
Brief Report

Exposure to Duty-Related Incident Stressors in Urban Firefighters and Paramedics

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Little is known about the variables that might be associated with posttraumatic stress symptomatology in high-risk occupational groups such as professional firefighters and paramedics. A sample of 173 urban professional firefighter/EMT's and firefighter/paramedics rated and ranked the stressfulness of 33 actual and/or potential duty-related incident stressors. They also reported whether they had experienced each of these incident stressors within the past 6 months and, if they had, to recall on how many occasions within the past 6 months. A principal components analysis of their rescaled incident stressor ratings yielded five components: Catastrophic Injury to Self or Co-worker, Gruesome Victim Incidents, Render Aid to Seriously Injured, Vulnerable Victims, Minor Injury to Self and Death & Dying Exposure.

KEY WORDS: posttraumatic stress; duty-related traumata; emergency workers; incident stressors.

Little is known about variables that might eventuate in posttraumatic stress symptomatology in high-risk occupational groups such as professional firefighters and paramedics (Beaton & Murphy, 1995). Most studies of occupational trauma in emergency workers have been event-specific such as a tornado exposure (Durham, McCammon, & Allison, 1985). Although a few investigations have examined the types of traumatic workplace expo-

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asures leading to stress reactions in emergency workers (e.g., Bryant & Harvey, 1996), their foci too have been on infrequently experienced incidents. In contrast, one prior investigation reported that even "routine" cardiopulmonary resuscitation (CPR) elicited posttrauma symptomatology in emergency personnel (Myles, Levine, Ramsden, & Swanson, 1990).

It is important to increase our understanding of event variables, including the type and frequency of exposures, that may increase the risk of posttraumatic stress symptoms in emergency workers. Previously reported risk factors associated with emergency worker incident exposures are victims' ages (e.g., infants' and childrens' injuries/deaths have a greater impact; Hartsough, 1985), exposure to gruesome injuries and/or death (Green, Grace, & Gleser, 1985), and facing dangerous and/or unpredictable situations (Martelli, Waters, & Martelli, 1989).

In summary, the literature has described stressful incident exposure in emergency workers, but few empirical studies have documented their relative importance. The primary goal of this investigation was to empirically rank and categorize ratings obtained from a sample of professional urban fire service personnel for numerous stressful incident scenarios. These emergency workers also estimated their frequencies of exposures to these same duty-related incidents.

Method

Participant Sample

Participants were 173 professional firefighters and firefighter/paramedics employed for at least the prior 6 months in two northwest U.S. Cities. Participants were predominantly married (75%), Caucasian (88%), male (90%) and averaged approximately 38 years old. Participants were excluded if they had functioned in any capacity other than as a firefighter (89%) or paramedic (11% of sample). Participants reported having been employed either as a firefighter or paramedic an average of 11.2 and 7.1 years, respectively. The sample was drawn from a larger group of employees of two urban fire departments ($n = 500$). Nonparticipants did not differ statistically from participants on any of the demographic or job description variables described above.

Measure of Duty-Related Incident Stressors

A self-report measure of the appraised stressfulness of duty-related incidents actually or potentially experienced was administered as part of

an ongoing investigation. The listing of 33 incident stressor (IS) items/scenarios included rare catastrophic events as well as more commonly encountered incidents. Participants were instructed to rate the stressfulness of each of these IS items on a 0 to 100 point variable analog scale (VAS), with the following anchors: 0 = not stressful at all, 50 = somewhat stressful, 100 = extremely stressful (Gift, 1987). Participants were instructed to rate how stressful an IS was or would have been "assuming they . . . were present at the incident scene." Finally, participants were asked to indicate if they had actually experienced a given IS within the past 6 months and, if they had, to recall how many times. A listing and brief description of each of the IS items are shown in Table 1.

Results

Rescaling of Incident Stressor Severity Ratings

When participants estimated the stressfulness of IS items they did so based on their own idiosyncratic sense of stressor impact reflected by their within-subject average scores. A second person-specific response characteristic was their VAS range. Finally, the distribution of each respondent's IS ratings were either symmetric or skewed. These within-person response characteristics were considered in the following analyses.

To maintain the sensitivity of the interval nature of the data, all participants' scores were transformed such that their minimum IS rating was forced to zero and the IS identified as their most stressful was forced to 100. This rescaling was accomplished via the following equation:

$$Y_i = [(X_i - X_{\min}) / (X_{\max} - X_{\min})] * 100$$

Here, the rescaled value Y_i is 0.0 for the IS item (X_i) that had the lowest rating for that respondent and 100.0 for the IS item with the maximum rating given by that same respondent. Averages based upon these rescaled IS values preserved the ordinal relationship between incidents for each individual as well as their interval relationship. Pearson product moment correlations generated between the participants' raw IS rating scores and their rescaled IS rating scores ranged from .87 to .98 with only one exception.

Table 1. Descriptive Information about Firefighters' and Paramedics' Incident Stressor Reports

Ranking	Incident Stressor Item Description	Raw Mean VAS Incident Stress Severity Score	Rescaled Mean VAS Incident Stress Severity Score	Standard Deviation	% Reporting Item Experienced	If Experienced, Range of Times Experienced (past 6 months)
1	Witness duty related death of co-worker	79.97	85.27	30.29	0	—
2	Co-worker firefighter fire fatality (not witnessed)	78.71	83.75	30.30	2	1-2
3	Experience career ending injury (self)	73.97	78.43	34.22	2	1-2
4	Render aid to seriously injured friend/relative	70.23	73.77	29.34	3	1
5	Sudden infant death incident	67.18	70.13	29.23	10	1-2
6	Exposure to hazardous chemicals	67.24	69.34	29.70	8	1-8
7	Serious injury to co-worker	67.37	69.27	29.92	2	1
8	Render aid to seriously injured child	65.20	66.81	28.58	26	1-4
9	Fire incident with multiple deaths	63.63	65.27	30.91	12	1-2
10	Multiple casualty motor vehicle accident (>5 deaths)	62.04	63.42	32.35	0	—
11	Third degree burn (self)	59.91	60.39	34.36	0	—
12	Multiple casualty motor vehicle accident (1-4 deaths)	58.93	58.93	27.27	27	1-4
13	Fire incident with multiple burn victims	57.50	57.53	29.42	5	1-2
14	Render aid to seriously injured adolescent	56.98	56.87	30.56	26	1-10
15	Render aid to dangerous psychiatric patient	55.46	54.72	26.67	39	1-10
16	CPR/full arrest—family present	52.76	52.21	27.17	44	1-10
17	Render aid to mutilated adult/attempted homicide	52.80	51.95	30.38	6	1-2
18	Treat injured patient who resembles self/spouse	50.73	49.88	32.42	9	1-4
19	Attempted domestic homicide victim	50.26	48.41	27.65	10	1-4
20	Experience head injury (self)	47.60	44.62	32.88	2	1
21	Render aid to sexual assault victim	46.49	43.13	26.36	37	1-20
22	Completed gun shot suicide	45.23	42.35	31.27	15	1-3
23	Fracture of extremity (self)	45.26	41.92	31.74	2	1-6
24	Render aid to adult stabbing victim	45.14	41.81	25.25	21	1-4
25	Render aid to gun shot victim of gang violence	44.60	41.78	28.09	21	1-6
26	Adult dead on arrival (DOA)—multiple wounds/injuries	44.52	41.19	28.11	25	1-4
27	Experience musculoskeletal strain (self)	43.94	39.78	29.32	26	1-6
28	Death of patient after long resuscitation	41.72	38.55	27.97	57	1-55
29	CPR—patient in cardiac arrest	40.20	37.13	28.43	74	1-15
30	Completed suicide hanging	41.18	37.08	31.35	4	1-2
31	Inappropriate dispatch	37.92	33.65	30.16	43	1-100
32	Render aid—attempted suicide/drug overdose	32.99	26.64	23.22	44	1-30
33	Adult (DOA)—natural causes	22.97	14.29	22.29	61	1-10

Note. $N = 173$. Incident Stressor item rankings and standard deviations were based upon the rescaled scores whereby each participant's minimum and maximum responses were rescaled to "0" and "100," respectively.

Rescaled Ratings, Rankings, and Reported Frequencies of Incident Stressors

Table 1 shows the raw means and the rescaled average Incident Stressor (IS) severity scores, their relative rankings, the associated IS item standard deviations (based on rescaled scores), as well as the percentage of participants who had reportedly experienced a given incident stressor at least once during the past 6 months. Employing rescaled scores, *t*-tests were generated to examine differences, if any, between participants who reported having experienced a particular IS within the prior 6 months (“experienced”) and those who did not report having such an experience (“not experienced”). With only four exceptions, the “experienced” and the “not experienced” groups’ mean IS item scores were not significantly different. Consequently, subsequent analyses combined data from the “experienced” and “not experienced” groups. Also shown in Table 1 are the ranges for the frequencies of recollected exposures for each IS item. Spearman Rank Order correlations generated between the Incident Stressor ratings (rescaled) and the reported frequency of incident occurrences ranged from -.09 to .27. These correlations were statistically significant ($p \leq .02$) for only three of the IS items.

Principal Component Analysis of Incident Stressor (IS) Measure

As shown in Table 2 and based upon rescaled IS ratings, a principal component analysis yielded five empirically distinct, theoretically relevant components. Component 1 (“Catastrophic Injury to Self or Co-worker”) had an eigenvalue of 13.33, accounted for 40% of the variance of the IS measure, and had nine items. Component 2 (“Gruesome Victim Incidents”), had an eigenvalue of 3.44, accounted for 10% of the instrument’s variance, and had eight items. IS Component 3 (“Render Aid to Seriously Injured, Vulnerable Victims”) was comprised of two items, possessed an eigenvalue of 1.73 and accounted for 5% of the variance. IS Component 4 (“Minor Injury to Self”) had three items, had an eigenvalue of 1.44, and accounted for 4% of the variance. Finally, IS Component 5 (“Death & Dying Exposure”), comprised of three items, had an eigenvalue of 1.18, and accounted for 4% of the IS variance. These five components together accounted for a cumulative total of 64% of the variance of the IS measure.

Discussion

The types of emergency service incident exposures assessed ranged from relatively “routine” CPR incidents to infrequently experienced but

Table 2. Principal Components Analysis of Firefighter/Paramedic Rescaled Ratings of Incident Stressor (IS) Items

IS Components & Items/Variables	Loading	Eigenvalue	Variance (%)
1. Catastrophic injury to self or co-worker		13.33	40.4
#24 Witness duty-related death of co-worker	.86		
#16 Co-worker fatality (not witnessed)	.84		
#26 Career-ending injury to self	.84		
#30 Serious injury to co-worker	.79		
#31 Third-degree burn (self)	.74		
#27 Exposure to hazardous chemicals (self)	.73		
#22 Multiple-causality MVA (>5 fatalities)	.53		
#33 Sudden infant death incident	.53		
#23 Fire incident with multiple burn victims	.51		
2. Gruesome victim incidents		3.44	10.4
#18 Render aid to adult stabbing victim	.78		
#19 Completed suicide hanging	.69		
#11 Completed gunshot suicide	.69		
#13 Render aid to mutilated attempted adult homicide victim	.69		
#12 Attempted domestic homicide victim	.68		
#29 Gunshot victim of gang violence	.65		
#28 Render aid to attempted suicide/drug overdose	.63		
#10 Adult DOA—multiple wounds/injuries	.61		
3. Render aid to seriously injured vulnerable victims		1.73	5.2
#4 Render aid to seriously injured adolescent	.73		
#9 Render aid to seriously injured friend/relative	.54		
4. Minor injury to self		1.44	4.4
#15 Duty-related muscle strain	.79		
#14 Duty-related concussion	.72		
#21 Duty-related fracture of extremity	.62		
5. Exposure to death & dying		1.18	3.6
#5 CPR-patient in cardiac arrest	.68		
#6 Adult DOA—natural causes	.46		
#3 Death of patient after long resuscitation	.45		
		Cumulative variance = 64.0	

Note. $N = 173$.

presumably “extremely stressful” incidents (e.g., a Sudden Infant Death incident). There were large differences between participants in their appraisals of the stressor intensity associated with the various IS items, emphasizing the importance role of individual response specificity. However, their appraisal of incident stressfulness, with a few exceptions, was the same whether or not they had reportedly experienced a particular incident stressor within the prior six months and with few exceptions, was independent of how frequently they had reportedly experienced a particular IS within that same time frame.

The urban firefighters/paramedic sample ratings and rankings of these incident scenarios were consistent with empirical data collected from Australian volunteer firefighters (Bryant & Harvey, 1996). For example, three-

fourths of these investigators' sample of volunteer firefighters reported that ". . . threats to their own or other's safety were the most stressful . . . critical incidents." Similarly, a sample of law enforcement personnel ranked the "violent death of a partner in the line of duty" as the most stressful (Sewell, 1983). Our data were also consistent with prior reports of volunteer ambulance workers who had been involved in a CPR incident (Myles et al., 1990). Their data and ours suggested that even "routine" CPR is stressful, at least to some degree, for these emergency workers.

The findings resulting from principal component and factor analyses using unrescaled ratings (not shown here) overlapped with our principal component findings shown in Table 2, but failed to identify and differentiate as many theoretically salient event variables. The five empirical IS groupings that emerged from our principal component analysis of the rescaled data overlapped conceptually with several dimensions reportedly associated with the anticipated stress of body recovery in Army soldiers by McCarroll et al. (1995). McCarroll et al. (1995) identified a "gruesomeness factor" which was very similar to our Component 2 (Gruesome Victim Incidents). These researchers also identified "emotional attachment" and "personal threat" variables which were similar to our Components 3 and 1, respectively.

Finally, our results are limited by the urban fire service personnel who did not participate, even though the nonrespondents were similar to our respondents in terms of the demographic and job variables assessed. Also, these data may not be representative of volunteer firefighters and/or other emergency workers from other regions of the United States or from other countries. However, despite these limitations, these findings should help us to identify relatively stressful incident exposures which might guide preventive and remedial intervention for exposed personnel.

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