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Positive Psychological Factors are Associated with Lower PTSD Symptoms among Police Officers: Post Hurricane Katrina

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Abstract

Following Hurricane Katrina, police officers in the New Orleans geographic area faced a number of challenges. This cross-sectional study examined the association between resilience, satisfaction with life, gratitude, posttraumatic growth, and symptoms of posttraumatic stress disorder in 84 male and 30 female police officers from Louisiana. Protective factors were measured using the Connor–Davidson Resilience scale, Satisfaction with Life Scale, the Gratitude Questionnaire, and the Posttraumatic Growth inventory. Symptoms of posttraumatic stress disorder were measured using the Posttraumatic Stress Disorder Checklist—Civilian (PCL-C). Potential associations were measured using linear regression and analysis of variance. Models were adjusted for age, sex, race, education, and alcohol. Mean PCL-C symptoms were 29.5 ± 14.5 for females and 27.8 ± 12.1 for males. Adjusted mean levels of PCL-C symptoms significantly decreased as quartiles of resilience (p <.001), satisfaction with life (p <.001), and gratitude (p <.001) increased. In contrast, PCL-C symptoms were not associated with posttraumatic growth in this sample. These results indicate that positive factors such as resilience, satisfaction with life, and gratitude may help mitigate symptoms of posttraumatic stress disorder. To further explore these relationships, longitudinal follow-up in a larger population would be of interest.

Keywords

police; posttraumatic stress disorder (PTSD); resilience; satisfaction with life; gratitude; posttraumatic growth

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Conflict of interest

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

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Introduction

Increasing attention is being paid to positive factors that may protect individuals from post-traumatic stress disorder (PTSD) following a traumatic event. Not all individuals who experience trauma develop PTSD (Agaibi & Wilson, 2005; Breslau, Chilcoat, Kessler, Peterson, & Lucia, 1999; Diener, Emmons, Larsen, & Griffin, 1985; Keane, Marshall, & Taft, 2006; McCullough, Emmons, & Tsang, 2002; Tedeschi & Calhoun, 2004). In fact, research indicates that while approximately 50% of the general population has been exposed to a traumatic event as defined by the Diagnostic and Statistical Manual of Psychiatric Disorders—IV (DSM-IV), approximately only 5%–6% of those will develop PTSD (Agaibi & Wilson, 2005; American Psychiatric Association [APA], 2007; Breslau et al., 1999; Diener et al., 1985; Keane et al., 2006; McCullough et al., 2002; Tedeschi & Calhoun, 2004). The risk of PTSD has been shown to increase with increasing exposure to traumatic events, for example, PTSD is more likely to occur in police officers, who as part of their work are frequently exposed to traumatic events (Berger et al., 2012; Marmar et al., 2006). Among officers, PTSD rates have been estimated to be between 7% and 19% (Berger et al., 2012; Marmar et al., 2006). However, even among officers, rates of PTSD, though higher, indicate variability in risk (Marmar et al., 2006). An individual's ability to cope with stressful factors, reducing their risk of PTSD, may be related to individual resilience, satisfaction with life, gratitude, or posttraumatic growth.

Resilience has a number of different definitions, including the absence of psychopathology in children raised in abusive and neglectful environments, recovery of physical health following an injury or serious illness, and the ability to overcome stress and adversity while maintaining normal physical and psychological function (Agaibi & Wilson, 2005; Wu et al., 2013). Research that has reviewed psychological and biological factors thought to confer resilience to PTSD and PTSD symptoms has found that resilience is a multidimensional construct that encompasses individual personality characteristics such as locus of control, disposition, self-esteem, assertiveness, and hardiness (Agaibi & Wilson, 2005; Hoge, Austin, & Pollack, 2007). Ego defenses and protective factors, coping style, the capacity to modulate emotion, and the ability to maintain a positive outlook were found to be important in the construct of resilience (Agaibi & Wilson, 2005). These factors have been found, in addition to the type and severity of the trauma, to not only increase an individual's response to trauma, but protect them from developing PTSD following a traumatic event. In another study, the relationship between resilience, spirituality, anger, and health status with PTSD severity was evaluated in community sample of 648 individuals (Connor, Davidson, & Lee, 2003). In this study, the Connor–Davidson Resilience Scale (CD-RISC) was used to measure resilience, which incorporates concepts such as hardiness, control, adaptability, and support. They found that resilience was negatively associated with PTSD symptom severity as well as mental and physical health. These results indicate that resilience may help moderate symptoms of PTSD.

While resilience reflects individual ability to cope and adapt to a traumatic event, posttraumatic growth is the ability of an individual to be transformed following trauma (Joseph & Linley, 2006; Joseph, Linley, & Harris, 2005; Tedeschi & Calhoun, 1995, 2004). Posttraumatic growth is described as positive psychological growth following a stressful,

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challenging, or traumatic event; a process in which individuals not only recover from trauma, but are able to function at a higher level than they would have prior to the challenging event (Linley & Joseph, 2004; Tedeschi & Calhoun, 1995, 2004). Tedeschi and Calhoun (1996) identified specific domains in which growth may occur, including re-evaluating life goals and priorities, relationships with others, possibilities in life, the sense of personal strengths, and spiritual development. Elements believed to play a role in the psychological process leading from trauma to posttraumatic growth include challenges to core beliefs, rumination about the event, and accommodation or assimilation of the event (Triplett, Tedeschi, Cann, Calhoun, & Reeve, 2012; Zoellner & Maercker, 2006). Traumatic events can challenge core beliefs that define how a person sees the world and their role in the world. Following a trauma, rumination can take the form of deliberate or intrusive rumination. Thinking actively or deliberately about the event and how it has impacted one's life is more likely to lead to cognitive restructuring and post-traumatic growth, while intrusive rumination, or unwanted thoughts is associated with increased distress (Triplett et al., 2012; Zoellner & Maercker, 2006). However, intrusive rumination may also lead to more deliberate rumination and posttraumatic growth may occur as individuals modify previous core beliefs, accommodate the traumatic event, and find meaning or make sense of the event (Triplett et al., 2012; Zoellner & Maercker, 2006). Interestingly, when the relationship between posttraumatic growth and PTSD in cross-sectional studies has been evaluated the results are mixed (Linley & Joseph, 2004; Zoellner & Maercker, 2006). The inconsistent findings may be the result of unaccounted mediating factors, such as time from event, trauma severity, or how posttraumatic growth has been measured (Linley & Joseph, 2004; Zoellner & Maercker, 2006). Researchers also suggest that psychological growth or adjustment may be independent of psychological distress. For example, following a traumatic event an individual may feel that they have a greater appreciation for their family, or feel that the experience has showed them their strengths, yet still feel distressed about how their life has been impacted. This also indicates that an individual may have experienced positive growth in one domain, but not others (Linley & Joseph, 2004; Triplett et al., 2012).

Life satisfaction is a cognitive self-imposed judgment by an individual of how satisfied they are with their life. It impacts an individual's sense of well-being and quality of life (Diener et al., 1985; Headley, Kelley, & Wearing, 1993). Individuals who are dissatisfied with life are more likely to suffer psychiatric morbidity including depression and anxiety, and are at an increased risk of suicide, and have higher levels of mortality (Deeg, van Zonneveld, van der Maas, & Habbema, 1989; Feller, Teucher, Kaaks, Boeing, & Vigl, 2013; Parker, Thorslund, & Nordström, 1992; Samaranayake & Fernando, 2011). Among military veterans, meaning in life was associated with lower levels of PTSD symptoms (Owens, Steger, Whitesell, & Herrera, 2009). With this in mind, individuals with low life satisfaction may experience worse PTSD symptoms compared to those who report high life satisfaction.

It has also been suggested that alleviating suffering does not necessarily result in individuals feeling better, rather, positive emotions such as feelings of gratitude may increase an individual's ability to develop intellectual, psychological, social, and physical resources to address negative affect (Eaton, Bradley, & Morrissey, 2014; Fredrickson, Tugade, Waugh, & Larkin, 2003). Gratitude or a grateful disposition is the tendency to acknowledge the

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positive values, benefits, and experiences in daily life (Kashdan, Uswatte, & Julian, 2006; McCullough, Tsang, & Emmons, 2004; McCullough et al., 2002). Among individuals with chronic illness, positive predispositions such as gratitude and satisfaction with life were found to be positively associated with an enhanced quality of life (Eaton et al., 2014). Similarly, gratitude was associated with positive emotions, satisfaction with life, and optimism in individuals with neuromuscular disorders (McCullough et al., 2004). Because gratitude is associated with positive emotions, it has been suggested that gratitude may help counter PTSD symptoms. For example, following the terrorist attacks on September 11, strong feelings of gratitude were associated with less psychological distress (Fredrickson et al., 2003). In a preliminary study, among Vietnam veterans, individuals without PTSD had higher levels of gratitude compared to those with PTSD (Kashdan et al., 2006). In this same study, however, among both individuals with and without PTSD, gratitude was associated with greater daily hedonic and eudemonic well-being outcomes. These results indicate that gratitude may be associated with fewer PTSD symptoms and feelings of well-being and worth further consideration.

Trauma may occur following a number of different events including armed conflicts, automobile accidents, interpersonal violence, serious illness, man-made, and natural disasters. A natural disaster may impact an individual on multiple levels, including their community, their family, and property resulting in psychological distress or acute reactions (Davidson & McFarlane, 2006; Galea et al., 2007). The severity of symptoms and risk of PTSD is associated with a number of different factors including the severity of the disaster, degree of exposure, personal losses, and even how one behaved during the event (Davidson & McFarlane, 2006; Galea et al., 2007). These factors may be particularly relevant for first-responders such as police officers, who experience increased work obligations while concurrently trying to meet the needs of their family (Bernard, Driscoll, Kitt, West, & Tak, 2006; West et al., 2008).

Following Hurricane Katrina police officers faced a number of physical and psychological challenges (Bernard et al., 2006; West et al., 2008). Officers' work duties included looting control, crowd control, and rescuing individuals from flooded areas as well as the retrieval and removal of bodies. Many officers reported experiencing open hostility from the citizens whom they were trying to aid, including being shot at (West et al., 2008). Due to the destruction of many of the buildings, many officers were required to work out of temporary offices with poor to no communication equipment, isolating them from coworkers and potential back-up. Most officers worked extended hours, with little sleep. During off-hours, due to the destruction of their homes, many officers lived in temporary housing and continued to try to meet the needs of their families (Baum, 2006; West et al., 2008). In one survey, eight weeks after Hurricane Katrina, 19% of officers reported symptoms that met the criteria for a PTSD diagnosis. Highest rates were observed in officers who were assaulted, who had a family member assaulted, were responsible for the recovery of bodies, or who were responsible for crowd control (West et al., 2008). However, what has been less well studied is what positive factors may protect officers from symptoms of PTSD. Only a few studies have evaluated the association between the presence of positive factors such as gratitude, life satisfaction, resilience, or posttraumatic growth and symptoms of PTSD in the general population, in individuals with chronic disease, or veterans (Agaibi & Wilson, 2005;

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Diener et al., 1985; McCullough et al., 2002; Tedeschi & Calhoun, 2004), and most of these studies only evaluated one of these positive factors. To our knowledge, none have evaluated these factors in police officers following a natural disaster. The aim of our study was to evaluate if higher levels of resilience, gratitude, life satisfaction, and posttraumatic growth were associated with lower PTSD symptoms in this high risk population.

Method

Study population

This cross-sectional study involved police officers from a department in the New Orleans, Louisiana geographic area. In April, 2012 the district Lieutenant with the permission of the Chief of Police distributed packets that contained instructions, a consent to participate, and questionnaires to all two-hundred fifty officers in their district. All officers in the district were surveyed, there were no exclusion criteria. The participants were given a self-addressed stamped envelope and instructed to mail the consent and results of the self-report measures directly to the project officer. The participants filled out questionnaires on personal history, if they worked during Hurricane Katrina, their level of involvement, health status, and use of medication. Several psychosocial instruments were used to measure level of depression, post-traumatic stress symptomology, as well as potential protective factors including resilience, life satisfaction, gratitude, and posttraumatic growth. The participants were directed to use Hurricane Katrina as the index event while completing all the questionnaires. A total of 123 officers participated in this project, resulting in an overall participation rate of 49.2%. Participants who did not have complete information on depressive symptoms ($N = 6$), post-traumatic stress symptoms ($N = 3$), or resilience ($N = 5$) were excluded from the analyses. This resulted in a final sample size of 114 officers with 84 males and 30 females. Out of the 114, ninety-two officers worked during Hurricane Katrina, while the remainder did not; however, due to the extreme stress associated with working both during and after the hurricane all officers who worked in this particular department in the New Orleans geographic area have been included in this study. 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.

Assessment of demographic and lifestyle characteristics

Basic demographic information for each participant was collected by questionnaire and included information on age, sex, race, education, marital status, years served as a police officer, and the number of alcoholic drinks drunk per day. Officers reported their race as being Caucasian, African American, or Other. For level of education officers could select from ‘less than 12 years of school’ to ‘graduate degree.’ These categories were collapsed to three groups, ‘high school/general equivalency diploma (GED),’ ‘college <4 years,’ and ‘college 4+ years’ to allow for sufficient sample size within each group. Officers reported marital status as ‘single,’ ‘married,’ or ‘divorced.’ Officers reported the number of alcoholic beverages they drank per day from ‘Never or 1–2 to ≥7.’ Officers reported their years of service as an officer, which was divided into four categories from ‘0–9 years’ to ‘20+ years.’

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Assessment of 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'. They reported their level of involvement during Hurricane Katrina as 'heavy involvement,' 'moderate involvement,' 'light involvement,' or 'does not apply, did not work during Hurricane Katrina.'

PTSD symptoms

PTSD symptoms were measured using the Post-traumatic Stress Disorder Checklist—Civilian version (PCL-C). The officers were told to use Hurricane Katrina as the index event while filling out this, and all other psychological questionnaires. The PCL-C consists of 17 questions that evaluate 'how much you have been bothered by that problem' on a 5-point likert scale ranging from 1 (not at all) to 5 (extremely). The symptoms are based on the DSM-IV symptom categories of re-experiencing, avoidance, and hyperarousal (American Psychiatric Association [APA], 2007). An overall symptom severity score (range = 17–85) and scores for each DSM-IV symptom cluster can be calculated. A diagnosis of PTSD is indicated if the total score exceeds a given threshold, which varies depending on the setting (e.g. the Department of Defense uses a cut point between 30 and 35 for the general population) (Weathers, 1993). If the symptom clusters are used to aid in a full or partial PTSD diagnosis then it is first determined if the individual meets the DSM-IV symptom criteria. This is met when a rating of three or higher is present for one or more symptoms of the re-experiencing cluster, three or more symptoms of the avoidance cluster, and two or more symptoms of the hyperarousal cluster. Partial PTSD is indicated if two out of three symptoms are present and full PTSD is indicated if three out of the three symptoms are present (Weathers, 1993). Both the overall score and DSM-IV symptom clusters were used in the present study. The Cronbach's alpha reliability coefficient for this sample was .95.

Connor–Davidson resilience scale

The abbreviated version of the Connor–Davidson Resilience Scale (CD-RISC10) was used to assess resilience among the police officers (Connor & Davidson, 2003). CD-RISC10 is a 10-item scale that asks the participants to indicate how much they agree with a list of statements over the past month and if a situation did not occur recently, they are to respond according to how they think they would have felt. Responses range from 0 (not true at all) to 4 (true nearly all the time) that measures the ability to cope or adapt to adverse situations. Higher scores indicate higher resilience (Connor & Davidson, 2003). Internal consistency of the 10-item CD-RISC was evaluated by calculating Cronbach's alpha of .85 (Campbell-Sills & Stein, 2007). An overall score can be calculated by summing the individual scores, which was used in this study. The Cronbach's alpha reliability coefficient for this sample was .87.

Satisfaction with life scale

The Satisfaction with Life Scale was used to assess how satisfied the police officers are with their life. The participants were asked to 'check the number beside each statement to indicate how much you agree with it.' It is a 5 item likert scale ranging from 0 (strongly disagree) to 7 (strongly agree). The scores are summed and an overall score is then used to evaluate an individual's satisfaction with life. A score of 30–35 indicates 'highly satisfied,'

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25–29 indicates 'things are mostly good,' 20–24 indicates 'generally satisfied,'15–19 'slightly below average life satisfaction,' 10–14 indicates 'dissatisfied,' and 5–9 indicates 'extremely dissatisfied' (Diener et al., 1985). The overall score was used in this study. The Cronbach's alpha reliability coefficient for this sample was .91.

Gratitude

The Gratitude Questionnaire (GQ-6) is a six item likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) (McCullough et al., 2002). The participants were asked to 'check the number beside each statement to indicate how much you agree with it.' To calculate a total score, the scores for questions 1, 2, 4, and 5 are summed. The scores for 3 and 6 are reversed then these scores are added to the total score calculated when 1, 2, 4, and 5 are summed. Higher scores reflect more gratitude and positive emotions such as life satisfaction, hope, and optimism (McCullough et al., 2002). The total score was used in this study. The Cronbach's alpha reliability coefficient for this sample was .88.

Posttraumatic growth inventory

The posttraumatic growth inventory is a 21 item likert scale ranging from 0 (I did not experience this) to 5 (I experienced this change to a very great degree). The participants were asked to 'indicate for each of the statements below the degree to which this change occurred in your life within the past six years.' Growth is determined by positive change in five factors that include, relating to others (questions 6, 8, 9, 15, 16, 20, and 21), new possibilities (question 3, 7, 11, 14, and 17), personal strength (questions 4, 10, 12, and 19), spiritual change (questions 5 and 18), and appreciation for life (questions 1, 2, and 13) (Tedeschi & Calhoun, 1996). An overall score can be determined by summing the individual scores or subfactor scale analyses can be done by summing the scores for each subfactor scale category. Both the overall score and subfactor scale scores were used in this study. The Cronbach's alpha reliability coefficient for this sample was .96.

Statistical methods

Descriptive statistics were used to characterize the study population. Potential confounders (age, sex, race, education, and alcohol use) were selected based on the associations with the exposure and the outcome in this study. Level of involvement was not associated with either the dependent or independent variables in this study and was therefore not included as a confounder. These associations were analysed using analysis of variance (ANOVA) and Pearson correlation coefficients. For descriptive purposes, individual participant's protective factor values (resilience, satisfaction with life, gratitude, and posttraumatic growth) were summed and divided into quartiles or tertiles. Tertiles were used when quartiles resulted in small numbers within each group. Unadjusted mean levels of PTSD symptoms were assessed across quartiles for each protective factor using ANOVA. Adjusted mean levels of PTSD symptoms were assessed across quartiles for each protective factor using ANCOVA; adjusting first for age and sex then adjusting for age, sex, race, education, and alcohol. Additionally, all statistical tests for trend for continuous independent variables were performed using linear regression. Beta coefficients and standard errors were also obtained

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from linear regression models. All analyses were performed using SAS version 9.2 (SAS Institute, Cary, NC).

Results

Lifestyle and demographic characteristics for the police officers who participated in this study are shown in Table I. Of the 114 participants, most were male (n = 84) and were either Caucasian (53.6%) or African–American (42.9%). The average age for this population was 43.0 ± 8.8 years. Most of the female officers were African American (48.3%) and had fewer than four years of college (43.3%). Female officers were most likely to be married (46.7%) and to have served as an officer for fewer than 9 years (31.8%). Approximately 76% of the female officers drank fewer than two alcoholic drinks per day. The average age for the female officers was 43.5 ± 9.1 years old. Their mean PCL-C symptom score was 29.5 ± 14.5. Their mean resilience, satisfaction with life, gratitude, and posttraumatic growth scores were 31.4 ± 4.8, 23.9 ± 6.7, 36.5 ± 5.7, and 55.3 ± 32.5, respectively (Table I).

The majority of the male officers was Caucasian (56.6%) and had 4 years or less of college (66.7%) (Table I). Most were married (63.9%) and had served for fewer than 9 years on the force (50.0%). Male officers were most likely to drink seven or more alcoholic drinks per day (43.8%). The average age for the male officers was 42.8 ± 8.8. Their average PCL-C symptom score was 27.8 ± 12.1. Their mean resilience, satisfaction with life, gratitude score, and posttraumatic growth scores were 29.9 ± 6.3, 23.0 ± 6.3, 33.9 ± 7.7, and 39.1 ± 25.9, respectively.

When demographic and lifestyle characteristics were stratified by mean PCL-C symptom scores the number of alcoholic drinks per day increased from less than or equal to two drinks per day to greater than or equal to seven drinks per day, PCL-C symptom scores increased from 24.9 ± 10.6 to 48.4 ± 10.3, respectively (data not shown). The highest mean PCL-C scores were observed in the ‘Other’ race category, which consists of Japanese, Native American, and Hispanic individuals (34.5 ± 25.8) followed by Caucasians (30.7 ± 13.1), with the lowest scores being observed in African Americans (24.6 ± 9.9).

When demographic and lifestyle characteristics of the officers were stratified by resilience, satisfaction with life, gratitude, and posttraumatic growth, mean resilience scores decreased from 31.5 ± 5.1 to 25.3 ± 7.7 as the number of alcoholic drinks per day increased from less than or equal to two to greater than or equal to seven drinks per day (data not shown). Mean satisfaction with life scores were lower in officers who had served 15–19 years compared to officers who had served at least 20 years (19.5 ± 6.9 versus 25.5 ± 7.1). Mean gratitude scores were highest in African Americans, high in Caucasians and lowest in the ‘Other’ race category (35.5 ± 6.3 versus 34.4 ± 7.1 versus 25.5 ± 16.1). Last, mean posttraumatic growth scores were higher in females compared to males (55.3 ± 32.5 versus 39.1 ± 25.9) (Table I).

Table II shows both the mean PCL-C symptom scores by quartiles of protective factors as well as the β-coefficients, standard errors (SE), and p-values for the unadjusted and adjusted models. When the association between mean PCL-C symptom scores and protective factors was evaluated, PCL-C symptom scores were negatively associated with resilience,

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satisfaction with life, and gratitude. These results remained significant at a Bonferroni critical alpha of .004 (.05/12). The association between the PCL-C symptom score and posttraumatic growth was not significant.

Mean PCL-C symptoms decreased with increasing quartiles of resilience (p <.001) (Table II). This relationship remained significant after adjustment for age and sex (β (SE) = −0.92 (0.19), p <.001), and multivariate adjustment (β (SE) = −0.65 (0.19); p <.001). As the resilience quartiles increased from 14.0 to 26.0, 27.0 to 30.0, 31.0 to 34.0, and 35.0 to 40.0, the multivariable adjusted mean PCL-C symptom score decreased from 31.6 ± 2.3 to 32.3 ± 2.3 to 26.4 ± 2.1 to 22.6 ± 2.2, respectively.

PCL-C symptoms were negatively associated with satisfaction with life (p <.001) (Table II). This relationship also remained significant after adjusting for age and sex (β (SE) = −0.63 (0.16); p <.001) and multivariable adjustment (β (SE) = −0.55 (0.15); p <.001). As the satisfaction with life quartiles increased from 5.0 to 17.0, 18.0 to 23.0, 24.0 to 29.0, and 30.0 to 35.0, the mean multivariable adjusted PCL-C symptom score decreased from 33.8 ± 2.3 to 29.7 ± 2.2 to 26.9 ± 2.2 to 23.3 ± 2.4, respectively.

The PCL-C symptom score was negatively associated with gratitude (p<.001) and remained significant after adjusting for age and sex (β (SE)=−0.73 (0.16), p<.001), and multivariable adjustment (β (SE)=−0.67 (0.15); p<.001) (Table II). As each quartile of gratitude increased, from 6.0 to 32.0, 33.0 to 36.0, 37.0 to 39.0, and 40.0 to 42.0, multivariable adjusted PCL-C symptom scores decreased from 33.3±2.1 to 26.5±2.4 to 27.8±2.3 to 24.7±2.3 (p<.001).

Last, we excluded officers (n = 22) who were not working during Hurricane Katrina and the associations observed between PCL-C symptom score and the positive factors remained similar and highly significant (data not shown).

To assess which PTSD symptom might be associated with the specific protective factors, the mean protective factors was stratified by the PCL-C symptoms (Table III). Multivariable adjusted mean level of resilience occurred significantly less often in officers reporting symptoms of re-experiencing and arousal, but only the association with re-experiencing remained significant at a Bonferroni critical alpha of .004 (.05/12) (Table III). Multivariable adjusted mean levels of satisfaction with life and gratitude occurred significantly less often in officers reporting all three symptoms of re-experiencing, avoidance/numbing, and arousal, but only those associated with avoidance/numbing remained significant at a Bonferroni critical alpha of .004 (.05/12). Results for posttraumatic growth were in opposition to all others. Multivariable, mean posttraumatic growth was observed to be highest in individuals who reported re-experiencing, avoidance/numbing, and arousal, but these differences did not reach statistical significance.

Discussion

The purpose of this study was to determine if mean PCL-C symptom scores were associated with the positive factors of resilience, satisfaction with life, gratitude, and posttraumatic growth. Consistent with past research, higher levels of resilience, satisfaction with life, and gratitude were associated with lower PTSD symptoms. Mean PCL-C levels were not

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associated with posttraumatic growth. The results of this study extend earlier findings that have shown that positive factors are associated with lower PTSD symptoms.

The prevalence rates of PTSD observed in our population reflect the high rates observed in other studies that evaluated PTSD in population studies directly following Hurricane Katrina and one year later (Galea et al., 2007; Kishore et al., 2008). Symptoms of PTSD are commonly seen in individuals following natural disasters (Kessler et al., 2008; Kishore et al., 2008). In non-policing populations, rates of PTSD range from between 19.2% and 33% (DeSalvo et al., 2007; Galea et al., 2007; Kessler et al., 2008; Kishore et al., 2008). Factors such as resource loss, impact of the hurricane on family and friends, as well as injury to or death of a family or friend is associated with symptoms of PTSD. In a follow-up study, rates of PTSD in metro New Orleans had virtually remained the same one year later and were significantly higher in non-metro regions of New Orleans (Kessler et al., 2008). It was suggested that these rates remained high and increased in some populations due to the presence of ongoing related stressors. Among police officers, rates of PTSD and symptoms of PTSD have been found to be as high as 19% (Bernard et al., 2006).

The Connor–Davidson Resilience Scale (CD-RISC) was used to measure resilience in this study. With the exception of two questions on optimism and faith, the content of this assessment is based on Kobasa's (1979) work on hardiness, Lyons' (1991) work on positive adjustment, and Rutter's (1985) work on protective factors that might buffer an individual's risk of developing a psychiatric disorder following a traumatic event (Connor & Davidson, 2003; Kobasa, 1979; Lyons, 1991; Rutter, 1985). Resilience has been described as both an innate quality or characteristic that protects an individual from developing PTSD following a traumatic event as well as a factor that can be influenced through training or experience, resulting in improved psychological outcomes (Bonanno, 2004; Connor & Davidson, 2003; Tedeschi & Kilmer, 2005). The CD-RISC was developed to measure the level of resilience within a population as well as assess to what extent resilience may increase following intervention (Connor & Davidson, 2003).

In our population, resilience scores were decreased as level of alcohol intake increased in the officers. These results are similar to previous research that has also found a relationship between the lack of resilience and alcohol use (Johnson, Dinsmore, & Hof, 2011; Wingo, Ressler, & Bradley, 2014). The literature indicates that resilience characteristics can mitigate both substance abuse and alcohol usage (Johnson et al., 2011; Wingo et al., 2014). In our population, alcohol use may have contributed to lower levels of resilience. Longitudinal follow-up may help elucidate the relationship between alcohol use and resiliency.

The cross-sectional nature of our data also allowed us to measure the association between level of resilience and PTSD symptoms, but we were not able to evaluate resilience as a dynamic process, i.e. how exposure to the hurricane may have increased or decreased resilience in the population. Our expectation was that individuals with fewer PTSD symptoms would have higher resilience scores. Our results reflected this expectation. This finding is consistent with other reports that have found that higher levels of resilience are associated with fewer PTSD symptoms (Agaibi & Wilson, 2005; Connor et al., 2003). It has been suggested that positive emotions, such as those identified with resilience including

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hope, high self-esteem, assertiveness, internal locus of control, and hardiness are associated with less emotional distress following a traumatic event and may protect individuals from negative sequela such as PTSD (Agaibi & Wilson, 2005; Fredrickson et al., 2003). Longitudinal studies that can evaluate resilience as a dynamic process will be of interest to better understand how internal and external factors contribute to resilience.

Gratitude scores were lowest among officers in the 'Other' racial category. This category consisted of Hispanic, Native American, and Japanese individuals. African Americans had the highest gratitude scores, followed closely by Caucasians. While this assessment has high psychometric properties and has been used in Caucasian, African American, Asian American, and Latino/Hispanic populations, it has not been validated in a number of other racial/ethnic groups. The lower gratitude score in the 'Other' category may be that gratitude is expressed differently in these populations; therefore the assessment did not accurately capture the feelings or the expression of gratitude in the group. It is also possible that the individuals in the 'Other' group experienced greater personal or property losses as a result of Hurricane Katrina resulting in a lower gratitude score.

Expressing gratitude or having a grateful disposition is associated with increased life satisfaction, hope, and happiness (McCullough et al., 2002; McCullough et al., 2004). Individuals who score high on gratitude also tend to score highly in empathy, forgiveness, and agreeableness (McCullough et al., 2002; McCullough et al., 2004). Positive attributes are associated with reduced distress related to PTSD (Agaibi & Wilson, 2005; McCullough et al., 2002). For this reason, we expected that mean PCL-C scores would be lower as the gratitude score increased. Our results reflected this expectation. Few studies have specifically evaluated the association between gratitude and symptoms of PTSD. One study that did, evaluated gratitude and well-being in Vietnam veterans, but did not find as association between gratitude and PTSD severity as measured by the Mississippi Scale (Kashdan et al., 2006). However, after controlling for PTSD severity, gratitude was significantly positively associated with affect balance, self-esteem, and intrinsically motivating activity in individuals with PTSD compared to those without (Kashdan et al., 2006). Overall, gratitude predicted feelings of well-being in the veterans with PTSD. Research indicates that individuals who experience more gratitude are more satisfied with their lives, happy, and optimistic (McCullough et al., 2002; McCullough et al., 2004). This trait may help an individual who has experienced a trauma recover more quickly or protect them from PTSD or PTSD symptoms and may help explain the positive relationship we saw between gratitude and PCL-C symptoms.

In our population, mean satisfaction with life increased as years served as an officer increased. This may be due to the fact that officers with more years are also most likely to be in higher positions, are able to work shifts of their choice, and make more money. It may also be that as the officers approach retirement they feel more life satisfaction.

Officers with high and very high life satisfaction also reported fewer PTSD symptoms. However, it is difficult to say, given the cross-sectional nature of this study, that experiencing PTSD symptoms results in dissatisfaction with life or dissatisfaction with life contributes to increased PTSD symptoms. In comparison to other studies, satisfaction with

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life has been found to be associated with lower rates of depression and anxiety (Samaranayake & Fernando, 2011). In a recent study, satisfaction with life was evaluated in 778 undergraduate students in Auckland, New Zealand. They found that students who reported dissatisfaction with life were more likely to suffer from anxiety and depression (Samaranayake & Fernando, 2011). In another study, satisfaction with life, meaning in life, and core beliefs were evaluated to examine which factors lead to posttraumatic growth (Triplett et al., 2012). Two populations were evaluated in this study: one consisted of 95 women and 53 men while the other consisted of 45 men and 140 women. The data from both groups was combined and analysed together. Life satisfaction was negatively related to PTSD symptoms as measured by the Impact of Events Scale—Revised (IES-R) (Triplett et al., 2012). In this study, the disruption of core beliefs that led to intrusive rumination about the event had a negative effect on life satisfaction. On the other hand, a disruption of core beliefs with deliberate rumination resulted in positive life satisfaction. Posttraumatic growth also had a total positive effect on life satisfaction (Triplett et al., 2012). These results indicate that life satisfaction is positively associated with fewer PTSD symptoms; however, a number of other factors contributed to this relationship including direct versus intrusive rumination, core beliefs, and the individuals' ability to find meaning in life. Posttraumatic growth was also associated with this relationship, but again this relationship is not linear and indicates that satisfaction with life may affect and be affected by other factors.

The idea that an individual may perceive some positive benefit from a traumatic event is captured in the concept of posttraumatic growth (Tedeschi & Calhoun, 1995, 1996). We found that posttraumatic growth was higher in female officers compared to male officers. This is consistent with some, but not all studies (Linley & Joseph, 2004; Tedeschi & Calhoun, 1996). Our results may indicate that the female officers are dealing with the trauma associated with Hurricane Katrina differently than the male officers, or that they have been better able to find some benefit or meaning from the event compared to the male officers. Unfortunately, due to small numbers we were unable to stratify the posttraumatic growth subfactors by sex. This may have allowed us to identify one or more specific subfactor domains in which the male and female officers differed, possibly further elucidating if any one or more subfactors enabled the female officers to cope better than the male officers.

We did not see an association between the PCL-C symptom score and posttraumatic growth in our population. Similar results have been reported in other cross-sectional studies in which either no association between PTSD symptoms and posttraumatic growth or a positive association was observed (Linley & Joseph, 2004; Zoellner & Maercker, 2006; Zoellner, Rabe, Karl, & Maercker, 2008). Interestingly, posttraumatic growth does not always occur in conjunction with less distress; research indicates that high scores on one will not equate to low scores on the other. The relationship between posttraumatic growth and distress appears to be more complex. Tedeschi and Calhoun (1996) reported similar results, finding that posttraumatic growth was not necessarily related to psychological health, but was a separate construct indicating that positive and negative effects of the trauma could co-occur in an individual.

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Unlike cross-sectional studies, longitudinal research generally reports positive associations between posttraumatic growth and distress (Cordova, Cunningham, Carlson, & Andrykowski, 2001; Frazier, Conlon, & Glaser, 2001; McMillen, North, Mosley, & Smith, 2002; Zoellner & Maercker, 2006). It has been suggested that posttraumatic growth may increase over time, which cannot be captured with cross-sectional data. Longitudinal research indicates that overall posttraumatic growth generally occurred within the first 2 months following the event and remained fairly stable over the next 3 to 8 years (Affleck, Tennen, Croog, & Levine, 1987; McMillen et al., 2002). Research also indicates that over time, distress decreases in individuals who have perceived some benefit from the trauma. In contrast, distress was reported to increase in individuals who did not perceive benefits (Zoellner & Maercker, 2006). As our study was cross-sectional we were unable to measure changes in posttraumatic growth across time. However, the index trauma occurred 7 years prior to the assessment. With this in mind, it might be assumed that if posttraumatic growth stabilizes over time, any posttraumatic growth or benefit the officers might experience would have already occurred. However, other events prior to, or since the hurricane may have affected the relationship between PTSD symptoms and posttraumatic growth in our sample. Longitudinal research in this population would be of interest to further evaluate the relationship between PTSD symptoms and posttraumatic growth and whether further time, or intervention would reduce PTSD symptoms and facilitate growth.

This study has several limitations. First, this study is limited by the small sample size and an approximate 49% response rate. Therefore, those officers who chose to respond to the study may be different than those who did not. Nonresponse may have introduced selection bias or nonresponse bias, if individuals with PTSD were more likely to respond. We do not have information about the non-responders. However, the rates of PTSD in this population are similar to those observed in other studies that evaluated PTSD associated with Hurricane Katrina; this may indicate that our sample population is representative of other populations affected by Hurricane Katrina and therefore might not be affected by misclassification bias, although we cannot be certain of this (Galea et al., 2007; Kishore et al., 2008). Second, because this study is cross-sectional we cannot show that resilience, gratitude, or satisfaction with life resulted in lower PTSD symptoms, only that they are associated in this population, the direction of causality cannot be determined. Third, the PCL-C provides a self-report measure of PTSD symptoms, as opposed to a clinical diagnosis of PTSD. Underreporting of symptoms may be of concern for this occupational population, who as a group might be reluctant to disclose this information. Fourth, recall bias is a potential issue in any retrospective study. It is also possible that, due to the nature of their work the officers may have experienced traumatic events prior to Hurricane Katrina. To reduce potential recall bias Hurricane Katrina was used as the index event and all officers were told to respond to the questionnaires with this event in mind. However, events prior to or since Hurricane Katrina may have affected the relationships we observed. Last, police self-select to work a job in which they are likely to experience stressful events that might lead to trauma; therefore, it is possible that the results seen for officers are not generalizable to other populations.

A strength of this study is that it is unique; there are few studies, if any, that have specifically evaluated if positive factors are associated with PTSD symptoms in police officers following a natural disaster. The results of this study may be generalizable to similar

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sized police forces in the same geographic area. Longitudinal studies in larger populations may help to further clarify these relationships, helping to elucidate causality.

In summary, the results of this research indicate that resilience, gratitude, and satisfaction with life may be protective or mitigate symptoms of PTSD in some police officers, and that clients' strengths may be important in helping them address trauma symptoms. In contrast, posttraumatic growth overall was not associated with reduced symptoms of PTSD. Continuing to extend our understanding of how positive factors are associated with fewer PTSD symptoms can inform and guide treatment modalities for PTSD. Longitudinal research should be conducted to continue to assess how protective factors alone and in combination play a role in protecting against or reducing negative sequelae such as PTSD.

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Table I

Characteristics of the study population stratified by sex

Characteristic	Females (*N* = 30)		Males (*N* = 84)		Total (*N* = 114)	
	n	%	*n*	%	*n*	%
Race						
Caucasian	13	44.8	47	56.6	60	53.6
African–American	14	48.3	34	40.9	48	42.9
Other	2	6.9	2	2.4	4	3.5
Education						
High school/GED	5	16.7	7	8.3	12	10.5
College < 4 years	13	43.3	56	66.7	69	60.5
College 4 + years	12	40.0	21	25.0	33	29.0
Marital status						
Single	9	30.0	14	16.9	23	20.4
Married	14	46.7	53	63.9	67	59.3
Divorced	7	23.3	16	19.2	23	20.3
Years served						
0–9	7	31.8	41	50.0	22	25.6
10–14	6	27.3	24	29.3	16	18.6
15–19	4	18.2	11	13.4	15	17.4
20+	5	22.7	6	7.3	33	38.4
Alcohol drinks per day						
Never or 1–2	22	75.9	15	23.4	63	56.8
3 or 4	6	20.7	10	15.6	30	27.0
5 or 6	1	3.5	11	17.2	12	10.8
≥7	0	0.0	28	43.8	6	5.4
	Mean (SD)		Mean (SD)		Mean (SD)	
Age (years)	43.5 (9.1)		42.8 (8.8)		43.0 (8.8)	
PCL-C score	29.5 (14.5)		27.8 (12.1)		28.2 (12.7)	
Resilience score	31.4 (4.8)		29.9 (6.3)		30.3 (5.9)	
Satisfaction with life	23.9 (6.7)		23.0 (6.3)		23.2 (7.5)	

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Characteristic	Females (*N* = 30)		Males (*N* = 84)		Total (*N* = 114)	
	n	**%**	***n***	**%**	***n***	**%**
Gratitude score	36.5 (5.7)		33.9 (7.7)		34.6 (7.3)	
Post-traumatic growth score	55.3 (32.5)		39.1 (25.9)		43.1 (28.4)	

Note: Categorical variables are *n* (%); continuous variables are means ± SD.

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Table II

Associations between the PCL-C score and protective factors

	PCL-C score			
Quartiles of protective factors	***N***	**Unadjusted[a] mean (SD)**	**Age and sex Adjusted[b] mean (SE)**	**Multivariable model[b,c] mean (SE)**
Resilience				
[14.0–26.0]	27	35.0 (15.3)	35.2 (2.3)	31.6 (2.3)
[27.0–30.0]	29	30.0 (14.2)	29.9 (2.3)	32.3 (2.3)
[31.0–34.0]	29	25.3 (8.1)	25.7 (2.4)	26.4 (2.1)
[35.0–40.0]	29	23.1 (9.0)	22.0 (2.4)	22.6 (2.2)
β (SE)		−0.84 (0.19)	−0.92 (0.19)	−0.65 (0.19)
p-value[d]		<.001	<.001	.001*
Satisfaction with life				
[5.0–17.0]	25	34.0 (14.4)	34.1 (2.5)	33.8 (2.3)
[18.0–23.0]	30	31.1 (15.7)	31.0 (2.4)	29.7 (2.2)
[24.0–29.0]	30	25.9 (9.1)	26.0 (2.4)	26.9 (2.2)
[30.0–35.0]	27	23.0 (7.6)	23.0 (2.5)	23.3 (2.4)
β (SE)		−0.62 (0.15)	−0.63 (0.16)	−0.55 (0.15)
p-value		<.001	<.001	.001*
Gratitude				
[6.0–32.0]	31	32.5 (13.0)	33.4 (2.3)	33.3 (2.1)
[33.0–36.0]	26	29.8 (13.4)	29.6 (2.6)	26.5 (2.4)
[37.0–39.0]	27	26.7 (10.1)	27.1 (2.5)	27.8 (2.3)
[42.0–42.0]	28	24.3 (13.1)	23.1 (2.5)	24.7 (2.3)
β (SE)		−0.60 (0.16)	−0.73 (0.16)	−0.67 (0.15)
p-value		<.001	<.001	<.001*
Post-traumatic growth				
[0.0–22.0]	27	26.7 (14.5)	27.9 (2.7)	26.1 (2.5)
[23.0–41.0]	28	25.1 (8.9)	24.8 (2.6)	24.6 (2.3)
[42.0–63.0]	28	33.1 (13.9)	33.1 (2.4)	32.7 (2.2)
[65.0–105.0]	27	28.8 (12.2)	27.7 (2.5)	29.8 (2.5)
β (SE)		0.06 (0.04)	0.03 (0.05)	0.09 (0.05)
p-value		.176	.138	.055

[a] Unadjusted means ± SD were calculated using ANOVA.

[b] Adjusted means ± SD were calculated using ANCOVA.

[c] Multivariable adjusted models included age, sex, race, education, and alcohol use.

[d] β (SE) and *p*-values were calculated using linear regression.

* These *p*-values remain significant at a Bonferroni critical alpha level of .004 (.05/12).

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Table III

Adjusted mean levels of protective factors stratified by DSM-IV PCL-C symptom clusters of re-experiencing, avoidance/numbing, and arousal

	Cluster B: Re-experiencing 1 of 5		*p*-value	Cluster C: Avoidance/Numbing 3 of 7		*p*-value	Cluster D: Arousal 2 of 5		*p*-value
	Yes	No		Yes	No		Yes	No	
Resilience	23.8 (1.6)	31.1 (0.6)	<0.001*	29.2 (1.4)	30.3 (0.7)	.489	25.9 (1.7)	30.8 (0.6)	.014
Satisfaction with life	18.0 (2.2)	23.9 (0.8)	0.015	18.3 (1.7)	24.5 (0.8)	.003*	18.9 (2.2)	23.8 (0.8)	.046
Gratitude	30.0 (2.1)	35.2 (0.8)	0.026	28.9 (1.6)	36.1 (0.8)	<.001*	29.3 (2.0)	35.4 (0.8)	.009
Posttraumatic growth	53.5 (7.8)	39.9 (2.9)	0.117	43.5 (6.4)	41.5 (3.1)	.788	50.2 (7.7)	40.5 (2.9)	.257

[a] Adjusted for: age, sex, race, education, and alcohol use.

* These *p*-values remain significant at a Bonferroni critical alpha of .004 (.05/12).