

Coping Responses and Posttraumatic Stress Symptomatology in Urban Fire Service Personnel

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Emergency workers, including urban fire fighters and paramedics, must cope with a variety of duty-related stressors including traumatic incident exposures. Little is known about coping responses of emergency workers or whether their coping responses predict future mental health outcomes. The previously formulated Coping Responses of Rescue Workers Inventory (CRRWI) underwent a principal components analysis employing a sample (N = 220) of urban fire fighters and paramedics. Six empirically and theoretically distinct CRRWI components were identified which were relatively stable over a 6-month period. Scores on one of the CRRWI scales, but neither years of service nor their past half year's traumatic incident exposures, predicted future changes in self-reports of posttraumatic stress symptomatology.

KEY WORDS: posttraumatic stress; emergency workers; coping strategies; duty-related incident exposures.

Emergency workers, such as fire fighter and paramedics, must cope with extraordinary and persistent occupational demands that are potentially cumulative. These include threats to their own and their co-workers' safety, dangerous fire suppression incidents, injuries and deaths of children and infants, gruesome victim incidents, body handling, completed suicides, and mass casualty accidents (Beaton & Murphy, 1995; Corneil, 1995). To continue to successfully function as emergency workers, professional fire fighters and paramedics must invariably cope with

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duty-related stressors, including their ongoing exposures to traumatic incidents. On the other hand, epidemiological evidence suggests that the job-related stressors of fire service personnel exact a heavy toll in terms of elevated occupational prevalences of posttraumatic stress disorder (PTSD) as well as many other adverse health outcomes (Beaton, Corneil, Pike, & Murphy, 1996; Bryant & Harvey, 1996; Corneil, 1995; Milham, 1983; Guidotti, 1995; Boxer & Wild, 1993; IAFF, 1995).

Conflicting findings have emerged pertaining to the coping responses of emergency workers. Some prior researchers have even questioned if emergency workers possess any extraordinary coping capabilities at all. Moran and Britton (1994), who collected data from Australian bushfire volunteers, concluded that their sample of emergency workers was no "hardier than most. . . (nor possessed any) particular coping styles" and that the coping and personality measures they used were not statistically significant predictors of their sample's reactions to traumatic incidents. Others believe coping responses of emergency workers are based on experience and years of service. For example, Hytten and Hasle (1989) findings suggested that experienced or "seasoned" emergency workers possessed more effective cognitive and behavioral coping strategies.

There are a number of inherent methodological and theoretical difficulties in studying coping responses of emergency workers. Their occupational demands are unusual, and any measure of their coping needs to reflect their duty-related tasks and exposure(s) to trauma as well as their "rescue" roles (McCammon, Durham, Allison, & Williamson, 1988). Furthermore, emergency workers are undoubtedly a self-selected occupational group and may not be representative of the general population in terms of their personalities nor their coping strategies (Mitchell & Bray, 1990). Most prior research on coping in emergency workers has been based on reactions to specific events such as a disastrous tornado, earthquake, or an avalanche (McCammon et al., 1988; Marmar, Weiss, Metzler, & Delucci, 1996; Johnsen, Eid, Løvstad, & Michelsen, 1997). Some have argued that coping processes may be, at least in part, unconscious, inaccessible and/or unknown to self, and for these reasons difficult to measure with self-report instruments (Horowitz & Wilner, 1981).

Lazarus and Folkman's (1984) theory of coping suggests it is a highly contextual process involving the cognitive appraisal and re-appraisal of threats and whether anything can be done to change the situation. Their model hypothesizes that coping strategies may change from one stage of a complex stressful encounter to another, making measurement difficult. Furthermore, an individual's coping responses may depend fundamentally on the type of stressor or stressor dimensions potentially inherent in different types of extreme events (Bjorck & Klewicki, 1997; Green, 1990). However, others have argued that coping responses may have enduring trait-like qualities, especially when one is required to cope with a certain class of chronic demands, e.g., fire service stressors (Hauser & Solomon, 1985).

Additionally, there is widespread agreement that certain personality traits and coping responses, such as problem solving, are generally adaptive or protective while others, such as brooding or an over-reliance on alcohol, may be maladaptive (Friedman, 1995; McFarlane & Alexander, 1989; Wortman, Sheedy, Gluhoski, & Kessler, 1992).

Based upon Lazarus and Folkman's (1984) cognitive stress appraisal theoretical framework and a re-wording of Horowitz and Wilner's (1981) Coping Responses Inventory, McCammon et al. (1988) developed the Coping Responses of Rescue Workers Inventory (CRRWI). These latter investigators reported that attempts to achieve cognitive mastery and to ascertain the meaning of the event were the most common self-reported coping responses employed by a heterogeneous sample of police, fire, emergency medical and hospital personnel in the aftermath of two community-wide disasters. Corneil (1993) reported the emergence of six factors in another factor analytic investigation that employed this same instrument but used a larger ($n > 600$) and more homogeneous sample consisting entirely of urban fire fighters. This latter investigator also reported that each of the CRRWI's coping variables identified by factor analysis in his sample of fire fighters was positively and significantly related to posttrauma symptoms as measured by the Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979). However, Corneil (1993) suggested that this relationship might be due to a temporal confounding of the fire fighter sample's traumatic reactions and the frequency of their duty-related traumatic exposures occurring over the previous year.

While McCammon et al. (1988) reported that certain coping strategies, as measured by their CRRWI, were more prevalent after the larger scale disaster (a tornado), these investigators did not state whether any particular coping strategy was more protective than any of the others or if any coping responses were differentially associated with subsequent levels of posttrauma symptomatology. Neither McCammon et al. (1988) nor Corneil (1993) reported the internal consistency, the test-retest reliability of their CRRWI factor variables or any predictive validity data. Furthermore, McCammon et al. (1988) did not report whether emergency workers with more experience were better equipped or less capable of coping with these disasters in terms of subsequent posttraumatic stress symptomatology.

Hytten and Hasle (1989) reported that "seasoned" volunteer and professional fire fighters with more years of experience were evidently "better able to cope" with a multi-casualty, multi-fatality apartment fire based on self-reported posttrauma symptomatology. These investigators argued that years of service, training, and exposure to previous traumatic incidents made it easier for these "seasoned" volunteer fire fighters to "digest" this presumably traumatic apartment fire event. However, Corneil (1995) reported a positive relationship between years of service and rates of PTSD (based on an Impact of Event Scale total score caseness criterion of ≥ 26) in a sample comprised of professional Canadian urban fire fighters. Moran and Britton (1994) also reported that length of emergency service as a volunteer

was positively associated with both the severity and chronicity of their adverse emotional reaction to their recollected "worst (duty-related) traumatic incident." However, both the Hytten and Hasle (1989) and Moran and Britton (1994) samples were comprised partially or entirely of volunteers who probably possessed neither the degree of preparatory training nor the frequency of traumatic incident exposures of professional U.S. urban fire fighter/paramedics such as those participating in the current investigation.

The purpose of the present investigation was to verify and extend the original factor analysis of the Coping Responses of Rescue Workers Inventory reported in McCammon et al. (1988) by employing a larger and relatively homogeneous sample of professional urban fire fighters, and also to establish the reliabilities and predictive validity of the emergent CRRWI scales. The present investigation will also examine the roles of years of service and the short-term (prior 6 months) frequency of their prior exposures to duty-related traumatic incidents in eliciting posttrauma symptomatology within the context of their self-reported coping responses as measured by the CRRWI. This investigation will employ a baseline sample of fire service personnel to generate a Principal Component analysis to identify numerous empirically-derived self-reported coping strategies/scales as measured by the CRRWI. Next, the inter-item and test-retest reliabilities of the CRRWI with the baseline and six follow-up samples will be assessed. Finally, the predictive validity of the CRRWI will be evaluated in a prospective study of self-reported posttraumatic stress symptomatology controlling for baseline post-traumatic stress symptomatology as well as years of service (as a proxy for career exposures) and the frequency of duty-related traumatic exposures during the past 6 months based on an analysis of departmental records.

Method

Samples

Baseline sample. A principal components factor analysis of the Coping Responses of Rescue Workers Inventory was based upon a baseline (T_0) sample ($n = 220$) of urban fire fighters participating in an ongoing investigation of stress in the fire service. The baseline sample as well as all other respondents were currently employed as full-time fire fighter/emergency medical technicians (EMTs) or fire fighter/paramedics in one of two northwestern U.S. cities. The baseline sample was comprised primarily of married (72%), Caucasian (87%) males (90%) who possessed, on average, 14 years of formal education, and averaged 39 years of age. Twenty-seven percent of the respondents were supervisory personnel (lieutenants, captains, or battalion chiefs), and approximately 65% were line fire fighters/EMTs or fire fighter/paramedics. Approximately 7% of this sample were

either uniformed dispatchers or fire service administrators. The baseline respondents reported an average of approximately 12 years of fire service experience in their respective departments. The baseline respondent sample was comprised of approximately 45% of the potential sample from both participating fire departments ($n = 506$) and was similar to the non-respondents on the vast majority but not all of the demographic and background variables assessed.

Demographic and background information were available for virtually all of the fire fighters and paramedics from both participating departments who were *not* part of the baseline sample. The baseline respondent sample was similar to the other nonparticipating urban fire service personnel in both departments in terms of their average years of education, marital status, ethnicity, gender composition, job title and rank, the proportion who had reportedly participated in the critical incident stress debriefing within the past 6 months, as well as the proportions who were reportedly either Vietnam or Gulf War veterans. However, the baseline sample differed significantly from their fire fighter and paramedic counterparts who did not participate at baseline in terms of their average ages (baseline sample's $M = 39.4$ years and nonbaseline sample's $M = 37.5$ years; $t(504) = 2.53, p < .05$), their average years of service (baseline sample's $M = 12.0$ and nonbaseline sample's $M = 9.7$; $t(504) = 2.79, p < .01$), the proportion who reportedly engaged in "other outside" employment (baseline sample's percentage with second job = 29% vs. 20% of non-baseline sample; $\chi^2(1, N = 506) = 5.55, p < .05$), as well as the percentage who had reportedly sought some form of counseling assistance within the prior 6 months (baseline sample's percentage who reportedly sought assistance = 17% vs. 8% of nonbaseline sample; $\chi^2(1, N = 506) = 9.54, p < .01$).

Test-retest and prospective outcomes subsamples. Both the test-retest and prospective outcome subsamples ($n = 148$) were comprised of fire fighter/EMTs and fire fighter/paramedic respondents who completed the Coping Responses of Rescue Workers Inventory survey at both baseline (T_0) as well as at 6-month follow-up (T_1). Additionally, these respondents must have completed the Impact of Event Scale ($n = 148$) at both T_0 and T_1 , and must have been employed by either fire department for at least the past year at T_1 . The test-retest and prospective outcome subsample ($n = 148$) was similar to all other nonparticipating fire service personnel from both participating departments on all of the background and demographic variables assessed including marital status, reported ethnicity, gender composition, average age, years of service, years of formal education, job title, rank, the proportion who had reportedly participated in a critical incident debriefing within the past 6 months, as well as the proportion who were reportedly either Vietnam or Gulf War veterans. However, the percentage who were reportedly engaged in some type of "other outside" employment (prospective outcome subsample's percentage with second job = 33% vs. 22%; $\chi^2(1, N = 506) = 7.73, p < .01$), as well as the percentage who had reportedly sought some form of counseling assistance within the past six months (prospective outcome subsample's

percentage who reportedly sought assistance = 18% vs. 11%; $\chi^2(1, N = 506) = 5.49, p < .05$).

Instruments

Coping responses of rescue workers inventory. The Coping Response of Rescue Workers Inventory (CRRWI) was based upon the 32-item coping inventory initially employed and factor analyzed by McCammon et al. (1988). On the CRRWI, fire service respondents were specifically instructed to indicate the frequency (on a four-point scale where 0 = never, 1 = rarely, 2 = sometimes, 3 = often) with which they employed any and/or all of the 32 items/ways of handling or coping with "stressful situations as a fire fighter." Some examples of the 32 CRRWI items included "Be more helpful to others," "Turn to religion or philosophy for help," and "Put feelings out of my mind." The McCammon et al. (1988) previously published factor analysis yielded four factors including *The Search for Meaning* (F1), *Regaining Mastery Through Individual Action* (F2), *Regaining Mastery Through Interpersonal Action* (F3), and *Philosophical and Self-Contemplative* (F4). Evidently no reliability nor predictive validity data have been reported for the CRRWI to date.

Impact of Event Scale

The Impact of Event Scale (IES) was used to assess the presence and self-reported frequency of posttraumatic stress symptomatology (Horowitz, Wilner, & Alvarez, 1979). The IES is a 15-item measure of posttrauma symptomatology that yields a total score as well as both intrusive and avoidance IES subscale scores (Zilberg, Weiss, & Horowitz, 1982). The IES has been used to assess avoidance and intrusive posttrauma stress symptomatology in a variety of trauma exposed populations including volunteer fire fighters exposed to a multi-fatality apartment fire or a catastrophic bush fire, as well as with British soldiers who handled and helped to identify deceased combat victims during the Gulf War (Deahl, Gillham, Thomas, Searle, & Srinivasan, 1994; Hytten & Hasle, 1989; McFarlane, 1988). The IES also appears to possess both good sensitivity (.91) and adequate specificity (.61) (Newman, Kaloupek, & Keane, 1996). Furthermore, both the intrusive and avoidance IES subscales also appear to possess good test-retest ($r_s = .89$ and $.79$) and internal consistency ($\alpha_s = .78$ and $.82$) (Newman et al., 1996). IES respondents are instructed to indicate the frequency with which they may have experienced a given symptom/item within the past week. IES total and subscale scores were based on the following weightings of respondent's frequency replies: not at all = 0, rarely = 3, sometimes = 3, and often = 5. This represented a variant of the weightings originally proposed by IES item reply (Horowitz et al., 1979).

Department records of incident exposures for prior year. The fire department records of incident exposures were coded from the participating departments' official Emergency Medical and Fire Incident reports. These incident reports/records were kept contemporaneously by both urban fire departments participating in the study and documented the nature of the emergency incident (medical, fire suppression, and/or hazardous material responses) as well as any potential injuries or fatalities involving fire personnel or citizens. Incident records from the participating departments also identified all personnel present at specific incident scenes including the respondents in this investigation. Only extremely stressful duty-related events and potentially "traumatic incidents" as previously defined by Corneil (1993) were included in subsequent analyses in this investigation. These included all "crime victim" incidents such as gunshot wounds and stabbings, fire incident fatalities (either civilian or fire service personnel), all "dead on arrival" incidents with the exception of those deemed due to "natural causes," all "serious injury accidents," as well as all incidents which involved rendering medical aid to children or infants. Types of fire suppression and emergency medical events *excluded* from these "stressful incident" analyses included all non-fatal fire suppression incidents, all emergency medical aid incidents such as relatively routine (adult) cardiopulmonary resuscitation events as well as virtually all injury motor vehicle and industrial accidents.

Results

Principal Components Analysis of Coping Responses of Rescue Workers Inventory

A total of six components with eigenvalues greater than 1.0 emerged from a principal components (varimax rotation) analysis of the Coping Responses of Rescue Workers Inventory (CRRWI) instrument with the fire service baseline sample ($n = 220$). These components, their item compositions, loadings, and associated percentage(s) of variance accounted for are presented in Table 1. Component 1, *Secondary Appraisal in Aftermath*, consisted of eight items and accounted for 30% of the CRRWI's variance. Component 2, *Behavioral Distraction and Social Support Seeking*, consisted of seven items and accounted for 8% of the CRRWI's variance. Component 3, *Cognitive Behavioral Avoidance and Numbing*, consisted of four items and accounted for 6% of the CRRWI's variance. Component 4, *Foster Positive Attitudes*, consisted of six items and accounted for 5% of the CRRWI's variance. Component 5, *Cognitive Positive Self-Talk*, consisted of two items and accounted for 4% of the CRRWI's variance. Finally, Component 6, *Inward Search—Philosophical Self-Contemplation*, consisted of five items and accounted for 4% of the CRRWI's variance. The cumulative variance of these six components accounted for 5.7% of the CRRWI's variance.

Table 1. Principal Components Analysis of Coping Responses of Rescue Workers Inventory in Urban Fire Fighters ($N = 220$)^a

Components and Constituent Items	Loading	Eigenvalue	Percentage of Variance
Component 1: Secondary appraisal in aftermath		9.69	30.3
#8 Thinking of the meaning of life after the event	.74		
#18 Figure out the meaning in fire fighting	.71		
#32 Figure out choices in life and how they relate to event	.70		
#4 Figure out which things you fear could have happened	.64		
#9 Work on expectations of the future	.61		
#14 Figure out when my responses were irrational	.55		
#10 Let myself experience all the feelings about event	.47		
#15 Devote myself to work	.46		
Component 2: Behavioral distraction & social support seeking		2.57	8.0
#30 Spend more time listening to music, etc.	.70		
#29 Find new interest	.68		
#27 Look for someone to provide direction	.68		
#31 Do things impulsively to see if it helps	.63		
#26 Seek emotional support from others	.59		
#25 Involve myself in other activities	.50		
#17 Seek out other Fire fighters dealing with same thing	.47		
Component 3: Cognitive behavioral avoidance & numbing		1.75	5.5
#12 Put feelings out of mind	.79		
#19 Put the whole thing out of my mind	.75		
#20 Withdraw from people	.59		
#5 Concentrate on other things	.56		
Component 4: Foster positive attitudes		1.64	5.1
#21 Develop a positive attitude about event	.72		
#13 Think about good things in life	.63		
#3 Look at situation realistically	.63		
#11 Talk to others about incident	.55		
#6 Think about humor in event	.48		
#7 <i>Be more helpful to others</i>	.44		
Component 5: Cognitive positive self-talk		1.26	3.9
#1 Remind myself I am providing help	.68		
#2 Remind myself things could be worse	.63		
Component 6: Inward search-philosophical self-contemplation		1.25	3.9
#24 Not be bothered by conflicting feelings	.83		
#22 Think about what happened on my own	.78		
#23 Figure out why the event made me feel this way	.56		
#16 Figure out how things would be different	.56		
#28 Turn to religion or philosophy for help	.69		

^aCumulative variance accounted for by six components = 56.7%

CRRWI Internal and Test-Retest Reliabilities

Table 2 shows the Cronbach α s and test-retest reliabilities of the CRRWI component scales for the baseline ($n = 220$) and prospective outcome samples ($n = 148$), respectively. CRRWI component scale scores were computed using unit-weighted sums of scale item responses. The Cronbach α s for the six CRRWI

Table 2. Internal Consistency and Test-Retest Reliabilities (T_0 – T_1 6-Month Follow-Up) for the Coping Responses of Rescue Workers Inventory Scales

Coping Responses of Rescue Workers Inventory Component Scales	Reliabilities	
	Cronbach's α	Test-Retest ^a
C1: Secondary appraisal in the aftermath	.85	.70
C2: Behavioral distraction & social support seeking	.81	.68
C3: Cognitive behavioral avoidance & numbing	.75	.61
C4: Foster positive attitudes	.70	.68
C5: Cognitive positive self-talk	.67	.53
C6: Inward search—philosophical self-contemplation	.62	.52

^aPearson Product Moment correlations (r_s) are based on replies of prospective outcome sample ($n = 148$) at T_0 and T_1 (6-month follow-up).

Table 3. Descriptive Data for Coping Responses of Rescue Workers Inventory (CRRWI) Components at Baseline and at 6-Month Follow-Up ($n = 148$)

CRRWI Component Scales	Baseline		6-Month Follow-Up	
	M	(SD)	M	(SD)
C1: Secondary appraisal in the aftermath	1.16	.63	1.17	.62
C2: Behavioral distraction & social support seeking	1.08	.58	1.06	.59
C3: Cognitive behavioral avoidance & numbing	1.05	.70	1.00	.63
C4: Foster positive attitudes	2.06	.59	2.02	.56
C5: Cognitive positive self-talk	1.68	.78	1.69	.79
C6: Inward search—philosophical self-contemplation	1.51	.59	1.48	.54

component scales ranged from .62 to .85. The 6-month test-retest reliabilities for these same six CRRWI component scales ranged from .52–.70. Table 3 shows the reported means and associated standard deviations for each of the CRRWI component scales at T_0 and at T_1 (6-month follow-up). All t-tests for mean differences between baseline (T_0) and 6-month follow-up (T_1) on all CRRWI component scales were nonsignificant (all $ps > .20$).

Coping Responses of Rescue Workers Inventory Scores, Years of Service, and Trauma Exposures From Department Records and Posttrauma Symptomatology at 6-Month Follow-Up

Table 4 shows the results of a stepwise hierarchical analysis employing the prospective outcome sample respondents' ($n = 148$) total Impact of Event Scale scores at 6-month follow-up as the dependent mental health outcome measure. In Step One, their baseline Impact of Event Scale scores and their reported years of prior fire service employment were entered as a block. In Step Two, the prospective outcome respondents' duty-related traumatic incident exposures from their departmental records over the six month period prior to T_1 was entered into the

Table 4. Hierarchical Multiple Regression Analysis To Predict Posttraumatic Symptoms at 6 Months as a Function of Initial Symptoms, Traumatic Exposures, and Coping

Variable	β	ΔR^2	R^2	Total F
Step 1				
Baseline IES total	.49*			
Years of service	-.11			
			.25	24.3**
Step 2 (enter past 6 months' traumatic incident exposures)				
Baseline IES total	.49*			
Years of service	-.09			
Frequency of past year's traumatic incident exposures	.05			
		.00	.25	16.36**
Step 3 (enter CRRWI Component Scale Scores)				
Baseline IES total	.30*			
Years of service	-.11			
Frequency of past 6 months' traumatic incident exposures	.05			
Exposures				
C1: Secondary appraisal in the aftermath	.13			
C2: Behavioral distraction & social support seeking	.05			
C3: Cognitive behavioral avoidance & numbing	.29*			
C4: Foster positive attitudes	-.01			
C5: Cognitive positive self-talk	-.09			
C6: Inward search—philosophical self-contemplation	-.07			
		.07	.32	7.18**

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

equation. Finally, in Step Three, the CRRWI component scale scores were entered as a block. This latter step significantly increased the predictive capacity of this model ($F(6, 125) = 2.19; p < .05$).

The results of this stepwise multiple regression equation showed that while baseline IES scores were strongly associated with the respondents' IES scores at 6-month follow-up, their T_0 (baseline) scores on the *Cognitive Behavioral Avoidance and Numbing* CRRWI component scale were also significantly ($p < .01$) associated with their total IES scores at the six month follow-up even after controlling for their baseline symptomatology. None of the other CRRWI component scale scores was significantly associated with changes in posttrauma stress symptomatology measured at T_1 (6-month follow-up), after controlling for the respondent's baseline (T_0) total IES scores. Furthermore, neither their prior years of service nor the frequency of the respondents' duty-related traumatic incident exposures were related to their six month follow-up IES scores after controlling for their baseline IES scores. Parallel but separate stepwise regression analyses employing baseline and 6-month follow-up avoidance and intrusive IES subscales (not shown here) yielded virtually identical outcomes—the only baseline CRRWI component scale significantly associated with their IES intrusive subscale ($\beta = .26; p < .01$) as well as the avoidance ($\beta = .35; p < .001$) subscale scores in Step three was

Cognitive Behavioral Avoidance & Numbing. Again, neither their years of service nor past year's traumatic incident exposures were related to their IES subscale scores at the 6-month follow-up assessment after controlling for their baseline IES subscale scores in the separate stepwise regression equations.

While there were some significant correlations between certain CRRWI coping component scale scores and years of service in the baseline sample, the Pearson Product Moment correlation generated between the *Cognitive Behavioral Avoidance & Numbing* CRRWI scale scores and years of service was essentially zero order, $r(146) = .01$, ns. However, baseline sample fire service respondents with more years of service were slightly *less* likely to use *Behavioral Distraction and Social Support Seeking* as measured by CRRWI Component 2 scale scores, $r(146) = -.14$, $p < .05$, and also *less* likely to reportedly engage in an *Inward Search-Philosophical Self-Contemplation* coping strategy as measured by CRRWI Component 6 scale scores, $r(146) = -.17$, $p < .05$. Yet, neither of these latter two coping strategies as measured by their respective CRRWI component scale was significantly associated with posttrauma symptomatology at 6-month follow-up.

Discussion

Several of the self-reported coping response components that emerged from the current component analysis of the CRRWI instrument with the present urban fire fighters and paramedic baseline sample, which together accounted for 57% of the measure's cumulative variance, overlapped with factors previously identified by McCammon et al. (1988). Their Factor 1, *Search for Meaning*, bore a resemblance to the present Component 1 (labeled *Secondary Appraisal in the Aftermath*) both conceptually as well as in terms of item content. McCammon et al.'s (1988) Factor 4, *Philosophical/Self-Contemplative*, overlapped with the present Component 6 (C6) in terms of item loadings as well as in terms of a shared theme of an inward, philosophical approach to coping. However, several components emerged from the present component analysis which were distinct and unique to the present baseline and more homogenous urban fire fighter/paramedic sample, including a *Cognitive Behavioral Avoidance & Numbing* component (C3) and a *Cognitive Positive Self-Talk component* (C5). However, paralleling the results of McCammon et al.'s (1988) factor analysis, their *Cognitive Search for Meaning* factor and the current respondent samples' *Secondary Appraisal in the Aftermath* component accounted for the most variance and best captured the statistical centrality of the Coping Responses of Rescue Workers Inventory measure.

The present Coping Responses of Rescue Workers Inventory component factor scales appeared to possess adequate internal and test-retest reliabilities, suggesting that it was assessing relatively cohesive, stable attributes in this sample of urban fire fighters and paramedics. However, it is important to note that the CRRWI did not and does not assess several potentially important coping variables such as

hardiness (Nowack, 1989), perceived self-efficacy (Swift et al., 1996), or their use of humor (Corneil, 1992). It is possible that these or other coping responses or measures of psychological adjustment might have yielded results differing from those reported here (Carver, Schier, & Weintraub, 1989; Weiss, Marmar, Metzler, & Ronfeldt, 1995).

Based on our prospective outcome analysis, we found that neither the respondents' years of service nor their exposures to extremely stressful and potentially traumatic incidents documented in their departmental records during their prior 6 months on duty correlated significantly with their subsequent posttraumatic stress symptomatology as measured by the IES, after controlling for their baseline symptomatology. Contrary to Hytten and Hasle (1989) and Deahl et al. (1994), we *did not* find years of experience or "seasoning" in our respondents to be a significant protective factor; nor did we find, as Corneil (1995) reported for a sample of urban Canadian fire fighters, that years of service was a risk factor for PTSD. Of course, years of service is only a very rough index of exposures to traumatic events in the fire service since actual traumatic exposures will depend on specific duty assignments as well as the "healthy-worker effect," whereby fire fighters at greatest risk of development of PTSD after an event are also more likely to leave the fire service (Guidotti, 1995). The present findings seemed to suggest that experience in emergency workers may be, as McCammon (1996) has noted, a "double-edged sword."

Also contrary to our expectations, the frequency of our fire service respondent's past 6 months' exposures to duty-related traumatic incidents was unrelated to their changes in posttraumatic stress symptomatology. This was true even though the line of duty incidents were carefully selected, potentially traumatic, almost certainly stressful, and objectively derived from participating departmental records (see Corneil, 1993). It is possible that no association between line of duty traumata and these outcome measures was detected because their exposures were not sufficiently intense (Weiss et al., 1995), or because they were not differentially weighted. It is also possible that no association was detected because the time frame for the line of duty incident exposures considered was brief (six months) relative to these emergency worker respondents' average of more than a decade of prior incident exposures over their entire fire service careers. However, as noted above, we also failed to document a significant relationship between the length of their fire service careers and posttraumatic stress symptomatology at T_1 (6 month follow-up) in the present sample of urban US fire service personnel.

The stepwise multiple regression analyses demonstrated that only one of the CRRWI component scales significantly predicted the respondents' subsequent changes in posttraumatic stress symptomatology at T_1 (6 month follow-up) after controlling for their baseline symptomatology. This predictive CRRWI component scale, *Cognitive Behavioral Avoidance & Numbing*, consisted of the following four items: "Put feelings out of mind," "Put the whole thing out of my mind," "Withdraw from people," and "Concentrate on other things." This was not a "protective"

copied response strategy since it was actually associated with statistically significant *increase* in posttraumatic stress symptomatology at the six month follow-up after controlling for their baseline posttraumatic stress symptomatology. The items comprising this CRRWI component scale were similar to the Denial factor reported by Corneil (1993) and the avoidance/escape emotion-focused coping strategy previously shown by Kabbe, Setterlind and Svensson (1996) to be elevated in their sample of "fired" and unemployed managers.

There is some controversy whether this tendency to avoid and/or emotionally withdraw represents a coping strategy or a symptom of a psychological disorder (Hauser & Solomon, 1985). For instance, the avoidance subscale of the IES contains some items that were similar to a few of those comprising the present CRRWI *Cognitive Behavioral Avoidance & Numbing* scale. Thus, it was possible that the correlation between this CRRWI scale and the IES total at the 6-month follow-up was, in part, an artifact of overlapping item content. However, mitigating against this latter interpretation was the finding that scores on the *Cognitive Behavioral Avoidance & Numbing* CRRWI scale at T_0 also correlated significantly ($r(147) = .44; p < .001$) with the IES intrusion ("re-experiencing") subscale scores at six month follow-up. Thus, it seems plausible that scores on this CRRWI *Cognitive Behavioral Avoidance & Numbing* component scale represent maladaptive coping strategies that lead to a variety of adverse mental health outcomes, including posttraumatic intrusive "re-experiencing" symptomatology.

It is possible that this or a similar coping measure could be used to identify individuals who may be overly reliant on this CRRWI avoidant coping strategy and who then may be at an increased risk to subsequently experience posttraumatic stress symptomatology and perhaps PTSD. Perhaps these "at risk" individuals in the fire service would benefit from cognitive restructuring and reframing therapies (Meichenbaum, 1985), but we were unable to identify any statistically significant *protective* cognitive or behavioral coping responses in our sample of fire service personnel associated with a reduced risk of posttraumatic stress symptomatology. However, years of service and a few of the CRRWI component coping scales such as *Cognitive Positive Self-Talk* were somewhat, albeit nonsignificantly, protective in nature. Thus, the findings of this present investigation do not offer much guidance in developing preventive interventions that might aid and abet coping efforts to "master, tolerate or reduce demands" associated with stress in the fire service (Kessler, Price, & Wortman, 1985).

In addition to the relatively short prospective time frame under study, the present investigation suffered from a number of other limitations including a large number and percentage of non-participants, although the latter were similar to respondents on most but not all measured demographic and job characteristics. In particular, it is worth noting that the prospective outcome sample was *more* likely to have sought counseling and perhaps was at higher risk of PTSD than the non-participants, and this factor may limit the generalizability of these findings. The

present investigation also reflects our current limited capacity to measure individual coping responses within a sociocultural context, although the present CRRWI did appear to possess a number of empirically and theoretically distinct coping response scales. These CRRWI coping response scales also possessed adequate reliability and at least some predictive validity in our sample of urban fire fighters and paramedics. Another limitation of the present investigation was that the traumatic events rated by the respondent prospective outcome sample at T_0 and T_1 differed, and this may have affected their posttrauma symptomatology. However, even though the rated traumatic events differed at T_0 and T_1 , the CRRWI *Cognitive Behavioral Avoidance and Numbing* Scale was still able to predict significant changes in posttrauma symptomatology at 6 months follow-up. Finally, we do not know if our results are generalizable to other samples of urban fire fighters in the US and/or in other countries, and as such, these findings must be considered preliminary at this stage of the conceptual and psychometric development of the Coping Responses of Rescue Workers Inventory.

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