A prospective study of predictors of depression symptoms in police

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Abstract

Police work is one of the most stressful occupations. Previous research has indicated that work stress and trauma exposure may place individuals at heightened risk for the development of depression symptomatology. This prospective longitudinal study was designed to examine predictors of depression symptoms in police service.119 healthy police recruits from an ongoing prospective study were examined. Participants completed baseline measures of depression symptoms, childhood trauma exposure, neuroticism, and self-worth during academy training. Follow-up measures of depression symptoms, PTSD symptoms, critical incident exposure, negative life events, and routine work environment stress were assessed after 12 months of police service. Hierarchical linear regression analysis was conducted to examine predictors of current levels of depression symptoms, controlling for baseline depression symptoms and current PTSD symptoms. Greater childhood trauma exposure, lower self-worth during training and greater perceived work stress in the first year of police service predicted greater depression symptoms at 12 months. Depression symptoms at one year of police service were partly independent from PTSD symptoms at 12 months. Greater childhood trauma exposure and lower self-worth during training may be important variables to screen as risk factors for duty-related depression. Strategies to reduce routine work environment stress have potential to decrease duty-related depression in law enforcement.

Keywords

depression; childhood trauma; self-worth; work stress

1. Introduction

Police work is widely regarded as one of the most stressful occupations in American society (Liberman 2002; Violanti, 2006). Police work involves exposure to multiple critical incident stressors including the risk of being seriously injured and even killed. Public demands on police officers and organizational factors such as long shifts, time pressure and inadequate

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resources also contribute to the stress of this profession (Collins and Gibbs, 2003). Previous studies have found that routine occupational stress or stressful work conditions have adverse effects on mental health (Liberman et al., 2002). A survey of experienced police officers indicated that perceived work stress was significantly associated with increased anxiety, depression, somatization, posttraumatic stress symptoms, "burnout", chronic back pain, alcohol abuse, and inappropriately aggressive behavior (Gershon, 2002).

While recent attention has been largely focused on Posttraumatic Stress Disorder, the combination of exposure to critical incident stressors and routine work stressors can also result in a number of other reactions, including depression. Major depression is among the most debilitating disorders and according to the World Health Organization is projected to become the second leading cause of the global burden of disease by 2020. Rates of major depression disorder and levels of depression symptoms were found to be higher in police than the general population and those with depression have poorer quality of life (Chen, 2006).

In the general population, risk factors for depression include female gender (Kendler, 2004; Blackmore, 2007), childhood trauma (Young, 1997; Cabrera, 2007), neuroticism (Kendler, 2004; Fanous, 2007), low self-worth/self-esteem (Reis and Grenyer, 2002; Franck and De Raedt, 2007), maladaptive coping styles (Walker, 2006), alexithymia (Honkalampi,2001), greater stressful life events (Kendler, 2004; Cabrera, 2007), greater work stress (Blackmore, 2007), low social support (Blackmore, 2007) and insecure attachment (Roberts,1996).

The majority of these findings were derived from cross-sectional studies relying on retrospective data. Although two prospective studies have been conducted with firefighters (Bryant and Guthrie 2005, 2007; Heinrichs 2005), the present study is the first prospective longitudinal design we are aware of to investigate predictors of depression in police service. In the present study, we hypothesized that greater exposure to childhood trauma, higher neuroticism and lower appraisals of self-worth assessed during academy training, and higher levels of critical incident exposure, negative life events and routine work environment stress during the first year of police service would predict greater levels of depression symptoms after the first year of police service. As we were interested in predicting symptoms that developed during the first year of active police duty, we controlled for baseline levels of depression symptoms assessed during academy training. We also controlled for PTSD symptoms assessed at the 12 month follow-up because depression often occurs a secondary co-morbidity in those with PTSD (Schnurr et al.2002).

2. Methods

2.1 Participants

Data were collected as part of a larger prospective and longitudinal study of police officer stress and health. Participating police officers were recruited during police academy training in four urban police departments (New York, Oakland, San Francisco, and San Jose). The sample used in this study is a subset of the 287 trainees who volunteered to participate in the parent project. Because one of the key measures (childhood trauma) was added after the parent project started, only 119 participants completed all the measures of the present study at the baseline. There were no significant differences in demographics and depression symptoms between this sub-sample and the whole sample. All 119 officers participated in the 12 months follow-up.

2.2 Procedures

Police academy trainees were referred to the study by research team personnel during academy training classes. The study presentation included the distribution of a letter from

the study team, a letter from the commissioner or police chief of the affiliated department, a description of the study procedures, a participation form, and a contact number. Participants were evaluated at baseline, which occurred while they were in training at the police academy, and twelve months after commencement of police service. Study procedures were described in detail and written informed consent was obtained. At each timepoint, a structured clinical interview was conducted by doctoral level clinicians and participants completed self-report questionnaires. All procedures were approved by the University of California Human Subjects Committee and Institutional Review Board and a Federal Certificate of Confidentiality was obtained.

2.3 Initial Assessment

2.3.1 Selected Axis I Disorders—The presence of current or past anxiety, mood and substance abuse disorders was determined using the *Structured Clinical Interview for DSM-IV (SCID NP)* (First et al, 1996).

2.3.2 Demographics—Participants were asked to report on age, gender, marital status, ethnic minority status, and education.

2.3.3 Baseline Depression symptoms—The *Symptom Checklist-90-Revised* (SCL-90-R, Derogatis, 1983) is a widely used 90-item self-report measure of global psychopathological symptoms. Respondents rate items on a five-point scale reflecting their distress during the past 7 days. Scores are generated for nine symptom scales and an overall Global Severity Index (GSI). In present study, we used the depression subscale as the measure of baseline depression symptoms.

2.3.4 Childhood Trauma—The *Early Trauma Inventory Self Report-Short Form* (ETISRSF, Bremner et al. 2007) was used to assess experience of childhood trauma before 18 years old. It includes 11 general trauma items, 5 physical abuse items, 5 emotional abuse items, and 6 sexual abuse items, for a total of 27 items. Participants indicate "yes" or "no" for each item. Items that have "yes" responses are added for each domain and the total score is the sum of the four domain scores. The ETISF-SF has been found to have good validity and reliability, with Cronbach's alpha of the individual domains ranging from 0.70 to 0.87.

2.3.5 Neuroticism—The *NEO Five-Factor Inventory* (NEO-FFI, Costa and McCrae, 1992) was used to assess neuroticism in the present study. The NEO-FFI is a 60-item abbreviated version of NEO Personality Inventory-Revised (NEO-PI-R) which is based on the Five Factor Model (FFM) of personality. Twelve questions for each factor are rated on a 5-point scale with responses ranging from "strongly agree" to "strongly disagree". Internal consistency was determined to be 0.86 for the neuroticism subscale.

2.3.6 Self-worth—The *World Assumptions Scale* (WAS, Janoff-Bulman, 1989) was used to measure self-worth. The WAS is a 32-item self report scale assessing eight categories of an individual's cognitive schemas of self and the world. Participants are asked to indicate their beliefs on a 6-point Likert type scale ranging from "*strongly disagree*" to "*strongly agree*". Internal consistency reliabilities of 0.67 to 0.78 have been reported for the subscales, and the measure has been determined to have good validity.

2.4 Twelve-Month Follow-Up

2.4.1 Current Depression symptoms—The *Beck Depression Inventory Revised* (BDI-II, Beck, Steer and Brown, 1996) was used to assess depression symptoms at twelve month follow-up. The BDI-II is a 21-item (four-point scale) self-report instrument, designed to assess the severity of depression symptoms over the preceding week. The BDI-II has been

shown to be a reliable and well-validated measure in screening for depression symptoms in adults with Cronbach's alpha ranging from 0.73 to 0.95.

2.4.2 Current PTSD Symptoms—The *PTSD Checklist-civilian version* (PCL-C, Weathers et al. 1993) is a 17-item self-report assessment of DSM-IV PTSD-related symptoms of intrusion, avoidance, and hyperarousal. Participants endorse the level of distress experienced for each of the items on a 5-point scale ranging from 1 (not at all) to 5 (extremely) in the past month. For this study, police were asked how much they have experienced each item related to their most stressful experience during police service.

2.4.3 Critical Incident Exposure—The *Critical Incident History Questionnaire* (CIHQ, Weiss D.S., et al.. 1999) is a 34-item self-report measure assessing cumulative exposure to critical incidents. Participants tabulate the frequency of exposure to each critical incident in the line of duty, resulting in a total cumulative exposure score across all items. The CIHQ demonstrated good agreement on incident severity ratings (.94), and adequate convergent and divergent validity. For the purposes of this study, we utilized 14 items that were personally life threatening to police officers.

2.4.4 Negative Life Events—Negative life events in the past year were measured with the *Life Experiences Survey* (LES, Sarason, et al, 1978). The LES contains 50-items describing life changes each of which are rated on a seven-point Likert scale ranging from "extremely negative" to "extremely positive" influence. Positive and negative events are summed separately. In the current investigation, we utilized negative life events reported in the last 12 months. The LES has been shown to have good validity and reliability.

2.4.5 Work Stress—The *Work Environment Inventory* (WEI; Liberman et al., 2002) is a 68-item measure in which police officers are asked to respond on a five-point Likert scale to several statements about police service with responses ranging from "strongly disagree" to "strongly agree". Positive and negatively phrased items are counterbalanced, and higher scores indicate greater work environment stress. This measure was found to have good validity and reliability, with a Cronbach's alpha of .92.

2.5 Data Analysis

All data were checked for expected ranges, presence of outliers and abnormal values, and to determine that the distribution of variables met assumptions of statistical tests. Pearson correlation analyses were used to determine associations of candidate predictors with depression symptoms at twelve-month follow-up (current depression symptoms). In order to test the contribution of each candidate predictor, hierarchical linear regression analysis was conducted with the BDI-II score as the dependent variable and childhood trauma, neuroticism, self-worth, negative life events, work stress and critical incident exposure as the predictor variables. To account for the effects of confounding factors, baseline depression (depression subscale of SCL-90-R) and PTSD symptoms at 12 month follow-up were entered into the regression equation in the first step and the additional predictors were entered in the subsequent steps in temporal order (i.e. pre-academy stage, academy stage and police service stage). Regression diagnostics showed that the assumptions of the linear regression model were reasonably met except that the residuals were not normally distributed (Shapiro-Wilk $W = 0.879$, $p < .001$). Because of this we repeated the regression analysis using non-parametric bootstrapping, and obtained results very close to those from the standard hierarchical linear regression. We therefore report the results of the standard hierarchical linear regression. Most of the statistical analyses were conducted using SPSS for Windows (Version 13.0). Bootstrap analyses were implemented by Stata Statistics and Data Analysis Package (Version 10.0).

3. Results

3.1 Participants Characteristics

Participant demographics are listed in Table 1. This table shows that the sample was ethnically diverse, predominantly male, single and under age 30 with some college education. There were no significant associations between these demographic variables and current depression symptoms.

SCID interviews at baseline revealed no current Axis I disorders present in recruits. A minority of participants met criteria for prior lifetime diagnoses, all in full remission during academy training, including several cases of prior major depression (5.9%, *n*=7), PTSD (1.7%, *n*=2), alcohol abuse (5.0%, *n*=6), and alcohol dependence (2.5%, *n*= 3),.

At the baseline assessment during academy training, participants were assessed for childhood trauma (Mean=3.71, SD=3.37, range:0-17), neuroticism (Mean=13.57, SD=5.92, range:0-23), perceived self-worth (Mean=55.32, SD=6.56) and baseline depression symptoms (Mean=0.16, SD=0.23, range:0-1.54). At twelve month follow-up assessment, participants were asked about current depression symptoms (Mean=3.94, SD=4.61, range: 0-20), critical incident exposure (Mean 6.05, SD 3.71, range:0-20.02), current PTSD symptoms (Mean=18.95, SD=3.80), negative life events exposure in past 12 month (Mean=4.77, SD=4.92, range:0-21) and perceived work stress (Mean= -0.40, SD=0.51, range:-2.0-0.86).

At twelve month follow-up assessment, 77.3% participants reported depression symptoms. The most frequent symptoms were *changes in sleep quality,* (56.3%), *loss of energy* (39.5%) and *tiredness/fatigue* (39.5%). Different depression measures were used for the baseline (SCL-90 R) and follow-up (BDI-II) assessments in our analyses. However, we examined the relationship between SCL-90-R depression scale at 12 months and BDI-II at 12 months and found they were highly correlated (r=0.77).

3.2 Correlation Analyses

Pearson correlations are presented in Table 2. Greater childhood trauma exposure, greater neuroticism and lower levels of perceived self-worth during academy training, and greater negative life events and greater perceived work stress in the first year of police service were associated with greater levels of current depression symptoms. The association of cumulative critical incident exposure during the first year of police service with depression symptoms at 12 months of service was not significant.

3.3 Hierarchical Linear Regression Analyses

Results of the hierarchical linear regression are presented in Table 3. Baseline depression symptoms and PTSD symptoms at 12 months, entered at the first step, accounted for 35% of the variance of BDI-II scores at 12 months. Childhood trauma, entered at the second step, accounted for an additional 7% of the variance, with greater childhood trauma associated with greater depression symptoms. Neuroticism and perceived self-worth, entered at step 3, accounted for an additional 4% of the variance of depression symptoms. The final step included stressor exposure variables during first year police service, including negative life events, perceived work stress and critical incidents, which accounted for an additional 3% of the variance. One control variable, current PTSD symptoms, and three predictor variables (greater childhood trauma, lower self-worth during training and greater perceived work stress in the first year of police service) had significant beta weights in the final model. Baseline depression, neuroticism, negative life events and critical incidents exposure were not significant predictors in the final model. There were 7 participants who had a prior

history of major depression. Although we controlled for baseline depression symptoms, we verified that our model yielded essentially the same results with these participants excluded.

4. Discussion

The present study focused on factors which may contribute to the development of depression symptoms following one year of active police duty. In the final model, greater childhood trauma exposure, lower perceived self-worth during training and greater perceived work stress during the first year of police service predicted higher levels of depression symptoms at 12 month follow-up (current depression symptoms) even after controlling for depression symptom levels during academy training and PTSD symptoms at 12 month follow-up.

Childhood trauma has been found to be significantly and positively associated with almost all psychiatric disorders according to a National Community Survey (Kessler et al. 1997). Greater childhood trauma exposure commonly occurs in a setting of multiple developmental risk factors, including more disturbed family environment, the latter being strongly associated with later vulnerability to mood and anxiety disorders (Young, 1997). In the present study, childhood trauma exposure strongly contributed to the development of depression symptoms. This result is consistent with several recent studies (Kendler, 2004; Cabrera, 2007). In addition, a recent study showed that depressed patients who had attempted suicide reported significantly more childhood trauma (Sarchiapone et al. 2007). This finding suggests that childhood trauma not only predicts depression symptoms but also predicts worse outcome.

Childhood trauma is associated with subsequent maladaptive coping styles. Prior studies suggest that maladaptive coping styles (Walker, 2006) and insecure attachment (Roberts et al, 1996) are predictors of depression. Moreover, attachment and coping styles are thought to mediate the effects of childhood trauma on psychological distress (Shapiro and Levendosky, 1999). Drawing on these previous findings, it is possible that police officers who experienced greater childhood trauma exposure may use maladaptive coping styles when encountering stressful situations in police service (Hyman, 2007), resulting in an increased likelihood of developing symptoms of depression.

Cognitive theory suggests that cognitive factors are involved in the development and maintenance of emotional disorders (Mathews and MacLeod, 2005). From this perspective depression is thought to be caused by the interaction of cognitive vulnerability factors and perceived stress (Ingram, 1998; Franck and De Raedt, 2007). Among those multiple cognitive factors, a number of studies revealed that lower self-worth or self-esteem is strongly associated with depression in both adults and adolescents (Roberts, 1996; Reis and Grenyer, 2002; Franck and De Raedt, 2007). In two other studies, regression and structural equation models indicated that low self-worth was associated with a vulnerability factor for depression symptoms (Reis and Grenyer, 2002; McCarty 2007). Consistent with previous research, in the present study, self-worth at baseline was negatively correlated with current depression symptoms. In contrast to the prior studies, the prospective nature of the present study allows us to conclude that low self-worth before entering active duty police service predicted the onset of depression symptomatology, over and above the effects of depression symptoms at baseline and current PTSD symptoms.

It has been suggested that those with lower self-worth tend to develop negative cognitions and self-devaluation, contributing further to dysphoric mood (Ingram 1998). Under stressful police work conditions, police officers with lower self-worth prior to entering active police service may have a greater tendency to develop depression symptoms, which may further perpetuate a cycle of depression symptomatology and low self-worth. These symptoms may in turn lead to greater perceived stress and impairment in the work setting. Our findings,

emerging in a prospective design, provide support for the cognitive theory of depression and suggest that perceived self-worth plays an important role in the development of subsequent depression symptoms. However, selfworth was measured during police academy training, which is also a stressful environment. Although we controlled for baseline depression in our analyses, we cannot completely exclude the impact of police training on self-worth.

Depression is increasingly viewed as an abnormality of stress adaptation systems in the brain (Shelton, 2000). Psychosocial stress may disturb neuroendocrine systems, which may lead to the development of a depression disorder (Kunz-Ebrecht et al. 2004; Rydmark et al. 2006). In particular, chronic work stress has been shown to be an important risk factor for depression (Blackmore, 2007). Several studies on the association of police work stress and PTSD have been carried out and reveal a significant impact of police work stress on PTSD symptoms (Liberman et al., 2002, Gershon et al., 2002),but few studies on the relationship of police work stress to depression have been done. Our results found that routine work environment stress in the first year of police service is significantly associated with current levels of depression symptoms, over and above critical incident stressors. However, because both perceived work stress and current depression symptoms were assessed at the same timepoint (12 months), it is difficult to determine causality.

Negative life events have also been thought to be a predictor of depression (Kendler, 2004; Cabrera, 2007). However, while negative life events were significantly associated with current depression symptoms in the present study, they did not account for a significant increment in variance in depression symptoms in our final model. This may be explained in part by the significant correlation between negative life events and work stress (r =0.196), however, as shown in the full model in Table 3, routine work stress predicted depression symptoms over and above negative life events. In addition, critical incident exposure was not correlated with depression symptoms suggesting that critical incident stress exposure may be more important in predicting PTSD than depression symptoms.

Consistent with prior research (Kendler, 2004; Fanous, 2007), we also found a significant correlation between baseline neuroticism and current depression symptoms in this study. However, neuroticism was not significant in our final model. Neuroticism is significantly associated with baseline depression, current PTSD symptoms and self-worth. Controlling for any one of these variables makes the relationship between neuroticism and current depression symptoms non-significant.

As might be expected, childhood trauma has strong associations with both perceived self-worth and perceived work stress in this population. Although all three factors were significant predictors of depression symptoms, our data suggests that childhood trauma may have a uniquely important role in development of depression symptoms. Childhood trauma exposure was still significant in predicting depression symptoms after we controlled for self-worth and perceived work stress. This is all the more noteworthy given the very low rate of lifetime PTSD in this sample. Exposure to childhood trauma, in the absence of a history of childhood or adolescent PTSD, is an important predictor, suggesting that exposure itself increases vulnerability to routine and traumatic stressors of police service. These results are consistent with the findings from primate studies reporting that early trauma exposure results in greater HPA reactivity to later stressors (Heim et al., 2008) and that childhood trauma exposure in combination with polymorphisms of the serotonin transporter gene predicts adult onset depression (Vergne and Nemeroff, 2006). The substantial impact of childhood trauma exposure on depression symptoms was also highlighted in a study of deployed military troops that found that childhood trauma independently predicted depression beyond the contribution of combat exposure (Cabrera, 2007).

There are several limitations to these data that should be noted. First, depression symptoms in this population were low after only one year of police service. A study of firefighters found that posttraumatic stress symptoms were low at six months of service but increased significantly after 4 years of fire fighting duties (Bryant and Guthrie 2005, 2007), and our previous cross-sectional survey also found moderately high depression symptoms among experienced police officers (Marmar et al, unpublished), suggesting that in our study symptoms are likely to increase over time as well. It will be important to continue to evaluate the relationships we tested as symptom profiles of our cohort change over time. Second, most of the participants in this study were male (86.6%), therefore it is not possible to explore the contribution of gender in predicting depression symptoms. Third, baseline depression was assessed using the SCL-90-R while the BDI-II was used to assess depression symptoms at the 12-month follow-up. Although there is a reasonably high correlation (r=0.77) between BDI-II and SCL-90-R depression subscale at the 12 month follow-up, using the BDI-II at the initial assessment would have provided more consistent and comprehensive assessment of depression at baseline. Fourth, the validity of adult retrospective self-report measures of childhood trauma may be compromised by fallibility of memory and social desirability bias (Min, 2007), although it has been demonstrated to be a worthwhile method (Hardt, 2004). Finally, it is possible that the relatively low prevalence of depression symptoms and lifetime mental disorder diagnoses in our sample may be due to a tendency to under-report due to concerns about employment status. This potential response bias may impact the generalizability of our results.

Despite the limitations our findings have implications for the prevention of depression symptoms among police officers. After one year of police service, depression symptoms were partly independent from PTSD symptoms and predicted by greater childhood trauma, lower perceived self-worth and greater perceived work stress. Childhood trauma and self-worth of police trainees may be important variables to screen for prior to police service to identify those who may be more vulnerable to depression and may benefit from resilience building interventions during academy training. In addition attention to routine work stress management during police service, including building unit cohesion by resolving conflicts, providing reliable equipment, limiting overtime shifts, fostering community relations, and eliminating prejudice in a diverse work force hold promise for protecting against the development of depression.

Acknowledgments

References

Beck, AT.; Steer, RA.; Brown, GK. Beck Depression Inventory-II: Manual. San Antonio, TX: The Psychological Corporation; 1996.

Blackmore ER, Stansfeld SA, Weller I, Munce S, Zagorski BM, Stewart DE. Major depressive episodes and work stress: results from a national population survey. American Journal of Public Health. 2007; 97:2088–2093. [PubMed: 17901431]

Bremner JD, Bolus R, Mayer EA. Psychometric properties of the Early Trauma Inventory-Self Report. Journal of Nervous and Mental Disease. 2007; 195:211–218. [PubMed: 17468680]

Bryant RA, Guthrie RM. Maladaptive appraisals as a risk factor for posttraumatic stress: a study of trainee firefighters. Psychological Science. 2005; 16:749–752. [PubMed: 16181434]

Bryant RA, Guthrie RM. Maladaptive self-appraisals before trauma exposure predict posttraumatic stress disorder. Journal of Consulting and Clinical Psychology. 2007; 75:812–815. [PubMed: 17907863]

Cabrera OA, Hoge CW, Bliese PD, Castro CA, Messe rSC. Childhood adversity and combat as predictors of depression and post-traumatic stress in deployed troops. American Journal of Preventive Medicine. 2007; 33:77–82. [PubMed: 17673093]

Chen HC, Chou FH, Chen MC, Su SF, Wang SY, Feng WW, Chen PC, Lai JY, Chao SS, Yang SL, Tsai TC, Tsai KY, Lin KS, Lee CY, Wu HC. A survey of quality of life and depression for police officers in Kaohsiung, Taiwan. Quality of Life Research. 2006; 15:925–932. [PubMed: 16721651]

Collins PA, Gibbs AC. Stress in police officers: a study of the origins, prevalence and severity of stress-related symptoms within a county police force. Occupational Medicine. 2003; 53:256–264. [PubMed: 12815123]

Costa, PT., Jr; McCrae, RR. Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI): professional manual. Odessa, FL: Psychological Assessment Resources; 1992.

Derogatis, LR. SCL-R: Administration, scoring and procedures manual for the Revised version. 1st. Towson, MD: Clinical Psychometric Research; 1983.

Fanous AH, Neale MC, Aggen SH, Kendler KS. A longitudinal study of personality and major depression in a population-based sample of male twins. Psychological Medicine. 2007; 37:1163–1172. [PubMed: 17407614]

First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview for DSM-IV Axis 1 Disorders - Non-Patient Edition (SCID-I/NP, Version 2.0). New York, NY: Biometrics Research Department, New York State Psychiatric Institute; 1996.

Franck E, De Raedt R. Self-esteem reconsidered: unstable self-esteem outperforms level of self-esteem as vulnerability marker for depression. Behaviour Research and Therapy. 2007; 45:1531–1541. [PubMed: 17321496]

Gershon RR, Lin S, Li X. Work stress in aging police officers. Journal of Occupational and Environmental Medicine. 2002; 44:160–167. [PubMed: 11851217]

Hardt J, Rutter M. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. Journal of Child Psychology and Psychiatry. 2004; 45:260–273. [PubMed: 14982240]

Heim C, Mletzko T, Purselle D, Musselman DL, Nemeroff CB. The dexamethasone/corticotropin-releasing factor test in men with major depression: role of childhood trauma. Biological Psychiatry. 2008; 63:398–405. [PubMed: 17825799]

Heinrichs M, Wagner D, Schoch W, Soravia LM, Hellhammer DH, Ehlert U. Predicting posttraumatic stress symptoms from pretraumatic risk factors: a 2-year prospective follow-up study in firefighters. American Journal of Psychiatry. 2005; 162:2276–2286. [PubMed: 16330591]

Honkalampi K, Hintikka J, Laukkanen E, Lehtonen J, Viinamäki H. Alexithymia and depression: a prospective study of patients with major depressive disorder. Psychosomatics. 2001; 42:229–234. [PubMed: 11351111]

Hyman SM, Paliwal P, Sinha R. Childhood maltreatment, perceived stress, and stress-related coping in recently abstinent cocaine dependent adults. Psychology of Addictive Behaviors. 2007; 21:233–238. [PubMed: 17563143]

Ingram, RE.; Miranda, J.; Segal, ZV. Cognitive vulnerability to depression. New York: Guilford; 1998.

Janoff-Bulman R. Assumptive worlds and the stress of traumatic events: applications of the schema construct. Social Cognition. 1989; 7:113–136.

Kendler KS, Kuhn JW, Prescott CA. Childhood sexual abuse, stressful life events and risk for major depression in women. Psychological Medicine. 2004; 34:1475–1482. [PubMed: 15724878]

Kessler RC, Davis CG, Kendler KS. Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. Psychological Medicine. 1997; 27:1101–1119. [PubMed: 9300515]

Kunz-Ebrecht SR, Kirschbaum C, Steptoe A. Work stress, socioeconomic status and neuroendocrine activation over the working day. Social Sciences&Medicine. 2004; 58:1523–1530.

Liberman AM, Best SR, Meltzer TJ, Fagan JA, Weiss DS, Marmar CR. Routine occupational distress in police. Policing: An International Journal of Police Strategies and Management. 2002; 25:421–441.

Mathews A, MacLeod C. Cognitive vulnerability to emotional disorders. Annual Review of Clinical Psychology. 2005; 1:167–195.

McCarty CA, Vander Stoep A, McCauley E. Cognitive features associated with depressive symptoms in adolescence: directionality and specificity. Journal of Clinical Child and Adolescent Psychology. 2007; 36:147–158. [PubMed: 17484688]

Melchior M, Caspi A, Milne BJ, Danese A, Poulton R, Moffitt TE. Work stress precipitates depression and anxiety in young, working women and men. Psychological Medicine. 2007; 37:1119–1129. [PubMed: 17407618]

Min M, Farkas K, Minnes S, Singer LT. Impact of childhood abuse and neglect on substance abuse and psychological distress in adulthood. Journal of Traumatic Stress. 2007; 20:833–844. [PubMed: 17955535]

Reis S, Grenyer BF. Pathways to anaclitic and introjective depression. Psychology and Psychotherapy. 2002; 75:445–459. [PubMed: 12626134]

Roberts JE, Gotlib IH, Kassel JD. Adult attachment security and symptoms of depression: the mediating roles of dysfunctional attitudes and low self-esteem. Journal of Personality and Social Psychology. 1996; 70:310–320. [PubMed: 8636884]

Rydmark I, Wahlberg K, Ghatan PH, Modell S, Nygren A, Ingvar M, Asberg M, Heilig M. Neuroendocrine, cognitive and structural imaging characteristics of women on longterm sickleave with job stress-induced depression. Biological Psychiatry. 2006; 60:867–873. [PubMed: 16934773]

Sarason I, Johnson J, Siegel J. Assessing the impact of life changes: Development of the Life Experiences Survey. Journal of Consulting and Clinical Psychology. 1978; 46:932–946. [PubMed: 701572]

Sarchiapone M, Carli V, Cuomo C, Roy A. Childhood trauma and suicide attempts in patients with unipolar depression. Depression and Anxiety. 2007; 24:268–272. [PubMed: 17048241]

Schnurr PP, Friedman MJ, Bernardy NC. Research on posttraumatic stress disorder: epidemiology, pathophysiology, and assessment. Journal of Clinical Psychology. 2002; 58:877–889. [PubMed: 12115712]

Shapiro DL, Levendosky AA. Adolescent survivors of childhood sexual abuse: the mediating role of attachment style and coping in psychological and interpersonal functioning. Child Abuse&Neglect. 1999; 23:1175–1191. [PubMed: 10604070]

Shelton RC. Cellular mechanisms in the vulnerability to depression and response to antidepressants. Psychiatric Clinics of North America. 2000; 23:713–729. [PubMed: 11147243]

Vergne DE, Nemeroff CB. The interaction of serotonin transporter gene polymorphisms and early adverse life events on vulnerability for major depression. Current Psychiatry Reports. 2006; 8:452–457. [PubMed: 17094925]

Violanti JM, Burchfiel CM, Miller DB, Andrew ME, Dorn J, Wactawski-Wende J, Beighley CM, Pierino K, Joseph PN, Vena JE, Sharp DS, Trevisan M. The Buffalo Cardio-Metabolic Occupational Police Stress (BCOPS) pilot study: methods and participant characteristics. Annals of Epidemiology. 2006; 16:148–156. [PubMed: 16165369]

Walker MS, Zona DM, Fisher EB. Depressive symptoms after lung cancer surgery: Their relation to coping style and social support. Psycho-Oncology. 2006; 15:684–693. [PubMed: 16302291]

Weathers, F.; Litz, B.; Herman, D.; Juska, J.; Keane, T. The PTSD Checklist (PCL): Reliability, validity and diagnostic utility; Poster session presented at the annual meeting of the International Society for Traumatic Stress Studies; San Antonio, TX. 1993.

Weiss, DS.; Brunet, A.; Metzler, T.; Best, SR.; Fagan, J.; Marmar, CR. Critical incident exposure in police officers: Frequency, impact and correlates; In Meeting of the International Society for Traumatic Stress Studies; Northbrook (IL). ISTSS; 1999. p. 52

Young EA, Abelson JL, Curtis GC, Nesse RM. Childhood adversity and vulnerability to mood and anxiety disorders. Depression and Anxiety. 1997; 5:66–72. [PubMed: 9262936]

Table 1

Participant Demographics (N=119)

	Mean or N	SD or %
Age	26.7	4.1
Gender (Male)	103	86.6
Ethnicity		
Caucasian	53	44.5
Hispanic	30	25.2
African American	14	11.8
Other or mixed ethnicity	22	18.5
Education		
Completed high school or equivalent	14	11.8
Completed 2 year college/vocational training	43	36.1
College graduate	55	46.2
Post-graduate degree	7	5.8
Marital status		
Single	98	82.4
Married	21	17.6

Table 2

Correlation Matrix of Predictor Variables with Depression Symptoms (N=119)

Variables	1	2	3	4	5	6	7	8	9
1. Depression Symptoms	--								
2. PTSD Symptoms	0.554 **	--							
3. Baseline Depression	0.393 **	0.341 **	--						
4. Childhood Trauma	0.423 **	0.259 **	0.219 *	--					
5. Neuroticism	0.221 *	0.227 *	0.273 **	.087	--				
6. Self-Worth	-0.381 **	-0.289 **	-0.192 *	-.189 *	-.303 **	--			
7. Negative Life Events	0.252 **	.188	0.232 *	0.203 *	0.031	-0.070	--		
8. Work Stress	0.414 **	.279 **	0.187 *	0.384 **	0.066	-0.144	0.196 *	--	
9. Critical Incidents	0.143	0.090	0.041	0.226 *	-0.125	-0.055	0.286 **	0.329 **	--

*
$p<0.05$,

**
$p<0.01$

Note: Depression symptoms and PTSD symptoms were assessed at 12 month follow-up

Table 3

Summary of Hierarchical Regression Analysis for Variables Predicting Depression Symptom (N=119)

Independent Variables	R^2	ΔR^2	F change	β (Step 1)	β (Step 2)	β (Step 3)	β (Step 4)
Step 1 Control Variables	0.35	0.35	28.35***				
PTSD Symptoms at 12 months				0.49**	0.43***	0.38***	0.35**
Baseline Depression				0.21*	0.17**	0.15	0.13
Step 2 Pre-academy	0.42	0.07	13.41***				
Childhood Trauma					0.28***	0.26***	0.20*
Step 3 Academy	0.46	0.04	3.28*				
Neuroticism						0.01	0.01
Self-Worth						-0.19*	-0.19*
Step 4 Police service	0.49	0.03	2.05				
Negative Life Event							0.08
Work Stress							0.18*
Critical Incident							-0.03

*
$p<0.05$,

**
$p<0.01$,

***
$p<0.001$