

Predictors of posttraumatic stress and preferred sources of social support among Canadian paramedics

Elizabeth A. Donnelly, PhD, MPH*; Paul Bradford, MD, MDS^{†‡§}; Matthew Davis, MD, MSc^{§¶}; Cathie Hedges[¶]; Michelle Klingel[¶]

ABSTRACT

Objective: Emergency medical service (EMS) providers are exposed to a variety of stressors endemic to the profession. These exposures may contribute to stress reactions, including posttraumatic stress. The objective of this study was to evaluate the relationship between work-related stressors and posttraumatic stress. The secondary objective was to determine paramedics' preferred sources of support for managing work-related stress.

Methods: 269 paramedics in a county-based EMS service were invited to complete an online survey. Respondents reported their demographic characteristics, levels of chronic stress, critical incident stress, posttraumatic stress symptomatology (PTSS), and preferred sources of support for managing work-related stress.

Results: A total of 145 paramedics completed the survey. PTSS was significantly correlated with operational stress ($p < 0.001$), organizational stress ($p < 0.001$), and critical incident stress ($p < 0.001$). Regression models revealed that chronic operational stress was a significant independent predictor of PTSS ($p < 0.001$) and in combination with critical incident stress ($p < 0.01$). Paramedics reported a higher preference for receiving support from a work partner, friend, or family member than from other sources ($p < 0.001$).

Conclusion: Both chronic and critical incident stressors appear to be significant predictors of PTSS. Our findings suggests that holistic health and wellness initiatives that address the impact of both critical incident stress and the chronic stressors associated with day-to-day operations may help mitigate PTSS. Our findings also provide preliminary evidence that interventions may benefit from a focus on peer support and on friends and family members who can support the affected paramedic.

RÉSUMÉ

Objectifs: Les fournisseurs de soins médicaux d'urgence (SMU) sont exposés à une multitude de facteurs de stress

qu'on pourrait qualifier d'« endémiques » à la profession. L'exposition à ces facteurs peut engendrer des réactions de stress, y compris l'état de stress post-traumatique (ESPT). L'étude avait pour objectif principal d'évaluer le lien entre les facteurs de stress liés au travail et l'état de stress post-traumatique et, pour objectif secondaire, de déterminer les sources préférées de soutien des ambulanciers paramédicaux pour faire face au stress lié au travail.

Méthode: Des ambulanciers paramédicaux, au nombre de 269, travaillant pour un fournisseur de SMU dans un comté ont été invités à répondre à une enquête en ligne. Les répondants ont fait état de leurs caractéristiques démographiques, du degré de stress chronique, d'événements traumatisants, de symptômes d'état de stress post-traumatique ainsi que de leurs sources préférées de soutien pour faire face au stress lié au travail.

Résultats: Au total, 145 ambulanciers paramédicaux ont répondu à l'enquête. L'ESPT était en corrélation étroite avec le stress lié au fonctionnement ($p < 0,001$), le stress lié à l'organisation ($p < 0,001$) et le stress lié à des événements traumatisants ($p < 0,001$). Les modèles de régression ont révélé que le stress chronique, lié au fonctionnement était un facteur prévisionnel important et indépendant d'ESPT ($p < 0,001$), de même que l'association du stress lié au fonctionnement et du stress lié à un événement traumatisant ($p < 0,01$). Les ambulanciers paramédicaux ont indiqué qu'ils préféreraient recevoir le soutien de collègues, d'amis ou de membres de la famille que celui d'autres sources ($p < 0,001$).

Conclusions: Le stress chronique et le stress lié à des événements traumatisants semblent des facteurs prévisionnels importants d'ESPT. D'après les résultats de l'étude, des initiatives de santé globale et de mieux-être ayant pour cibles l'effet du stress lié à des événements traumatisants et les facteurs de stress chronique, liés au fonctionnement quotidien pourraient atténuer l'ESPT. De plus, l'étude fournit des données préliminaires selon lesquelles on gagnerait à élaborer des interventions fondées sur le soutien de

From the *School of Social Work, University of Windsor, Windsor, ON; †Department of Emergency Medicine, Windsor Regional Hospital, Windsor, ON; ‡University of Western Ontario; §Southwest Ontario Regional Base Hospital Program; ¶Division of Emergency Medicine, University of Western Ontario, London, ON; and ||Essex Windsor Emergency Medical Services, West Essex, ON.

Correspondence to: Elizabeth A. Donnelly, University of Windsor, School of Social Work, 401 Sunset Avenue, Windsor, ON, N9B 3P4; Email: donnelly@uwindsor.ca

collègues, d'amis ou de membres de la famille capables d'aider l'ambulancier paramédical affecté.

Keywords: Paramedic, Stress, Posttraumatic Stress, Emergency Medical Services, Social Support, Paramedicine

INTRODUCTION

Paramedics are exposed to a variety of stressors during their day-to-day work; these may be related to the provision of patient care or more chronic in nature. A significant body of research has examined the stressors related to patient care, known as “critical incident stress.” Critical incident stress includes, but is not limited to, responding to the death of a child,^{1,2} providing care to friends, family or those known to the responder,²⁻⁶ and treating acutely ill or seriously injured patients.^{2,4,7,8} Additional stressors associated with the provision of care include the risks of exposure to blood-borne pathogens,⁹⁻¹¹ verbal or physical violence,^{7,12,13} and injury or death from vehicle-related crashes.¹⁴⁻¹⁶ To a lesser extent, other research efforts have found that paramedics may also experience chronic work-related stressors, including insufficient salaries,^{17,18} conflict with administrators,^{17,19,20} lack of support from or conflict with colleagues,^{2,3,5,17-21} and interference with non-work-related activities.^{3,5,17,21}

Exposure to work-related stressors has been linked to stress reactions, most frequently to posttraumatic stress.^{1,3,5,6,18,22-29} Most research in this area has focused on the link between critical incident stress and posttraumatic stress symptomatology (PTSS). However, recent research has found preliminary evidence that chronic work stressors may significantly contribute to PTSS. A study of United States emergency medical services (EMS) personnel found a significant link between organizational stressors (the stresses associated with the culture of the EMS service), operational stressors (the stress associated with the practice of EMS), and posttraumatic stress.³⁰ These findings suggest that a more holistic view of stress may be required to fully understand the risk for posttraumatic stress associated with paramedic practice. However, there are unique structural differences in the provision of EMS services in the United States, so it is not clear if this phenomenon is generalizable to the Canadian context. Beyond knowledge gaps regarding the factors involved in work-related stress, there remains a paucity of literature examining where paramedics would prefer to seek out support for issues relating to work-related stress.

It is important to understand all the ways in which paramedics may be at risk for posttraumatic stress; it is

equally important to understand how paramedics would like to receive support to manage that stress. The primary objective of this study was to determine if a relationship exists between chronic work-related stress and critical incident stress with the development of PTSS, and to identify variables associated with the development of PTSS among Canadian paramedics. The secondary objective was to determine where paramedics would prefer to receive support for work-related stress.

METHODS

Study design and sampling

All paramedics employed in one county-based EMS service in southwest Ontario (annual call volume approximately 80,000) were contacted via email using the survey protocol recommended by Dillman.³¹ The EMS service was comprised of staff working at both the primary care paramedic (PCP) and advanced care paramedic (ACP) levels. The email contained a link to the survey as well as an option to unsubscribe from the study. Respondents received a total of up to five contacts: a pre-survey informational contact alerting participants to the upcoming study, followed by two invitations to participate and two reminders. The surveying took place during the fall of 2011.

The study received ethics approval by the University of Windsor Research Ethics Board.

Instruments

Posttraumatic stress symptomatology (PTSS) was measured using a standardized tool called the PTSD (posttraumatic stress disorder) Checklist (PCL).^{32,33} The PCL is a 17-item scale that provides a continuous measure of PTSS and a threshold cut-off that indicates possible PTSD. Response options are on a 5-point Likert scale and possible scores range from 17 to 85. Scores over 50 are indicative of possible PTSD. The PCL has been successfully used in prior paramedic research.³⁰

Two types of chronic stress were assessed in this study. The EMS Chronic Stress Scales³⁴ assess both

organizational and operational types of chronic workplace stress. Each scale consists of 10 items. Operational stress includes the stress associated with the structural elements of working on an ambulance service, like shift work, risk of being injured, and fatigue. Organizational stress encompasses factors associated with the culture of the organization in which the respondent is working (e.g., conflict with supervisors, changes in policies). Respondents were asked to report levels of stress over the past six months on a 7-point Likert scale, and the responses were summed, resulting in scores that could range from 10 to 70.

Critical incident stress was assessed using the Critical Incident Stress Inventory for EMS,³⁵ an inventory that examines both the number of exposures to a select number of critical incidents, as well as levels of stress associated with those exposures. If respondents indicated they had been exposed to a critical incident, they were asked to report on a 7-point Likert scale how much stress that incident had caused them over the past six months. The responses were summed, resulting in scores that could range from 0 to 252.

In order to determine where paramedics would primarily prefer to go for support in dealing with work-related stress, respondents were asked, "If you felt that you were suffering from work-related stress, how likely is it you would go to the following for help?" Respondents were asked to rate the sources of support on a 7-point Likert scale. Response options ranged from 1 (not at all likely) to 4 (neither likely nor unlikely) to 7 (extremely likely). Respondents rated sources of support, including a supervisor, a co-worker, a base hospital educator, a union representative, a partner, a family member or friend, and the employee assistance program or a therapist.

Demographic measures collected in this study included age, gender, marital status, level of certification, length of service in EMS, weekly hours worked, and income.

Statistical analysis

Analyses were conducted using SPSS (v. 22). In order to reduce error due to missing data, respondents who had not completed at least 85% of the survey were removed from the sample.³⁶ Descriptive statistics were used to determine demographic breakdown of the survey sample and the prevalence of types of work-related stress and posttraumatic stress. Ordinary least squares

(OLS) linear regression was used to determine the relative influence of different stressors on posttraumatic stress. The R^2 coefficient of determination was used to assess the goodness of fit of the model. Repeated measures analysis of variance (ANOVA) strategies were used to assess the relative difference in preferred sources of support.

RESULTS

Of 269 paramedics invited to participate in the study, 162 (60%) responded to the survey. Nine individuals declined to participate and eight respondents were not included, as they had not completed at least 85% of the survey. The final resulting number of usable responses was 145 (a 54% response rate). The scales in this study demonstrated acceptable reliability (operational stress scale $\alpha = 0.863$, organizational stress scale $\alpha = 0.876$, and posttraumatic stress scale (PCL) $\alpha = 0.915$). Demographic characteristics of the study population are presented in Table 1.

Predictors of PTSS

The data were initially examined to determine whether significant bivariate relationships existed, as it would be inappropriate to undertake multivariate analyses in the absence of this. The results of this analysis are provided in Table 2 and indicate that PTSS is significantly correlated with all three types of workplace stress ($p < 0.001$).

In our bivariate analyses, we determined whether differences existed in critical incident stress, organizational and operational stress, as well as posttraumatic stress, by demographic characteristics (e.g., age, income, level of training). The results were virtually uniformly non-significant, with the exception that advanced care paramedics (ACPs) were found to have significantly higher levels of critical incident stress than primary care paramedics (PCPs, $p < 0.01$).

Given the significant bivariate results, we proceeded to a multivariate regression analysis. Our use of OLS regression allowed for the testing of the relationship between the different types of workplace stress and posttraumatic stress, while controlling for the influence of demographic factors (e.g., level of training or years of experience). In Table 3, the standardized coefficients (beta weights) are provided; standardization converts the beta weights of all variables to a common metric,

Table 1. Sample Demographic Characteristics

	Mean	(SD)
Age	38.3	(10.3)
Length of service	13.75	(11.07)
	N	%
Hours worked weekly		
10-19 hours	1	.7
20-39 hours	39	26.9
40-59 hours	90	62.1
60-79 hours	10	6.9
80-99 hours	5	3.4
Gender		
Male	103	71.0
Female	42	29.0
Level of certification		
Advanced care paramedic (ACP)	28	19.3
Primary care paramedic (PCP)	117	80.7
Marital status		
Married for the first time	84	58.7
Married with previous marriages	12	8.4
Widowed	1	.7
Divorced or separated	15	10.5
Never married	31	21.7
Income		
\$30,000-39,999	4	2.8
\$40,000-49,999	10	7.0
\$50,000-59,999	20	14.1
\$60,000-69,999	23	16.2
\$70,000-79,999	45	31.7
\$80,000-89,999	25	17.6
\$90,000-99,999	4	2.8
\$100,000 +	11	7.7

Table 2. Stress Variables: Univariate and Bivariate Results

	Mean (SD)	Correlation with PTSS
Operational stress	31.4 (12.1)	0.508*
Organizational stress	34.8 (13.5)	0.419*
Critical incident stress	59.4 (36.9)	0.433*
Posttraumatic stress	30.5 (11.3)	1

**p* < 0.001

which allows the magnitude of the coefficients to be meaningfully compared. Model 1 tested PTSS against demographic factors, none of which were found to be significantly associated. We then added other variables in a forward stepwise manner to test their impact on the predictive power of the model. In Model 2, the stress variables were added. Operational stress was found to be significantly associated with PTSS (*p* < 0.001),

whereas organizational stress was not (*p* = 0.672). Critical incident stress was also significantly associated with PTSS (*p* < 0.05). In Model 3, an interaction term was applied to determine whether an interaction of operational stress and critical incident stress increased the overall predictive power of the model. We found the introduction of the interaction term resulted in critical incident stress losing significance as an independent predictor of PTSS.

In the final model, operational stress retained significance as a predictor. The standardized beta weights indicated that operational stress had the greatest influence on the predictive power of the model, both as an independent predictor and as part of the interaction term. The final model was found to have an *R*² of 0.39, thus explaining almost 40% of the variance in PTSS.

Sources of social support

More than 80% of respondents reported they were likely to go to a friend or family member for assistance and more than 70% reported they would go to a work partner (someone with whom they regularly work on the ambulance) in dealing with work-related stress. Less than half of respondents were likely to seek help from a co-worker, with even fewer being willing to seek assistance from the other sources of support. In order to assess if the observed differences in preferred sources of social support were statistically significant, repeated measures ANOVA were utilized. These revealed significant differences in preferred sources of support (Table 4). Mauchly’s test indicated that the assumption of sphericity had been violated ($\chi^2(20) = 69.3, p < 0.001$), so the Greenhouse-Heisser estimate of sphericity ($\epsilon = 0.845$) was used to correct the degrees of freedom. After correction, significant differences remained between the preferred sources of social support (*p* < 0.001). Post-hoc analyses, utilizing a Bonferroni correction, reaffirmed our finding that a statistically significant proportion of respondents preferred their sources of support to be a friend, family member, or work partner. The groups that were statistically distinct from each other were, by order of most to least preferred:

- 1) a friend, family member, or work partner
- 2) a co-worker, employee assistance program, or other therapist
- 3) a union representative or supervisor
- 4) a base hospital educator.

Table 3. Standardised Coefficients from OLS Regression of Predictor Variables on Posttraumatic Stress

	Model 1		Model 2		Model 3	
	B	p	B	p	B	p
Level of certification	-0.056	0.560	0.000	0.997	-0.023	0.764
Length of service	0.066	0.727	0.079	0.616	0.024	0.874
Age	0.007	0.965	0.020	0.884	0.031	0.816
Gender	-0.056	0.552	-0.104	0.177	-0.114	0.123
Hours worked weekly	0.037	0.741	-0.059	0.521	-0.028	0.753
Income	0.019	0.879	0.026	0.802	0.021	0.832
Operational stress			0.468	0.000	0.455	0.000
Organizational stress			0.044	0.672	0.060	0.550
Critical incident stress			0.211	0.011	0.126	0.128
Critical incident stress x Operational stress					0.259	0.001
Adjusted R ²		-0.024		0.334		0.390
Change in R ²				0.357**		0.058*

*p<0.01, **p<0.001

Table 4. Descriptive Results and Repeated Measures ANOVA for Preferred Sources of Support

If you felt that you were suffering from work-related stress, how likely is it you would go to the following for help?	Likely to seek support	
		Mean (SD)
A family member or friend	81.4%	5.64 (1.77)
Your partner	73.2%	5.18 (1.91)
A co-worker	49.7%	4.10 (2.01)
The employee assistance program/another therapist	38.6%	3.74 (2.05)
A union representative	22.1%	2.76 (1.89)
A supervisor	17.2%	2.47 (1.76)
A base hospital educator	7.6%	1.79 (1.45)

Result of repeated measures ANOVA: F(5.01, 710.11) = 108.94, p<0.001

DISCUSSION

Our findings suggest that a multiplicity of stressors are significant predictors of PTSS, and moreover that it is critical incident stress combined with operational stress that contributes to the risk of PTSS, rather than critical incident stress alone. We did not find a significant association between demographic factors and posttraumatic stress. However, when controlling for demographic characteristics, we found that operational stress was significantly associated with PTSS. While critical incident stress did not significantly predict posttraumatic stress, critical incident stress interacting with operational stress was found to be a significant predictor of posttraumatic stress.

While unique to Canada, these findings are consistent with the results of research done on US paramedics,³⁰ which also found a significant relationship between

operational stress and PTSS and a significant interaction between operational stress and critical incident stress.

Operational stress was found to have a significant association with PTSS in our study population, suggesting the stressors that fall into that domain may be important as a target for intervention. Operational stress encompasses many factors that reflect the structure of service provision in EMS. Specifically, operational stress involves such things as the strain from shift work, missing and working through meals, fatigue, managing a social life outside of work, worry of injury, lack of understanding from friends and family, and feeling like one is always “on the job.” These stressors may not currently be addressed by existing interventions for workplace stress in EMS systems. Given the strength of the relationship that we found between operational stress and PTSS, this may be an area in which there is great opportunity for beneficial intervention.

Current interventions, like Critical Incident Stress Debriefings,^{37,38} focus exclusively on critical incident stress, and despite their widespread use, have inconsistent evidence supporting their use³⁹. It is possible that having paramedics return to work on a scheduled day off for debriefing could increase their operational stress, especially in a shift work environment. Other common interventions for work-related stress are offered in the form of employee assistance plans, Workplace Safety Insurance Programs, staff psychologists, or other institutional provisions of mental health services. But such interventions are focused on treating pathological responses after they have occurred, rather than on prevention. Further, significant barriers to accessing these services have been identified, including stigma, scheduling challenges, personal beliefs about mental health and mental illness,^{40,41} and concerns about the professional ramifications of help-seeking⁴². Given the problematic nature of the current interventions available to paramedics, our findings underscore the need for the development and validation of evidence-based interventions to address the multiplicity of factors that can contribute to the development of stress reactions in paramedics. Further, our findings suggest that interventions for managing workplace stress should be holistic and target both critical incident and chronic workplace stressors.

We identified significant differences between preferred sources of support for managing workplace stress among paramedics. Paramedics indicated a strong preference for receiving support from a work partner or friend or family member. These findings suggest that emerging interventions, like peer support programs⁴³ and programs that equip families with the resources to support paramedic family members, might be beneficial for paramedic health and well-being. Our findings also agree with previous research which found that social support from both work and family sources ameliorated stress and was protective against distress for police officers and firefighters.⁴⁴⁻⁴⁶

LIMITATIONS

A number of limitations should be kept in mind when interpreting our results. Our study was conducted using a convenience sample, which may limit the ability to generalize our findings. In particular, it is not possible to determine whether the relationships between different stresses and posttraumatic stress we observed

would be found in other EMS services. Another limitation lies in the response rate. While we feel our response rate of over 50% was reasonable, our results may be biased by non-responders differing from responders in ways that we were not able to determine. At the time of data collection, it was not possible to access demographic data for the entire service, which precluded us from carrying out an assessment to determine whether those who responded to the survey were representative of the overall service. Future research may avoid this limitation with the use of a non-responder survey to determine whether there are qualitative differences between those who did or did not participate. A survey, while arguably the best modality for addressing the research questions outlined in this study, is by its nature cross-sectional, thus providing a “snapshot” of providers without the ability to assess how provider experience may change over time. Further, self-reporting is vulnerable to social desirability bias, whereby respondents alter their responses to reflect how they think they ought to reply rather than in a way that reflects their true experiences or beliefs. Unfortunately, in order to reduce the response burden in this survey, we were unable to include a measure to assess the degree to which concerns of social desirability might be influencing the findings. Given the complexity and multidimensionality of social science research, capturing every factor that might influence PTSS is impossible. Our study did not assess a multiplicity of factors which have been identified as associated with PTSS (e.g., personal coping style, previous trauma history). However, we feel that our finding that the inclusion of operational stress and the interaction between operational stress and critical incident stress account for nearly 40% of the variation in posttraumatic stress scores remains extremely compelling.

CONCLUSION

Both chronic and critical incident stressors appear to be significant predictors of PTSS. Our findings suggest that holistic health and wellness initiatives that address the impact of both critical incident stress and the chronic stressors associated with day-to-day operations may help mitigate PTSS. Our findings also provide preliminary evidence that interventions may benefit from a focus on peer support and on friends and family members who can support the affected paramedic. Future research efforts should focus on exploring the impact of chronic and critical incident stress on other

stress reactions, such as depression and anxiety, as well as exploring how stress might influence safety-related outcomes like injury, errors, adverse events, and safety-compromising behaviours.

Competing Interests: None declared.

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