$), and mean PTG scores were 55.3 ($SD = 32.5$). Among male officers, mean satisfaction with life scores, gratitude scores, and social support scores were 23.0 ($SD = 7.8$), 34.1 ($SD = 7.7$), and 86.7 ($SD = 22.0$), respectively. Mean total life stress scores among male officers was 646.8 ($SD = 383.4$), and mean PTG scores were 38.5 ($SD = 25.7$).

The correlation matrix shows that total life stress scores and PTG were positively correlated ($r = 0.23$, $p < .05$; Table 2). Gratitude was positively correlated with PTG ($r = 0.20$, $p < .05$). Satisfaction with life was negatively correlated with total life stress scores ($r = -0.23$, $p < .05$) and strongly positively correlated with gratitude ($r = 0.64$, $p < .001$). Social support was strongly positively correlated with both gratitude ($r = 0.69$, $p < .001$) and satisfaction with life ($r = 0.58$; $p < .001$). Among the covariates, alcohol was positively correlated with total life stress score ($r = 0.25$, $p < .01$) and negatively correlated with gratitude ($r = -0.29$, $p < .01$), satisfaction with life ($r = -0.31$; $p < .01$), social support ($r = -0.22$, $p < .05$), and age ($r = -0.30$, $p < .01$). Heavy involvement was positively correlated with age ($r = 0.26$, $p < .05$). Being female was positively correlated with PTG ($r = 0.25$, $p < .01$), negatively correlated with alcoholic drinks per day ($r = -0.20$, $p < .05$), and heavy involvement in Hurricane Katrina ($r = -0.28$; $p < .01$). Being Caucasian was negatively correlated with PTG ($r = -0.22$, $p < .05$).

6.1 | Gratitude

Table 3 shows the results when the demographic and lifestyle covariates only were entered into the regression model. They did not significantly account for any variance in PTG, $F(5, 91) = 1.92$, $p = .10$. When total life stress scores and gratitude were entered into the second model, total life stress scores were positively associated with PTG ($B = 0.018$, $p \leq .05$). The variance with both total life stress scores and gratitude in the model increased from 10% to 17%, $F(7, 88) = 2.57$, $p = .018$. In the final model, neither total life stress scores nor gratitude were independently associated with PTG. However, the interaction term (Total Life Stress Scores \times Gratitude) was significant,

TABLE 1 Characteristics of study participant by gender, officers of post Hurricane Katrina

	Females (<i>n</i> = 27)	Males (<i>n</i> = 84)	All officers (<i>n</i> = 111)
Race	%	%	%
Caucasian/Other	52.0	61.0	58.9
African-American	48.0	39.0	41.1
Education			
High school/General Equivalency Diploma (GED)	18.5	7.1	9.9
College <4 years	44.4	67.9	62.2
College 4+ years	37.0	25.0	27.9
Marital status			
Single	29.6	16.9	20.0
Married	48.2	61.5	58.2
Divorced	22.2	21.7	21.8
Alcohol drinks per day			
Never or 1–2	80.8	51.2	58.3
3 or 4	15.4	28.1	25.0
≥5	3.9	20.7	16.7
Hurricane involvement			
Heavy	30.8	39.0	37.0
Moderate	7.7	30.5	25.0
Light	26.9	15.9	18.5
Does not apply	34.6	14.6	19.4
	Mean ± SD	Mean ± SD	Mean ± SD
Age (years)	43.7 ± 9.5	43.0 ± 9.1	43.1 ± 9.1
Resiliency score	31.4 ± 4.2	29.8 ± 6.3	30.2 ± 5.9
Satisfaction with life	23.9 ± 6.9	22.9 ± 7.9	23.2 ± 7.7
Gratitude score	36.9 ± 5.3	33.9 ± 7.7	34.7 ± 7.3
Total life stress score	674.9 ± 396.7	654.3 ± 383.9	659.3 ± 385.4
Posttraumatic growth scores	55.3 ± 32.5	38.9 ± 25.7	42.9 ± 28.3
Alcohol use total score	2.9 ± 2.6	5.1 ± 5.1	4.6 ± 4.7
ISEL score	92.9 ± 19.0	86.3 ± 22.0	87.9 ± 21.4

Note. ISEL = Interpersonal Support Evaluation List.

indicating that gratitude moderated the relationship between total life stress scores and PTG ($B = 0.002$, $p \leq .05$). Including the interaction term in the model explained 21% of the variance in PTG, $F(8, 87) = 2.95$, $p < .001$.

To further examine the interaction effects, the regression of PTG on different levels of total life stress scores and gratitude was plotted. Total life stress scores and gratitude were estimated at one standard deviation above and below their means (Aiken & West, 1991; Figure 1). The results show that total life stress scores are positively associated with PTG. Furthermore, the results show the moderating effects of gratitude on the relationship between total life stress scores and PTG. Although the protective effect of gratitude can be seen at all levels of total life stress scores, the level of protection was highest when the mean total life stress scores were the highest. In this case, police officers with higher mean total life stress scores and higher gratitude were more likely to report PTG compared to officers with low mean total life stress scores and gratitude.

6.2 | Satisfaction with life

The demographic and lifestyle covariates were entered in the first step of the hierarchical regression (Table 4). Because the dependent and independent variables are the same, the results did not differ from the results reported above (Table 3). $F(5, 91) = 1.92$, $p = .10$. Total life stress scores and satisfaction with life were entered in the model in the second step. Both total life stress scores ($B = 0.021$, $p < .001$) and satisfaction with life ($B = 0.901$, $p \leq .05$) were independently positively associated with PTG. Having both total life stress scores and satisfaction with life in the model accounted for 21% of the variance in PTG, $F(7, 87) = 3.28$, $p < 0.001$. In the third step, the interaction term (Total Life Stress Scores \times Satisfaction with Life) was entered into the model. In this model, neither total life stress scores nor satisfaction with life were independently significantly associated with PTG. The interaction term, however, was positively associated with PTG indicating that satisfaction with life moderates the

TABLE 2 Correlations for main variables of interest

	Stress score ^a	PTG	Gratitude	Satis-faction with life	Social support	Age	Alcohol	Heavy involvement	Female ^a	White ^a
Stress score	—	—	—	—	—	—	—	—	—	—
PTG	0.23*	—	—	—	—	—	—	—	—	—
Gratitude	-0.08	0.20*	—	—	—	—	—	—	—	—
Satisfaction with life	-0.23*	0.18	0.64***	—	—	—	—	—	—	—
Social support	-0.14	0.10	0.69***	0.58***	—	—	—	—	—	—
Age	-0.17	-0.05	0.01	0.17	0.01	—	—	—	—	—
Alcohol	0.25**	-0.01	-0.29**	-0.31**	-0.22*	-0.30**	—	—	—	—
Heavy involvement ^b	-0.12	0.01	-0.03	0.05	0.01	0.26*	0.07	—	—	—
Female ^b	0.03	0.25**	0.16	0.05	0.12	0.03	-0.20*	0.28**	—	—
White ^b	0.11	-0.22*	-0.001	0.05	0.05	-0.11	0.14	0.08	-0.10	—

Note. PTG = posttraumatic growth.

^aStress score = Total life stress score.

^bSex (Female = 1, Male = 0); Race/Ethnicity (White = 1; Other = 0); Involvement (Heavy/Moderate Involvement = 1; Light/No Involvement = 0).

* p value < .05.

** p value < .01.

*** p value < .001.

TABLE 3 Hierarchical regression of posttraumatic growth on stressful life events and the interaction term of gratitude

	Model 1			Model 2			Model 3		
	B	SE B	Std β	B	SE B	Std β	B	SE B	Std β
Age	-0.35	0.33	-0.12	-0.31	0.33	-0.10	-0.28	0.32	-0.10
Female ^a	13.4	7.12	0.20	11.2	7.02	0.17	10.2	6.89	0.16
White ^a	-13.1	5.54	-0.24*	-14.4	5.46	-0.26**	-15.7	5.38	-0.29**
Alcohol intake (drinks/day)	0.11	0.63	0.02	-0.05	0.68	-0.01	0.20	0.68	0.04
Heavy involvement ^a	5.72	6.24	0.10	6.90	6.14	0.12	6.79	6.01	0.12
Total life stress score (TLSS)				0.018	0.008	0.25*	-0.04	0.03	-0.49
Gratitude				0.52	0.39	0.14	-0.68	0.67	-0.18
TLSS \times Gratitude							0.002	0.001	0.82*
Model R^2			0.10			0.17			0.21
F for change in R^2			1.92			3.95*			4.81*
F statistic (p value)			$F(5, 91) = 1.92 (.099)$			$F(7, 88) = 2.57 (.018)$			$F(8, 87) = 2.95 (.006)$

^aSex (Female = 1, Male = 0); Race/Ethnicity (White = 1; Other = 0); Involvement (Heavy/Moderate Involvement = 1; Light/No Involvement = 0).

Bold text highlights statistical significance for models 2 and 3.

* $p \leq .05$;

** $p < .01$;

*** $p < .001$.

relationship between total life stress scores and PTG ($B = 0.002$, $p \leq .05$). This final model accounted for 25% of the variance of PTG, $F(8, 86) = 3.60$, $p < .001$.

To further evaluate the interaction effects, the regression of PTG was also plotted against different levels of total life stress scores and satisfaction with life (Aiken & West, 1991; Figure 2). Total life stress scores and satisfaction with life were estimated at one standard deviation above and below their means. The results indicate that for higher total life stress scores, PTG also increased. The significant interaction indicates that satisfaction with life moderates the relationship between total life stress scores and PTG. Officers who reported higher total life stress scores and higher satisfaction with life had higher PTG. In

contrast, officers who reported higher total life stress scores but low satisfaction with life reported little PTG. These results indicate that higher satisfaction with life may promote PTG even as total life stress scores increase.

6.3 | Social support

Similar to gratitude and satisfaction with life, the first regression model contained the covariates. The results did not differ from those previously reported (Table 5). $F(5, 91) = 1.92$, $p = .10$. The total variance in PTG explained by the addition of total life stress scores and social support in the second step was 16%, $F(7, 89) = 2.46$, $p \leq .05$. Consistent

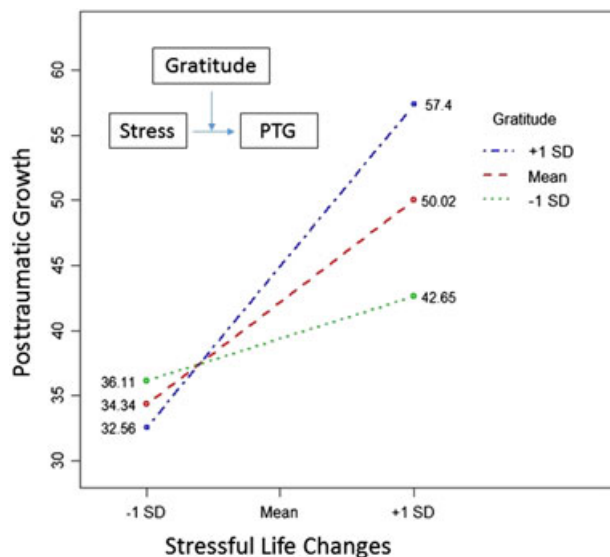


FIGURE 1 The moderating effect of gratitude on the relationship between stressful life changes and posttraumatic growth. PTG = posttraumatic growth

with the previous regressions, total life scores were significantly positively associated with PTG ($B = 0.019$, $p \leq .05$) when total life stress scores and social support were put in the model in Step 2. Following the addition of the interaction term (Total Life Stress Scores \times Social Support) in the third step, the results indicated that social support moderated the association between total life stress scores and PTG ($B = 0.001$, $p \leq .05$). The addition of the interaction term explained 20% of the variance in PTG, $F(8, 88) = 2.70$, $p < .01$.

Plotting the interaction was again conducted to further explore the relationship between the moderator social support with total life stress scores and PTG (Figure 3). PTG was regressed on different levels of total life stress scores and social support. Levels of total life stress scores and social support were estimated at one standard deviation

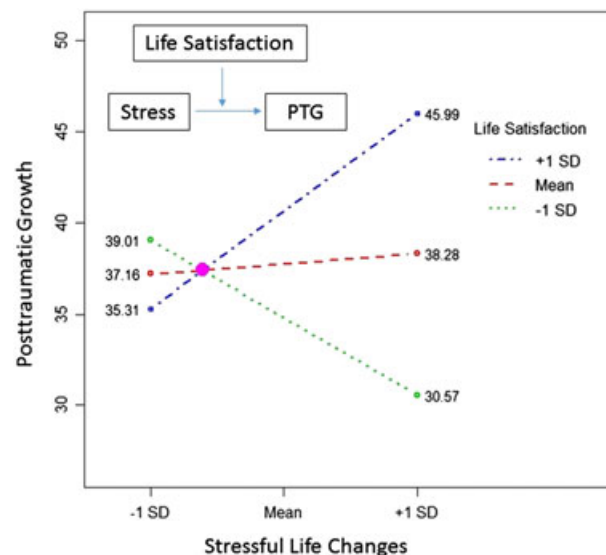


FIGURE 2 The moderating effect of satisfaction with life on the relationship between stressful life changes and posttraumatic growth. PTG = posttraumatic growth

above and below their means. The results show that as the total life stress scores increased, PTG likewise increased. However, as the significant interaction indicated, officers who reported higher total life stress scores and more social support had higher PTG. In contrast, officers who reported higher total life stress scores but less social support had less PTG. These results indicate that social support may promote PTG even when total life stress scores are high.

7 | DISCUSSION

The purpose of this study was to investigate the relationship between the level of stressful life events and PTG in police officers ($N = 113$) serving in the geographic area affected by Hurricane Katrina and

TABLE 4 Hierarchical regression of posttraumatic growth on stressful life events and the interaction term of satisfaction with life

	Model 1			Model 2			Model 3		
	B	SE B	Std β	B	SE B	Std β	B	SE B	Std β
Age	-0.35	0.33	-0.12	-0.38	0.32	-0.13	-0.32	0.31	-0.11
Female ^a	13.4	7.12	0.20	12.2	6.83	0.18	10.6	6.73	0.16
White ^a	-13.1	5.54	-0.24*	-15.9	5.41	-0.29**	-16.2	5.30	-0.30**
Alcohol intake (drinks/day)	0.11	0.63	0.02	0.09	0.66	0.02	0.34	0.65	0.06
Heavy involvement ^a	5.72	6.24	0.10	7.11	6.02	0.13	4.66	5.99	0.08
Total life stress score (TLSS)				0.021	0.007	0.28**	-0.022	0.021	-0.29
Satisfaction with life				0.901	0.37	0.25*	-0.38	0.69	-0.11
TLSS \times Satisfaction with Life							0.002	0.001	0.65*
Model R^2			0.10			0.21			0.25
F for change in R^2			1.92			6.23**			4.81*
F statistic (p value)			$F(5, 91) = 1.92 (.099)$			$F(7, 87) = 3.28 (.004)$			$F(8, 86) = 3.60 (.001)$

^aSex (Female = 1, Male = 0); Race/Ethnicity (White = 1; Other = 0); Involvement (Heavy/Moderate Involvement = 1; Light/No Involvement = 0).

Bold text highlights statistical significance for models 2 and 3.

* $p \leq .05$.

** $p < .01$.

*** $p < .001$.

TABLE 5 Hierarchical regression of posttraumatic growth on stressful life events and the interaction term of social support

	Model 1			Model 2			Model 3		
	B	SE B	Std β	B	SE B	Std β	B	SE B	Std β
Age	-0.35	0.33	-0.12	-0.32	0.32	-0.11	-0.28	0.32	-0.09
Female ^a	13.4	7.12	0.20	11.4	7.00	0.17	10.6	6.90	0.16
White ^a	-13.1	5.54	-0.24*	-13.9	5.41	-0.25*	-14.4	5.34	-0.26**
Alcohol intake (drinks/day)	0.11	0.63	0.02	-0.20	0.66	-0.03	-0.17	0.65	-0.03
Heavy involvement ^a	5.72	6.24	0.10	7.03	6.13	0.13	7.85	6.05	0.14
Total life stress score (TLSS)				0.019	0.008	0.26*	-0.025	0.024	-0.34
ISEL				0.13	0.12	0.11	-0.23	0.22	-0.19
TLSS \times ISEL							0.001	0.0003	0.67*
Model R^2			0.10			0.16			0.20
F for change in R^2			1.92			3.54*			3.83
F statistic (p value)			F(5, 91) = 1.92 (.099)			F(7, 89) = 2.46 (.024)			F(8, 88) = 2.70 (.011)

Note. Interpersonal Support Evaluation List (ISEL) is the measure of social support.

Bold text highlights statistical significance for models 2 and 3.

^aSex (Female = 1, Male = 0); Race/Ethnicity (White = 1; Other = 0); Involvement (Heavy/Moderate Involvement = 1; Light/No Involvement = 0).

* $p \leq .05$.

** $p < .01$.

*** $p < .001$.

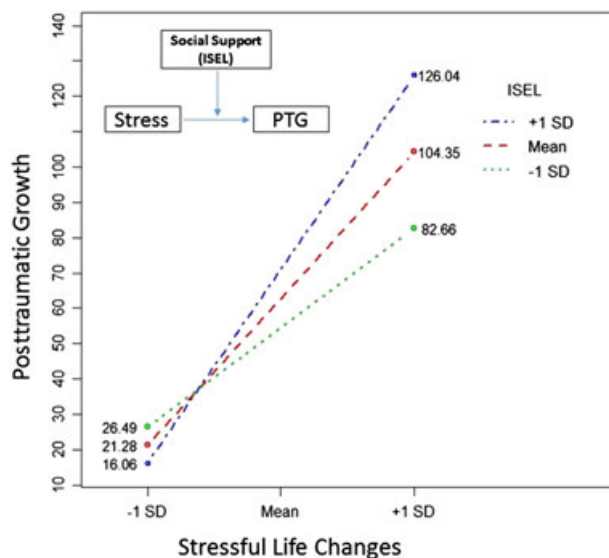


FIGURE 3 The moderating effect of social support on the relationship between stressful life changes and posttraumatic growth. PTG = posttraumatic growth

determine if the relationship was moderated by gratitude, social support, and satisfaction with life. As hypothesized, results indicate that an increasing number and magnitude of stressful life events is associated with greater PTG. Also as hypothesized, results indicate that satisfaction with life, gratitude, and interpersonal support moderate the effect of stressful life events on PTG. Thus, among police officers who experienced a greater magnitude of stressful life changes, those high in gratitude, satisfaction with life, and social support experienced greater PTG.

Rather than evaluating traumatic events in relation to PTG, this study is novel in that it examined whether PTG was associated with

positive and negative life events that may be perceived as stressful. Previous studies have indicated that stress and PTG have a curvilinear relationship in the shape of an inverted “U” (Dekel et al., 2011; Joseph et al., 2012). The curvilinear relationship suggests that moderate levels of stress promote more growth than too little or too much stress.

Our findings demonstrated a linear relationship between total life stress scores and PTG; a higher total life stress score predicted higher levels of PTG. The unique cohort in the present study may explain the divergence in findings. It may be that police officers handle common life stressors differently than other populations. Previous studies have shown that police officers may utilize maladaptive coping, such as alcohol use, to cope with occupational stressors (Grubb, Brown, & Hall, 2015). However, Larsson, Kempe, and Starrin (1988) found that Swedish police officers ($N = 54$) did utilize different and more effective stress appraisal and coping strategies than ordinary individuals in stressful situations. The authors suggested that stress inoculation (i.e., resilience to stress) may be a factor. This is supported in other literature, which indicates that overcoming a number of challenging stressful events develops individuals' ability to successfully cope with subsequent stressors (Ashokan et al., 2016). Researchers have also suggested that individual factors, such as personality and social variables, influence the development of resilience to stress (Ashokan et al., 2016; Joseph & Linley, 2006). Thus, it is possible that, due to the stressful nature of police work in addition to the stressors present in the aftermath of Hurricane Katrina, the officers in the current study may have habituated to stressful events over time. According to Larsson et al. (1988), career changes within the police force generally occur before the age of 40. The mean age in our study was 43.7. Thus, similar to Larsson et al, police officers around the age of 40 or above may consist of “a selected sample of stress-inoculated individuals who enjoyed their work” (p. 272). Further research is warranted to determine

if stress inoculation is a factor in the development of PTG and whether stress inoculation contributes to positive or negative outcomes in the long run.

Although the association between gratitude and PTG has not previously been assessed among police officers, there are studies that have highlighted its benefits and association with PTG in individuals who have experienced trauma (Chun & Lee, 2013; Fredrickson et al., 2003; Vernon, 2012). Lies, Mellor, and Hong (2014) found that gratitude was negatively associated with posttraumatic stress among 310 earthquake survivors 8 months after the disaster; a finding that was not evident 5 months postincident. The authors suggested that gratitude may have a delayed positive influence on those who experience traumatic events. This may coincide with the findings of the present study, due to the fact that the officers were surveyed 7 years after Hurricane Katrina.

Consistent with the present study, a positive association between life satisfaction and PTG has been observed in recent literature (Mols, Vingerhoets, Coebergh, & van de Poll-Franse, 2009; Mosher, Danoff-Burg & Brunner, 2006; Powell, Gilson, & Collin, 2012). However, this relationship remains poorly understood. Some authors have speculated that meaning-making serves as a mediational process between PTG and life satisfaction (Triplett et al., 2012). Although meaning-making was not studied in the present sample, it is possible that the officers found meaning in the 7 years since Hurricane Katrina. One could argue that they had ample time to process and reflect on their stressful experiences surrounding the disaster allowing for increased meaning-making and PTG.

Police officers often abstain from seeking help in the form of social support in times of stress due to perceived stigma, confidentiality concerns, and other barriers (Carlan & Nored, 2008). Some researchers have found that although police officers recommend that their colleagues seek support, they often neglect to do so themselves (Evans et al., 2013). A few studies have demonstrated that social support yields positive outcomes for law enforcement officers, including reduced stress and decreased burnout (Fusilier, Ganster, & Mayes, 1987; Louw, 2014; Patterson, 2003). The results of this study add to this body of literature by revealing a connection between interpersonal support and increased PTG in the wake of stressful life events. Taken together, these findings emphasize the need for police departments and mental health professionals to further address the stigma associated with help-seeking behavior.

The results of this study supported the reinforcing effects of interpersonal support, gratitude, and life satisfaction on PTG. Although more stressful life changes correlated with increased PTG, higher levels of interpersonal support, gratitude, and life satisfaction moderated PTG scores; participants with higher levels of these variables demonstrated higher PTG scores. Such findings have been corroborated in civilian and veteran samples who have experienced trauma (McDonough, Sabiston, & Wrosch, 2014; Tsai, Sippel, Mota, Southwick, & Pietrzak 2015), but to the best of our knowledge, this study is the first to link support, gratitude, and life satisfaction to PTG among law enforcement. Thus, police officers appear to share similarities with their civilian counterparts who have experienced growth after trauma. Additional research could focus on the mechanisms by which these variables are associated with PTG, particularly

among law enforcement officers. Within the realm of clinical practice, it might be beneficial to determine how to promote social support, gratitude, and life satisfaction in law enforcement officers.

Although there is a substantial base of literature on coping with stress and trauma, researchers have more recently shifted to examining potential positive outcomes following adversity (Joseph & Linely, 2006). It is still unknown if PTG is always related to positive outcomes. The PTGI measures perceived growth, rather than actual growth. Frazier et al. (2009) found no relationship between perceived and actual growth in their sample of 122 college undergraduate students. However, they may have measured too soon after the reported trauma and that sample was from a very young demographic. Researchers have suggested that measurement using the PTGI differs between undergraduates and older participants (Cordova et al., 2001). Future research could examine PTG in relation to PTSD symptoms in police officers.

Several limitations should be considered when interpreting these results. First, the sample size was relatively small with a response rate of 49%. Police officers who chose to respond to the surveys may differ from those who did not respond. We did not have any information on nonresponders. Moreover, the sample consisted of police from one geographic area. Second, recall bias is a possible factor, as this was a retrospective study utilizing self-report surveys. To mitigate this limitation, Hurricane Katrina was used as the index event. However, due to the nature of retrospective studies, confounding variables may have influenced the results. Third, because this study is cross sectional, we cannot show that gratitude, satisfaction with life, or social support resulted in increased PTG, only that they are associated in this population; the direction of causality cannot be determined. Fourth, there is no delineation between crises and moderate life stressors in our data. Finally, it is possible that police officers self-select to enter a stressful and potentially traumatic field. Therefore, these findings may not be generalizable to the greater population.

Despite the limitations, this study identifies possible factors for the promotion of PTG in police officers and possibly other emergency responders. Gratitude, interpersonal support, and life satisfaction appear to moderate the relationship between stressful life events and PTG. Thus, the current study represents another meaningful step toward understanding how positive psychological factors may promote PTG among law enforcement officers. Limited knowledge exists about the correlates of PTG in this population. Additional research could focus on the mechanisms by which interpersonal support, gratitude, and life satisfaction moderates the relationship between stressful life events and PTG. It might be beneficial to determine how to promote these factors in the lives of those who are regularly at risk of trauma exposure.

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CONFLICT OF INTEREST

The authors have declared that they have no conflict of interest.

REFERENCES

- Agaibi, C. E., & Wilson, J. P. (2005). Trauma, PTSD, and resilience. *Trauma, Violence, & Abuse*, 6(3), 195–216.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage.
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: Author.
- Ashokan, A., Sivasubramanian, M., & Mitra, R. (2016). Seeding resilience through inoculation. *Neural Plasticity*, 2016(6), 1–6.
- Baum, D. (2006). Deluged: When Katrina hit, where were the police? *New Yorker*, 9, 50–63.
- Carlan, P. E., & Nored, L. S. (2008). An examination of officer stress: Should police departments implement mandatory counseling? *Journal of Police and Criminal Psychology*, 23(1), 8–15. <https://doi.org/10.1007/s11896-008-9015-x>
- Centers for Disease Control and Prevention (2006). Health hazard evaluation of police officers and firefighters after Hurricane Katrina—New Orleans, Louisiana, October 17–28 and November 30–December 5, 2005. *MMWR: Morbidity and Mortality Weekly Report*, 55(16), 456–458. Retrieved from <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5516a4.htm>
- Christopher, M. (2004). A broader view of trauma: A biopsychosocial-evolutionary view of the role of the traumatic stress response in the emergence of pathology and/or growth. *Clinical Psychology Review*, 24, 75–98.
- Chun, S., & Lee, Y. (2013). "I am just thankful": The experience of gratitude following traumatic spinal cord injury. *Disability and Rehabilitation: An International, Multidisciplinary Journal*, 35(1), 11–19. <https://doi.org/10.3109/09638288.2012.687026>
- Cohen, S., & Hoberman, H. M. (1983). Positive events and social supports as buffers of life change stress. *Journal of Applied Social Psychology*, 13(2), 99–125.
- Cordova, M. J., Cunningham, L. L. C., Carlson, C. R., & Andrykowski, M. A. (2001). Posttraumatic growth following breast cancer: A controlled comparison study. *Health Psychology*, 20(3), 176–185.
- Dekel, S., Mandl, C., & Solomon, Z. (2011). Shared and unique predictors of post-traumatic growth and distress. *Journal of Clinical Psychology*, 67(3), 241–252.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment*, 49(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13
- Emmons, R. A., & Crumpler, C. A. (2000). Gratitude as a human strength: Appraising the evidence. *Journal of Social and Clinical Psychology*, 19(1), 56–69.
- Evans, R., Pistrang, N., & Billings, J. (2013). Police officers' experiences of supportive and unsupportive social interactions following traumatic incidents. *European Journal of Psychotraumatology*, 4. <https://doi.org/10.3402/ejpt.v4i0.19696>
- Frazier, P., Tashiro, T., Berman, M., Steger, M., & Long, J. (2004). Correlates of levels and patterns of positive life changes following sexual assault. *Journal of Consulting and Clinical Psychology*, 72(1), 19–30. <https://doi.org/10.1037/0022-006X.72.1.19>
- Frazier, P., Tennen, H., Gavian, M., Park, C., Tomich, P., & Tashiro, T. (2009). Does self-reported posttraumatic growth reflect genuine positive change? *Psychological Science*, 20(7), 912–919.
- Fredrickson, B. L. (2003). The value of positive emotions: The emerging science of positive psychology is coming to understand why it's good to feel good. *American Scientist*, 91(4), 330–335.
- Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crisis? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology*, 84(2), 365–376. <https://doi.org/10.1037/0022-3514.84.2.365>
- Fusilier, M. R., Ganster, D. C., & Mayes, B. T. (1987). Effects of social support, role stress, and locus of control on health. *Journal of Management*, 13(3), 517–528. <https://doi.org/10.1177/014920638701300308>
- Gloria, C. T., & Steinhart, M. A. (2014). Relationships among positive emotions, coping, resilience and mental health. *Stress and Health*, 32, 145–156.
- Grubb, A., Brown, S., & Hall, P. (2015). Personality traits and coping styles in UK police officers. Do negotiators differ from their non-negotiator colleagues? *Psychology. Crime & Law*, 3-4(21), 347–374.
- Haarr, R. N., & Morash, M. (1999). Gender, race, and strategies of coping with occupational stress in policing. *Justice Quarterly*, 16(2), 303–336.
- Hall, B. J., Hobfoll, S. E., Canetti, D., Johnson, R. J., Palmieri, P. A., & Galea, S. (2010). Exploring the association between posttraumatic growth and PTSD: A national study of Jews and Arabs following the 2006 Israeli-Hezbollah War. *Journal of Nervous and Mental Disease*, 198(3), 180–186.
- Heavey, S. C., Homish, G. G., Andrew, M. E., McCanlies, E., Mnatsakanova, A., Violanti, J. M., & Burchfiel, C. M. (2015). Law enforcement officers' involvement level in Hurricane Katrina and alcohol use. *International Journal of Emergency Mental Health*, 17, 267–273.
- Joseph, S. (2004). Client-centred therapy, post-traumatic stress disorder and post-traumatic growth: Theoretical perspectives and practical implications. *Psychology and Psychotherapy: Theory, Research, and Practice*, 77, 101–119.
- Joseph, S., & Linley, P. A. (2006). Growth following adversity: Theoretical perspectives and implications for clinical practice. *Clinical Psychology Review*, 26, 1041–1053.
- Joseph, S., Murphy, D., & Regel, S. (2012). An affective-cognitive processing model of post-traumatic growth. *Clinical Psychology and Psychotherapy*, 19, 316–325.
- Kashdan, T. B., & Kane, J. Q. (2011). Post-traumatic distress and the presence of post-traumatic growth and meaning in life: Experiential avoidance as a moderator. *Personality and Individual Differences*, 50, 84–89.
- Knabb, R. D., Rhome, J. R., & Brown, D. P. (2005). *Tropical cyclone report: Hurricane Katrina*. Retrieved from http://www.nhc.noaa.gov/data/tcr/AL122005_Katrina.pdf
- Kuppens, P., Realo, A., & Diener, E. (2008). The role of positive and negative emotions in life satisfaction judgment across nations. *Journal of Personality and Social Psychology*, 95(1), 66–75.
- Larsson, G., Kempe, C., & Starrin, B. (1988). Appraisal and coping processes in acute time-limited stressful situations: A study of police officers. *European Journal of Personality*, 2(4), 259–276.
- Lies, J., Mellor, D., & Hong, R. Y. (2014). Gratitude and personal functioning among earthquake survivors in Indonesia. *The Journal of Positive Psychology*, 9(4), 295–305. <https://doi.org/10.1080/17439760.2014.902492>
- Lindstrom, C. M., Cann, A., Calhoun, L. G., & Tedeschi, R. G. (2013). The relationship of core belief challenge, rumination, disclosure, and socio-cultural elements to posttraumatic growth. *Psychological Trauma: Theory, Research, Practice, and Policy*, 5(1), 50–55. <https://doi.org/10.1037/a0022030>
- Linley, P. A., & Joseph, S. (2004). Positive change following trauma and adversity: A review. *Journal of Traumatic Stress*, 17(1), 11–21. <https://doi.org/10.1023/B:JOTS.0000014671.27856.7e>
- Louw, G. J. (2014). Burnout, vigour, big five personality traits and social support in a sample of police officers. *SAJIP: South African Journal of Industrial Psychology*, 40(1), 1–13. <https://doi.org/10.4102/sajip.v40i1.1119>
- Luhmann, M., Hofmann, W., Eid, M., & Lucas, R. E. (2012). Subjective well-being and adaptation to life events: A meta-analysis. *Journal of*

- Personality and Social Psychology*, 102(3), 592–615. <https://doi.org/10.1037/a0025948>
- Maitlis, S. (2011). Posttraumatic growth: A missed opportunity for positive organizational scholarship. In G. M. Spreitzer, & K. S. Cameron (Eds.), *The Oxford handbook of positive organizational scholarship* (pp. 909–923). New York, NY: Oxford University Press.
- Maercker, A., & Zoellner, T. (2004). The Janus face of self-perceived growth: Toward a two-component model of posttraumatic growth. *Psychological Inquiry*, 15(1), 41–48.
- McCanlies, E. C., Mnatsakanova, A., Andrew, M. E., Burchfiel, C. M., & Volanti, J. M. (2014). Positive psychological factors are associated with lower PTSD symptoms among police officers: Post Hurricane Katrina. *Stress and Health*, 30, 401–415.
- McCullough, M. E., Emmons, R. A., & Tsang, J. A. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of Personality and Social Psychology*, 82(1), 112–127.
- McDonough, M. H., Sabiston, C. M., & Wrosch, C. (2014). Predicting changes in posttraumatic growth and subjective well-being among breast cancer survivors: The role of social support and stress. *Psycho-Oncology*, 23(1), 114–120. <https://doi.org/10.1002/pon.3380>
- McMillen, C., Smith, E. M., & Fisher, R. H. (1997). Perceived benefit and mental health after three types of disaster. *Journal of Consulting and Clinical Psychology*, 63, 733–739.
- Miller, M. A., & Rahe, R. H. (1997). Life changes scaling for the 1990s. *Journal of Psychosomatic Research*, 43(3), 279–292.
- Mols, F., Vingerhoets, A. M., Coebergh, J. W., & Van de Poll-Franse, L. V. (2009). Well-being, posttraumatic growth and benefit finding in long-term breast cancer survivors. *Psychology and Health*, 24(5), 583–595. <https://doi.org/10.1080/08870440701671362>
- Mosher, C. E., Danoff-Burg, S., & Brunner, B. (2006). Post-traumatic growth and psychosocial adjustment of daughters of breast cancer survivors. *Oncology Nursing Forum*, 33(3), 543–551. <https://doi.org/10.1188/06.ONF.543-551>
- Park, C. L., & Gutierrez, I. A. (2013). Global and situational meanings in the context of trauma: Relations with psychological well-being. *Counselling Psychology Quarterly*, 26(1), 8–25. <https://doi.org/10.1080/09515070.2012.727547>
- Park, N., Park, M., & Peterson, C. (2010). When is the search for meaning related to life satisfaction? *Applied Psychology: Health and Well-Being*, 2(1), 1–13. <https://doi.org/10.1111/j.1758-0854.2009.01024.x>
- Paton, D., & Norris, K. (2014). Vulnerability to work-related posttraumatic stress: Family and organizational influences. In J. M. Violanti (Ed.), *Dying for the job: Police work, exposure and health* (pp. 126–141) Springfield, IL, Charles C. Thomas, Publisher, LTD.
- Patterson, G. T. (2003). Examining the effects of coping and social support on work and life stress among police officers. *Journal of Criminal Justice*, 31(3), 215–226. [https://doi.org/10.1016/S0047-2352\(03\)00003-5](https://doi.org/10.1016/S0047-2352(03)00003-5)
- Pietrzak, R. H., Goldstein, M. B., Malley, J. C., Rivers, A. J., Johnson, D. C., Morgan, C., & Southwick, S. M. (2010). Posttraumatic growth in veterans of operations enduring freedom and Iraqi freedom. *Journal of Affective Disorders*, 126(1–2), 230–235. <https://doi.org/10.1016/j.jad.2010.03.021>
- Powell, T., Gilson, R., & Collin, C. (2012). TBI 13 years on: Factors associated with post traumatic growth. *Disability and Rehabilitation: An International, Multidisciplinary Journal*, 34(17), 1461–1467. <https://doi.org/10.3109/09638288.2011.644384>
- Ruini, C., & Vescovelli, F. (2013). The role of gratitude in breast cancer: Its relationships with post-traumatic growth, psychological well-being and distress. *Journal of Happiness Studies*, 14(1), 263–274. <https://doi.org/10.1007/s10902-012-9330-x>
- Stanton, A. L., Bower, J. E., & Low, C. A. (2006). Posttraumatic growth after cancer. In L. G. Calhoun, & R. G. Tedeschi (Eds.), *Handbook of posttraumatic growth: Research and practice* (pp. 138–175). Mahwah, NJ: Erlbaum.
- Swatt, M. L., Gibson, C. L., & Piquero, N. L. (2007). Exploring the utility of general strain theory in explaining problematic alcohol consumption by police officers. *Journal of Criminal Justice*, 35, 596–611.
- Tedeschi, R. G., & Calhoun, L. G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress*, 9(3), 455–471.
- Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, 15(1), 1–18.
- Tedeschi, R. G., & McNally, R. J. (2011). Can we facilitate posttraumatic growth in combat veterans? *American Psychologist*, 66(1), 19–24. <https://doi.org/10.1037/a0021896>
- Triplett, K. N., Tedeschi, R. G., Cann, A., Calhoun, L. G., & Reeve, C. L. (2012). Posttraumatic growth, meaning in life, and life satisfaction in response to trauma. *Psychological Trauma: Theory, Research, Practice, and Policy*, 4(4), 400–410. <https://doi.org/10.1037/a0024204>
- Tsai, J., Sippel, L. M., Mota, N., Southwick, S. M., & Pietrzak, R. H. (2015). Longitudinal course of posttraumatic growth among U.S. military veterans: Results from the National Health and Resilience in Veterans Study. *Depression and Anxiety*, 33(1), 9–18. <https://doi.org/10.1002/da.22371>
- Ullman, S. E. (2014). *Correlates of posttraumatic growth in adult sexual assault victims*. Traumatology: An International Journal. <https://doi.org/10.1037/h0099402>
- Vernon, L. L. (2012). Relationships among proactive coping, posttrauma gratitude, and psychopathology in a traumatized college sample. *Journal of Aggression, Maltreatment and Trauma*, 21(1), 114–130. <https://doi.org/10.1080/10926771.2012.633298>
- Violanti, J. M., Slaven, J. E., Charles, L. E., Burchfiel, C. M., Andrew, M. E., & Homish, G. G. (2011). Police and alcohol use: A descriptive analysis and associations with stress outcomes. *American Journal of Criminal Justice*, 36(4), 344–356. <https://doi.org/10.1007/s12103-011-9121-7>
- West, C., Bernard, B., Mueller, C., Kitt, M., Driscoll, R., & Tak, S. (2008). Mental health outcomes in police personnel after Hurricane Katrina. *Journal of Occupational and Environmental Medicine*, 50(6), 689–695. <https://doi.org/10.1097/JOM.0b013e3181638685>
- Willman, E. A. (2012). Alcohol use among law enforcement. *Journal of Law Enforcement*, 2(3), 1–4.
- Zhou, X., & Wu, X. (2016). Understanding the roles of gratitude and social support in posttraumatic growth among adolescents after Ya'an earthquake: A longitudinal study. *Personality and Individual Differences*, 101, 4–8.
- Zoellner, T., & Maercker, A. (2006). Posttraumatic growth in clinical psychology: A critical review and introduction of a two component model. *Clinical Psychology Review*, 26, 626–653.
- Zoellner, T., Rabe, S., Karl, A., & Maercker, A. (2008). Posttraumatic growth in accident survivors: Openness and optimism as predictors of its constructive or illusory sides. *Journal of Clinical Psychology*, 64(3), 245–263.

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