

A Prospective Study of Trait Anger and PTSD Symptoms in Police

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It is unknown whether anger is a risk factor for the development of posttraumatic stress disorder (PTSD) symptoms, arises as a consequence of PTSD, or both. Two hypotheses were tested in 180 police recruits: Greater trait anger during training will predict greater PTSD symptoms at one year; greater PTSD symptoms at one year will predict greater state anger at one year. Both hypotheses were confirmed, suggesting that trait anger is a risk factor for PTSD symptoms, but that PTSD symptoms are also associated with an increase of state anger. Increased anger is important not only because of the impact it has on individual distress and physical health, but also because of its potential public health impact.

Over recent decades, there has been increasing interest in the relationship between posttraumatic stress disorder (PTSD) symptoms and anger. Studies of Vietnam War veterans provided some of the first, large-scale empirical support for the association between PTSD and anger (Lasko, Gurvits, Kuhne, Orr, & Pitman, 1994; McFall, Wright, Donovan, & Raskind, 1999). Subsequent studies confirmed this association in civilian populations (Jakupcak & Tull, 2005; Swan, Gambone, Fields, Sullivan, & Snow, 2005). A recent meta-analysis combining anger and hostility studies of military and civilian populations found strong associations between anger/hostility and trauma in both groups, with a larger effect in samples with military war experience than in populations with other types of traumas (Orth & Wieland, 2006). In that study, anger and hostility are described as distinct constructs, with anger

pertaining to an emotion with “cognitive, physiological, motivational and behavioral components,” and hostility referring to an attitude with a “predisposition to dislike and mistrust others, and to interpret others’ behavior as egoistic and hurtful” (Orth & Wieland, 2006). The authors justify their combination of anger and hostility studies by noting that hostility increases the frequency of anger and that measures of hostility and anger have overlapping content.

Two caveats emerge with the study of PTSD and anger. First, the cross-sectional nature of most study data does not allow determination of causality. In particular, it has been difficult to determine whether anger is a risk factor for the development of PTSD, anger is a consequence of PTSD, or both. The number of prospective studies bearing on this question is extremely limited. One study of

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43 male German firefighters found that greater levels of hostility and lower levels of self-efficacy during academy training were associated with greater posttraumatic stress symptoms 2 years later (Heinrichs et al., 2005). Although this data provides support for the idea that hostility is a risk factor for PTSD symptoms, the study did not reassess hostility at 2 years and therefore did not address the effect of PTSD on hostility. The authors suggest that hostility might cause increased symptoms of PTSD by decreasing the social support needed for recovery. In a study designed to determine the predictors of PTSD in 157 victims of violent crime, anger at 1-month postcrime was associated with PTSD symptoms at 1-month postcrime; 1-month anger measures were not predictive of PTSD symptoms measured 6 months after the traumatic event (Andrews, Brewin, Rose, & Kirk, 2000).

The second caveat relates to overlap between PTSD symptoms and anger. As specified in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association, 1994), 1 of 17 symptoms of PTSD is "irritability or outbursts of anger." Although many individuals who meet diagnostic criteria for PTSD do not report this specific symptom, there remains a risk of circularity in relating measure of anger with measures of PTSD. Consequently, one would expect measures of PTSD to correlate with measures of anger, given that PTSD includes symptoms related to anger. With cross-sectional data, efforts have been made to explore the relationship between anger and PTSD by creating modified PTSD scales. In one study of Vietnam Veterans, the anger items of the Mississippi Scale for PTSD were removed. Even with this modified scale, anger measures continued to account for 40% of the variance in PTSD symptoms (Novaco & Chemtob, 2002). In addition, the authors found that anger measures differentiated veterans with and without PTSD as determined by the Structured Clinical Interview for Diagnosis Non-Patient Version (SCID-NP-V). They conclude that anger is a primary component of combat-related PTSD.

At this point, there is support for the idea that preexposure trait hostility increases the risk of developing PTSD symptoms and that anger is a central component of combat-related PTSD. To date, there have been few studies that assess the role of anger both as a predictor and a consequence of PTSD symptoms in the same data set. This study fills that gap by providing the first large, prospective longitudinal cohort study that examines the relationships among preexposure trait anger, PTSD symptoms, and postexposure state anger. These constructs are examined in a population of police academy recruits, beginning with baseline data collected during academy training prior to police duty. The study explores the association of PTSD at one year of service to trait anger at baseline during academy training, and how state anger is related to trait anger and the development of PTSD symptoms at 1 year of police service. The following hypotheses are tested in this study: (1) Greater trait anger at baseline during academy training will predict greater symptoms of PTSD at one year of police service; (2) Greater PTSD symptoms at 1 year will pre-

dict greater state anger at 1 year, controlling for trait anger at baseline.

There have been efforts to evaluate potential mediators of the relationship between trait anger and the risk for developing PTSD. Some authors suggest that anger may contribute to PTSD by decreasing social support (Heinrichs et al., 2005). Lack of social support has been shown to increase the risk of PTSD (Glynn et al., 2007; Johansen, Wahl, Eilertsen, & Weisaeth, 2007). Self-efficacy and hostility have also been shown to have independent effects on later PTSD symptoms (Heinrichs et al., 2005). Several cross-sectional studies describe an inverse relationship between PTSD and "self-efficacy" (Soet, Brack, & DiIorio, 2003; Sumer, Karanci, Berument, & Gunes, 2005). Self-worth has also been found to be associated with the PTSD symptoms of avoidance and overall distress (Littleton, 2007). In the interest of evaluating these variables further, this study includes measures of social support and self-worth derived from the World Assumptions Scale, the latter being a concept closely related to self-efficacy and one which has been shown to have an association with PTSD symptoms. To determine the unique contribution of trait anger assessed during academy training to the prediction of PTSD symptoms at 1 year of police service, we also included age, gender, education, measures of exposure to traumatic events prior to entering the police academy, cumulative exposure to personally threatening critical incident stressors during police service, peritraumatic dissociation to the worst critical incident in the first year of police service and state anger after 1 year of police service, as these variables have been previously shown to predict PTSD symptoms in our research with police officers (Marmar et al., 2006).

METHOD

Participants

This study examines the role of trait anger in the subsequent development of PTSD symptoms in 180 participants collected as part of an ongoing prospective and longitudinal study of police officer stress and health, approved by the University of California Human Subjects Committee and Institutional Review Board. Participants were recruited from four urban police departments, the New York Police Department (NYPD), and three departments in the San Francisco Bay Area (Oakland, OPD; San Francisco, SFPD; and San Jose, SJPD) during police academy training. Academy trainees were introduced to the study through an in-person presentation made by study personnel during academy training classes. This presentation included the distribution of two letters, one from the commissioner or police chief of the affiliated department and one from the study team. Included with the approach letters was a description of the study procedures, a contact number, and a participation form including the option to be contacted by the study team. Only those trainees who were combat veterans at the time of academy training or who had prior experience in law

enforcement or emergency services occupations were excluded from participating in the study.

Measures

The age, years of service, gender, ethnicity, marital status, and education of each participant were collected.

The revised version of the original State-Trait Anger Expression Inventory (STAXI-2; Spielberger, 1999) consists of 57-items with six scales: trait anger, anger expression-out, anger expression-in, anger control-out, anger control-in, and state anger. Two of the scales were used in this study: state anger and trait anger. The STAXI-2-State is a 15-item scale including major components of State Anger (feeling angry, feeling like expressing anger verbally, and feeling like expressing anger physically). The STAXI-2-Trait is a 10-item scale measuring the disposition of someone to express anger with and without provocation.

The World Assumptions Scale (WAS; Janoff-Bulman, 1989) is a 32-item self-report scale that includes eight subscales, which measure categories of personal beliefs, including benevolence of the impersonal world, benevolence of people, justice, controllability of life events, randomness of life events, self-worth, self-controllability, and personal luck.

The Sources of Support (SOS; Kulka et al., 1991) is a 10-item measure assessing perceived social support. Participants rate their emotional and instrumental support in a yes/no format.

The Peritraumatic Dissociation Questionnaire (PDEQ; Marmar, Metzler, & Otte, 2004) is a 10-item measure of dissociative symptoms (e.g., altered time perception or depersonalization) experienced during or immediately following a traumatic event. The participants rate each item with respect to their most disturbing traumatic event on a 5-point scale from (1 = *not at all true* to 5 = *extremely true*) and the mean score of all the items is used as the total score. This questionnaire was completed based on to the participant's self-identified most distressing critical incident in the past 12 months.

The Mississippi Combat Scale-Civilian Version (MCS-CV; Keane, Caddell, & Taylor, 1988) is a 35-item measure that assesses PTSD-related symptoms of intrusion, avoidance, hyperarousal, and other difficulties since the time of critical incident or trauma exposure. The civilian version has been used to assess PTSD symptoms in emergency services personnel following a disaster (Marmar, Weiss, Metzler, & Delucchi, 1996; Weiss, Marmar, Metzler, & Ronfeldt, 1995). For this study, the police were asked how much they have experienced each item, "since beginning police service." Please see data analysis section for description of the removal of anger and reverse coded items of the MCS-CV.

The Critical Incident History Questionnaire (CIHQ; Brunet, Boyer, Brillon, Ehrensaft, & Stephenson, 1998; Weiss et al., 2004) is a 34-item self-report measure assessing cumulative exposure to life-threatening critical incidents. Participants tabulate the number of times (frequency of exposure) that they have personally experi-

enced each of the 34 critical incidents in the line of duty. The total cumulative exposure score is derived by summing the frequency of incident exposure across all items. For this study, we tabulated 14 items of experiences that posed a threat to life or physical integrity to be consistent with *DSM-IV-TR* Criterion A for PTSD. Statistical analyses were performed using the log-transformed values of the sum due to a skewed distribution of scores.

Exposure to civilian trauma prior to starting police work was assessed by interview with the Life Stressor Checklist-Revised (LSC-R), which includes 30 stressful life events. We selected nine items that involved personal threat where the participant also believed they could have been killed or seriously harmed. These items included experiencing sexual and/or physical assault, serious accident or disaster, serious physical and mental illness, physical neglect, and for women, abortion or miscarriage (Wolfe & Kimerling, 1997).

The presence of current or past anxiety, mood, and substance abuse disorders was determined with the Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Gibbon, & Williams, 1997).

Procedure

The baseline assessment was conducted while the participant was still in training at the police academy. Prior to the assessment, each study procedure was described in detail and written informed consent was obtained. The baseline assessment included a self-report questionnaire package and a structured clinical interview. The structured clinical interview assessed lifetime and current anxiety, mood disorders, alcohol and drug abuse, lifetime trauma exposure, and peritraumatic responses to the worst preacademy stressor.

Participants were contacted again at 12 months after commencing active police duty. At this time point, they were administered a self-report questionnaire packet assessing various domains of psychological functioning and a structured clinical interview for lifetime and current *DSM-IV* Axis I psychiatric disorders.

Data Analysis

The means, standard deviations, and ranges of the variables, as well as the Pearson correlations of the variables of interest were evaluated. Partial correlations were conducted to explore the associations among trait anger, state anger, and PTSD symptoms. To assess the relationship between trait anger at baseline and PTSD symptoms at 12 months, a hierarchical linear regression was conducted with the MCS-CV as the dependent variable. The MCS-CV is made up of both items in which a higher number indicates greater symptoms and 10 reverse-coded items, in which a lower number indicates greater symptoms. The psychometric properties of reverse-coded MCS-CV questions have been analyzed, with results indicating that deletion of the reverse coded items creates an MCS-CV scale with improved validity and no loss of reliability

(Conrad et al., 2004). After reviewing the MCS-CV measure research, we chose to delete reverse-coded items from the MCS-CV measure used in this analysis. As discussed above, PTSD criteria include anger items. To avoid spurious associations, the three MCS-CV items regarding anger were removed, to create a new variable, the MCS-CV-modified. Items removed were #3 (“Since becoming a police officer, if someone pushes me too far, I am likely to become violent.”), #27 (“Since becoming a police officer, I have been an easy-going, even-tempered person.” [reverse-coded]), and #31 (Since becoming a police officer, I lose my cool and explode over minor everyday things.”). The MCS-CV-modified, with reverse-coded and anger items removed, was used in two linear regressions. The nonstandardized Cronbach’s alpha of the modified measure is 0.82.

A linear, hierarchical regression was done with MCS-CV-modified as the dependent variable. Baseline characteristics, including age, gender, and education were included in the first step of the analysis. At the second step, prior trauma, baseline trait anger, and self-worth were added because of their potential association with current PTSD symptoms (Heinrichs et al., 2005; Littleton, 2007). In the third step, exposure to duty-related life-threatening critical incidents (CIHQ) at 12 months and peritraumatic dissociation (PDEQ) at 12 months were added because these have been previously shown to be predictors of PTSD symptoms in police officers (Marmar et al., 2006; McCaslin et al., 2006). In the fourth step, sources of social support (SOS) at 12 months was added, in light of previous hypotheses that hostility increases risk of PTSD symptoms through its effect on social support (Heinrichs et al., 2005). In the fifth step, state anger at 12 months was added to distinguish its potential effect on PTSD symptoms from that of trait anger at baseline.

To further assess the relationship between PTSD symptoms, trait anger at baseline, and state anger at 12 months, the three variables were analyzed by a partial correlation test.

RESULTS

The 180 police recruits in this sample were an average of 27.2 (*SD* = 4.7) years old, and 87.2% were men. The majority of participants were Caucasian (46.6%). Latino accounted for 19.9%, Asian American/Pacific Islander 15.3%, African American 8.0%, and 10.2% were of other or multiple ethnicities. More than half were unmarried (77.3%) and most completed at least some college (89.5% completed a 2- to 4-year-college degree, 5.0% had completed a graduate degree).

The SCID interview at baseline confirmed that none of the participants met criteria for full or subsyndromal PTSD at the time of baseline screening. The study participants had no other current Axis I disorders. A minority of participants met criteria for prior lifetime diagnoses, including 19 cases of depression (major depression disorder or depression not otherwise specified; *N* =

Table 1. Means and Standard Deviations for Variables (*N* = 180)

Variable	<i>n</i>	<i>M</i>	<i>SD</i>
Age Baseline	180	27.24	4.70
Prior trauma Baseline	172	.59	.49
Trait anger Baseline	176	13.61	3.20
Self-worth Baseline	172	56.52	6.33
Sources of support Baseline	173	4.48	.64
Sources of support 12 months	178	4.38	.75
Critical incident exposure 12 months	180	6.80	3.69
State anger 12 months	180	15.91	3.24
Peritraumatic dissociation 12 months	174	1.40	.56
MCS-CV-modified 12 months	173	28.62	6.19

Note. MCS-CV-modified = Mississippi Combat Scale-Civilian Version-modified (reversed and anger items removed).

180, 10.6%), one case of PTSD, (*N* = 180, 0.6%), 21 cases of alcohol abuse (*N* = 180, 11.7%), and 7 cases of alcohol dependence (*N* = 180, 3.9%).

Table 1 shows the variable means and standard deviations. Table 2 shows correlations among the variables. Social support at baseline was found to be significantly associated with social support at 12 months, but not with any other variables, whereas social support at 12 months was found to be associated with PTSD symptoms, peritraumatic distress, state anger, and self-worth. Based on this data, social support at 12 months only was included in the regression. We also conducted partial correlations to clarify the associations among trait anger, state anger at 12 months, and PTSD symptoms at 12 months. Trait anger assessed during academy training is associated with state anger at 12 months, covarying for PTSD symptoms at 12 months. State anger at 12 months is associated with PTSD symptoms at 12 months, after controlling for trait anger at baseline.

Results of the hierarchical linear regression model are presented in Table 3. The dependent variable for this model is the total PTSD symptom score on the MCS-CV-modified (reverse-coded and anger items removed, as described above), assessed at the 12-month point in the study. At Step 1, demographics accounted for 0.1% of the variance. At Step 2, we entered prior trauma exposure, trait anger, and self-worth, which accounted for an additional 7.2% of the variance. In Step 3, exposure and peritraumatic distress measures were added, accounting for an additional 19.9% of the variance. At Step 4, social support at 12 months was added, accounting for an additional 1.5%. State anger was added at the final step, accounting for an additional 21.8%. The final model accounted for 50.6% of the variance in PTSD symptoms.

Table 2. Intercorrelations Between Study Variables

Study Measures	1	2	3	4	5	6	7	8	9	10
1. Age	–	.15	–.13	.01	–.15*	–.10	.02	–.04	–.02	–.00
2. Prior trauma		–	.01	–.14	–.11	.11	–.03	–.07	.14	.14
3. Trait anger baseline			–	–.15*	.01	–.07	–.02	–.08	.23**	.19*
4. Self worth baseline				–	.18*	.02	–.05	.16*	–.23**	–.07
5. Sources of support baseline					–	.00	.02	.49**	–.02	–.07
6. Critical incident exposure 12 months						–	.21**	.02	–.02	.28**
7. Peritraumatic dissociation 12 months							–	–.08	.00	.43**
8. Sources of support 12 months								–	–.15*	–.17*
9. State anger 12 months									–	.51**
10. MCS										–

Note. Study measures: 1 = Age; 2 = prior trauma; 3 = trait anger baseline; 4 = self-worth baseline; 5 = sources of support baseline; 6 = critical incident exposure 12 months; 7 = peritraumatic dissociation 12 months; 8 = sources of support 12 months; 9 = state anger; 12 months; 10 = Mississippi Combat Scale-Civilian Version-modified (reversed and anger items removed).

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

Table 3. Hierarchical Linear Regression Model Predicting MCS-CV-modified (reversed and anger items removed) Total Scores at 12 Months ($N = 172$)

Predictors	R^2	ΔR^2	F Change (p)	β Step 1	β Step 2	β Step 3	β Step 4	β Final model
1.	.00	.00	.05 (.99)					
Age				–.00	.01	.02	.01	.04
Gender				.03	–.01	.07	.07	.02
Education				–.02	–.02	.01	.01	–.02
2.	.07	.07	3.91 (.01)					
Prior trauma					.16	.15*	.14*	.08
Trait anger (STAXI-2-trait)					.21**	.22**	.20**	.12
Self-worth (WAS)					–.05*	–.00	.01	.10
3.	.27	.20	20.28 (.00)					
Exposure (CHIQ)						.20**	.21**	.22***
Peritraumatic distress (PDEQ)						.38***	.37***	.37***
4.	.29	.02	3.17 (.08)					
Social support (SOS.12)							–.13	–.08
5.	.51	.22	64.54 (.00)					
State anger (STAXI-2-state)								.50***

Note. MCS = Mississippi Combat Scale-Civilian Version-modified; LSC = Life Stressor Checklist-Revised; STAXI-2-trait = Spielberger Trait Anger Inventory; WAS = World Assumptions Scale; CIHQ = Critical Incident History Questionnaire; PDEQ = Peritraumatic Dissociation Experiences Questionnaire; SOS.12 = Sources of Social Support at 12 months; STAXI-2-state = Spielberger State Anger Inventory.

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

DISCUSSION

As reflected in Steps 1–3 of the linear regression, trait anger measured prior to exposure to the stressors of the first 12 months of active duty police work predicts the development of PTSD symptoms at 1 year of service. With the addition of state anger to the model, the effect of trait anger on PTSD symptoms is reduced, an expected effect given the positive association between trait and state anger as shown in Table 2. As demonstrated in Step 5, state

anger remains highly related to PTSD symptoms, after controlling for trait anger, all the other covariates in the full model, and after removing the anger items from the PTSD measure.

These findings bear on the question as to whether anger is a predictor or consequence of PTSD symptoms. The data suggests that trait anger is a risk factor for PTSD symptoms, and that PTSD symptoms are also associated with an increase of state anger, not accounted for by preexposure trait anger. Thus, this data provides an excellent illustration of the “nature–nurture” relationship

by demonstrating that trait anger predicts vulnerability to PTSD symptoms, and that trauma exposure and PTSD symptoms are associated with a further intensification of anger.

Anger is important not only because of the emotional turmoil it causes, but also because it has been linked to adverse individual and public health outcomes. Anger has been found to be a significant risk factor for both the development of cardiac disease over time and acute cardiac events (Krantz et al., 2006; Tennant & McLean, 2001). Elevated anger has been linked to decrements in social/occupational functioning (Evans, Giosan, Patt, Spielman, & Difede, 2006). In the context of PTSD, anger has also been linked to increased risk of interpersonal violence. Research from both military and civilian populations shows a strong association between PTSD and violence (Jakupcak & Tull, 2005; Kulka, 1990; Lasko et al., 1994; Swan et al., 2005). Thus, the association between PTSD and anger has important public health implications: Population exposure to traumatic stressors with subsequent development of PTSD symptoms could lead to increased community problems with physical health, interpersonal relationships, and violence, mediated by the escalation of anger associated with PTSD symptoms.

This study supports the central finding of the previously published prospective study of PTSD symptoms and hostility by showing a positive relationship between baseline trait anger and PTSD symptoms at one year (Heinrichs et al., 2005). However, this study differs from Heinrichs and colleagues on several other accounts. First, Heinrichs et al. found an inverse relationship between self-efficacy and PTSD symptoms at 2 years, using the Competence and Control Beliefs Inventory. The data presented here do not show a significant relationship between World Assumptions self-worth subscale at baseline and PTSD symptoms at 1 year. In addition, Heinrichs et al. postulated that the effects of baseline hostility on later PTSD symptoms were mediated by decrements in social support experienced by those with high hostility. In the analyses described above, no association was found between baseline social support and PTSD symptoms or anger measures. In addition, trait anger was found to be significantly associated with PTSD symptoms after controlling for social support at 12 months, suggesting that, in the present study, 12-month social support does not explain the relationship between trait anger and PTSD symptoms.

The study has a number of limitations. This is a sample of young, healthy, police academy recruits, who, for reasons of selection and training, are not representative of the general population, necessitating caution in generalizing our findings. This sample is also predominantly male, which did not permit multivariate modeling of trait anger, state anger, and PTSD symptoms in female officers. The participants are early in police service with generally low levels of PTSD symptoms. As the cohort is followed over time, critical incident exposure and PTSD symptoms will increase, allowing for a more robust test of the hypotheses, including the role of time varying covariates such as social support and state anger in predicting PTSD symptoms.

In recent years, there has been increasing research into the causes and effects of PTSD. Our study contributes to this literature by clarifying the association between anger and PTSD symptoms, using prospective data, with exclusion of symptoms of anger from the dependent variable. This study shows that baseline trait anger predicts later PTSD symptoms and that PTSD symptoms are associated with increased state anger, independent of baseline anger. This is an important finding, as it suggests that PTSD symptoms may generate anger even in a resilient population of young men and women early in their law enforcement careers. As discussed above, not only is anger important because of the impact it has on individual distress and physical health, but it has also been linked to interpersonal violence. In light of the latter association, the relationship between anger and PTSD symptoms is not only a mental and physical health concern for the trauma victim, but it is also a public health concern. Next steps in this line of research include following this cohort over time, which will permit more robust tests of the relationships between trait anger, PTSD, and state anger. For those with PTSD-related anger difficulties, education and early intervention with treatments for PTSD, including anger management, will be important in protecting the emotional and physical health of the officers and reducing the risk of domestic or duty-related violence.

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