

Secondary Traumatic Stress in Emergency Services Systems (STRESS) Project

Quantifying Personal Trauma Profiles for Secondary Stress Syndromes in Emergency Medical Services Personnel With Prior Military Service

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ABSTRACT

Background: EMS personnel are often exposed to traumatic material during their duties. It is unknown how prior military experience affects the presence of stress in EMS personnel. **Methods:** This was a prospective cross-sectional study. Nine EMS agencies provided data on call mix, while individuals were recruited during training evolutions. The survey evaluated sociodemographic factors and the relationship between childhood trauma and previous military service using the Adverse Childhood Experiences questionnaire, Life Events Checklist DSM-5, and Military History Questionnaire. Descriptive statistics calculated personal trauma profiles, comparing civilian EMS personnel to those with prior service. Hierarchical linear regression assessed the predictive utility of military history to scores on the Impact of Events Scale-Revised. **Results:** A total of 765 EMS personnel participated in the study; 52.8% were male, 11.4% were minorities, and 11.6% had prior military service. A total of 64.4% of civilian EMS providers had any stress syndrome, while that number was 71.8% in those with prior military service. Hierarchical linear regression identified that years of service and the performance of combat patrols or other dangerous duty accounted for a unique criterion variance in the regression model. **Conclusions:** Prior military service or combat deployments alone do not contribute to the presence of stress syndromes. However, performance of combat patrols or other dangerous duties while deployed was a contributing factor. These results must be interpreted holistically, as other factors contribute to the presence of vicarious trauma (VT) in EMS personnel who are also veterans.

KEYWORDS: paramedic; EMS; military; compassion fatigue; vicarious trauma; burnout; secondary traumatic stress

Introduction

This report is part of the Secondary Trauma Response in Emergency Services Systems (STRESS) project. The focus of this arm was to create a personal trauma profile of emergency medical services (EMS) personnel with prior military service, while evaluating the impact of military service on the presence of stress syndromes in this population.

The depth and breadth of the patient care experience provided by EMS personnel in the prehospital environment is considerable. However, these clinicians have little control over the events and circumstances to which they are often exposed.

Previous reports have identified that clinicians in direct patient care roles are at a higher risk for developing secondary traumatic stress syndromes.^{1,2} Concomitantly, previous studies on traumatic stress show a relationship between a clinician's personal history of trauma acting as a psychopathological comorbidity and the development of stress syndromes, such as vicarious trauma (VT).³⁻⁶

VT, like posttraumatic stress disorder (PTSD), is a primary stress syndrome characterized by exposure to intensely traumatic material that causes a maladaptation in clinician coping structures.⁷⁻¹⁰ VT can be best described as emotional countertransference between a care provider and their patient and can often lead to a transformation of the clinician's worldview.^{11,12} Symptomatology can range from nonspecific dissatisfaction and irritability to the loss of a sense of purpose, emotional withdrawal, hopelessness, or a general feeling of being unsafe.^{7-10,13,14}

Similar to other types of stress syndromes, VT is based on the amalgamation of constructionist self-development theory (CSDT) and oppression theory.^{8,15-17} After the occurrence of a traumatic event, a clinician may not be able to rationalize that to which they have been exposed, which results in maladaptive coping. This can be a dramatic interruption to coping mechanisms that have evolved over the clinician's lifetime. As this exposure continues, the clinician's belief system may also become altered. Faced with a tenuous hold on a previously understood reality, individuals may model their values on others who have been determined to be "right."^{8,15-17} These individuals may then cope with the frustration of ill-fitting values by engaging in lateral violence with peers and superiors.^{8,15-17} This series of events repeats with the exposure to additional traumatic material and can be cumulative in nature.

Anecdotally, it is known that EMS personnel are sometimes exposed to intensely traumatic material. However, the rates and types of exposure in this unique population have yet to be comprehensively quantified, particularly in those with prior military service. Collaterally, many studies have identified that combat veterans have also been exposed to highly stressful matter, albeit in a different setting. The effects of such stress could be compounded by continued service in the EMS profession on military discharge.¹⁸⁻²⁰ It is important to understand the interplay between military and EMS service, particularly as those experiences relate to traumatic stress syndromes. As

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such, this study sought to create a comprehensive personal trauma profile for EMS personnel with prior military service and to evaluate the impact of military service on the likelihood of VT. This holistic trauma profile included sociodemographic, childhood trauma, military, and occupational characteristics, as well as life events experienced by the population of prior-service EMS professionals.

Methods

Study Design

Institutional review board approval was obtained from Rush University, Chicago, Illinois. This was a prospective cross-sectional survey study. Twelve EMS agencies were selected based on human settlement area (HSA), geographic location, and size. Of those, nine agreed to participate in this study. An agency information questionnaire (AIQ) was sent to each agency to identify the types of prehospital service provided as well as the annual number and types of critical stress events that affected the agency. HSA was defined as rural, suburban, or urban based on 2013 US Census criteria, of which four, three, and two EMS agencies were recruited, respectively.²¹ Geographic location was based on data from the North Carolina Department of Commerce and all regions were represented except for the southeast, western, and northwest.²² EMS personnel were recruited during monthly training evolutions offered by each participating EMS agency. Each respondent was provided a 105-item paper survey designed to quantify stress syndromes in EMS professionals. For this project, sociodemographic and personal trauma profiles were extrapolated from the overall survey using both the 10-item Adverse Childhood Experiences (ACEs) questionnaire and the 17-item Life Events Checklist DSM-5 (LEC-5). The Impact of Events Scale-Revised (IESR) was used to determine the presence of VT.

The aims of this study were to create an individualized personal trauma profile for EMS clinicians with prior military service and to determine the impact of prior service on the prevalence of VT while controlling for potential confounders.

Study Setting and Population

The 415 EMS agencies in North Carolina answer over one million calls for service annually and provide primary 911 response to the state's 100 counties and some 9.5 million residents.^{23,24} A total of 25,344 individuals hold an EMS credential in the state, of which 6,952 were paramedics, 1,707 were advanced EMTs (AEMTs), and 14,005 were emergency medical technicians (EMTs), accounting for 89.42% of the credentialed emergency services personnel in the state.²⁴ Emergency medical responders (EMRs) and emergency medical dispatchers (EMDs) make up the remaining 10.58% of personnel and were not included in this study. Using this data, a standard sample size calculator was used to determine the needed sample for this project, using a confidence level of 95% and a margin of error of 4%. The sample size needed was determined to be 587 respondents, which was then multiplied by 25% to account for the potential of attrition bias and yielded a final, needed sample of 734 respondents.

At any given time, there are roughly 736,000 military veterans living in North Carolina and an additional 129,000 active-duty military personnel.^{25,26} Veterans represent 9.8% of North Carolina's total population.²⁵ Of those, 21% served in the Gulf War, while 14% served in military operations

post-9/11, which ostensibly includes Operation Iraqi Freedom (OIF), Operation Enduring Freedom (OEF), and Operation New Dawn (OND).²⁵

Prior to the collection of any individual or agency information questionnaires, written informed consent was obtained from all participants and EMS agency leaders. A total of 764 EMS personnel participated in this study with an overall survey completion rate of 98.3%. Of those, 89 (11.6%) were veterans.

Life Events

The Life Events Checklist DSM-5 (LEC-5) was used to quantify the proportions of stressful material experienced by EMS personnel with prior military service and evaluated 17 potentially traumatic events (PTEs) stratified by how the respondent had experienced the event: directly, witnessed, learned about, or part of job duties. The instrument had good internal consistency, yielding a Cronbach's α of .854. Previous studies have reported a range for Cronbach's alpha of 0.67–0.93 for this instrument.^{27–29} Each respondent could select any way an event applied to them individually, which yielded a comprehensive profile of not just what events had been experienced by EMS personnel (with and without veteran status), but in what manner those events had been experienced.

Statistical Analysis

IBM® SPSS® Statistics (IBM; www.ibm.com/analytics/spss-statistics-software) was used to collect and analyze data with statistical significance established with an $\alpha \leq .05$. Descriptive statistics were utilized to compare proportions of EMS personnel with and without prior military service to various demographic, socioeconomic, childhood, and occupational factors. Civilian EMS and military subgroups were further stratified by whether the likelihood of any stress syndrome existed.

Hierarchical linear regression was conducted using total scores on the IESR to ascertain the predictive utility of prior military service. It was also used to understand the unique contribution of prior service to the EMS clinician affected by VT. Squared semipartial correlations for significant variables determined unique criterion validity.

Results

Sociodemographic Profile

A total of 764 individuals participated in the survey. Overall, 89 (11.6%) had prior military service. In total, 496 (64.4%) civilian EMS personnel were identified as experiencing any of three evaluated stress syndromes (burnout [BO], compassion fatigue [CF], or VT), while 61 (71.8%) of veterans were affected by one or more of these syndromes. The proportion of males was 20.0% higher in the veteran population compared to civilian EMS personnel. A full sociodemographic profile is located in Table 1.

Military Profile

In this sample, 89 EMS personnel indicated prior military service. A total of 49 (57.6%) were male, and 15 (16.9%) were minorities. Of those, 61 (71.8%) were affected by a stress syndrome. A total of 56 (62.9%) veterans had prior Army service, while 8 (8.9%), 11 (12.4%), and 9 (10.1%) veterans served in the Navy, Marine Corps, and Air Force, respectively. A single (1.1%) veteran served in the US Coast Guard.

TABLE 1 Sociodemographic Profile of EMS Professionals With Prior Military Service Compared to the Overall Sample [n (%)]

	Civilian EMS 496 (64.4%)	Military 61 (71.8%)
Male gender	249 (37.8%)	49 (57.6%)
Sexual orientation		
Homosexual	36 (5.5%)	3 (3.5%)
Heterosexual	439 (67.3%)	57 (67.1%)
Other	14 (2.1%)	1 (1.2%)
Age group, y		
19–25	115 (17.7%)	3 (3.6%)
26–32	141 (21.7%)	21 (23.6%)
33–39	89 (13.7%)	10 (11.2%)
40–46	81 (12.5%)	12 (13.5%)
47–52	48 (7.4%)	8 (8.9%)
>53	19 (2.9%)	7 (7.9%)
Education		
High school diploma	50 (7.6%)	3 (3.5%)
Some college	170 (25.8%)	26 (30.6%)
Associate degree	149 (22.6%)	18 (21.2%)
Bachelor's degree	112 (17.0%)	11 (12.9%)
Master's degree	14 (2.1%)	3 (3.5%)
Doctoral degree	1 (0.2%)	0 (0.0%)
Race		
Caucasian	439 (66.7%)	50 (58.8%)
African American	25 (3.8%)	6 (7.1%)
American Indian or Alaskan Native	6 (0.9%)	1 (1.2%)
Asian	1 (0.2%)	1 (1.2%)
Hawaiian or other Pacific Islander	0 (0.0%)	1 (1.2%)
Two or more races	20 (3.0%)	2 (2.4%)
Other	5 (0.8%)	0 (0.0%)
Marital status		
Single	213 (32.5%)	10 (11.8%)
Married	206 (31.4%)	39 (45.9%)
Separated	17 (2.6%)	3 (3.5%)
Divorced	56 (8.5%)	9 (10.6%)
Widowed	2 (0.3%)	0 (0.0%)
Annual income		
< \$20,000	17 (2.6%)	1 (1.2%)
\$20,001–\$40,000	126 (19.2%)	13 (15.3%)
\$40,001–\$60,000	185 (28.2%)	9 (10.6%)
\$60,001–\$80,000	98 (14.9%)	21 (24.7%)
\$80,001–\$100,000	64 (9.8%)	13 (15.3%)
> \$100,000	47 (7.2%)	4 (4.7%)
Credential level		
EMT	88 (13.4%)	8 (9.4%)
AEMT	38 (5.8%)	3 (3.5%)
Paramedic	370 (56.2%)	50 (58.8%)

VT = vicarious trauma; CF = compassion fatigue; BO = burnout; NSS = no stress syndrome; EMT = emergency medical technician; AEMT = advanced emergency medical technician.

Of those, 49 (55.1%) deployed overseas for a mean (\pm SD) total time deployed of 20.1 (\pm 18.7) months with an average of 7.3 (\pm 5.4) years of active-duty service. A total of 39 (43.8%) either actively engaged the enemy and/or were actively engaged by the enemy during combat operations, and 53 (59.5%) reported conducting combat patrols or participating in other dangerous duties. Other dangerous duties were defined subjectively by the respondent in that this category could

have included combat patrols while deployed or any other occupational duty considered dangerous by the participant.

Twenty-one (23.6%) functioned as a combat medic while in the military. A complete profile of military service history stratified by the likelihood of stress syndromes is located in Table 2.

TABLE 2 Military Service Profile of EMS Professionals With Any Stress Syndrome or No Stress Syndrome

Categorical Variables	Any Stress 61 (71.8%) n (%)	No Stress 24 (28.2%) n (%)
Branch of service		
Army	40 (65.6%)	16 (66.7%)
Navy	4 (6.6%)	4 (16.7%)
Marine Corps	9 (14.8%)	2 (8.3%)
Air Force	7 (11.5%)	2 (8.3%)
Coast Guard	1 (1.6%)	0 (0.0%)
Overseas deployment to combat zone	32 (52.5%)	15 (62.5%)
Active engagement of the enemy	25 (41.0%)	12 (50.0%)
Service as a combat medic	12 (19.7%)	8 (33.3%)
Other dangerous duty	36 (59.0%)	15 (62.5%)
Continuous Variables		
Years of service	8.27 \pm 5.89	7.03 \pm 5.25
Total deployment time (in months)	19.82 \pm 15.96	21.29 \pm 24.47

Employment Profile

Table 3 illustrates the employment profile of EMS personnel with and without prior military service. More than 3 times as many EMS personnel with stress syndromes had an additional part-time job in EMS compared to those providers who did not have a stress syndrome. Nearly 4 times as many personnel without stress syndromes worked in the fire service part-time in addition to their full-time EMS employment, irrespective of prior military service. The mean shift length (in hours) was nearly an hour longer for prior-service EMS personnel with stress syndromes compared to those without.

Childhood Trauma Profile

The ACEs questionnaire was used to evaluate the proportion of childhood trauma in EMS personnel with stress syndromes with and without prior military service compared to the overall sample (Table 4). Veterans had higher rates of emotional and sexual abuse, parental divorce, maternal domestic violence, familial mental illness, depression or suicide, and incarcerated family members than their nonveteran counterparts. In some cases, the rates of adverse childhood experiences in the population of EMS personnel with prior military service was 1.5–3.0 times higher than in those personnel for which no stress syndrome could be assigned. The ACEs total score was a full point higher in EMS personnel with prior military service compared to the overall sample (2.47 [\pm 2.27] vs 1.46 [\pm 1.78]).

Resource Profile

Survey questions related to the understanding of what resources were available to EMS personnel if they experienced a critical stress event are located in Table 5. More than double the rate of prior-service EMS personnel were aware that incident debriefing, crisis intervention teams (CIT), employee assistance programs (EAP), and time off were available to them. The overall proportion of veterans in the stress group who had a prior history of counseling was nearly 6 times higher than

TABLE 3 Employment Profile of EMS Professionals Stratified by Prior Military Service and Specific Stress Syndromes Compared to the Overall Sample

Categorical Variables	Civilian EMS 496 (64.4%) n (%)	Military 61 (71.8%) n (%)	NSS 187 (24.3%) n (%)
Human settlement area			
Rural	176 (26.7%)	29 (34.1%)	72 (9.7%)
Suburban	194 (29.4%)	21 (24.7%)	72 (9.7%)
Urban	126 (19.1%)	11 (12.9%)	43 (5.8%)
Employment status (full-time)	405 (61.6%)	52 (61.2%)	142 (19.1%)
Primary role (patient attendant)	426 (64.7%)	48 (56.5%)	166 (22.3%)
Secondary employment			
EMS	209 (31.8%)	25 (29.4%)	70 (9.4%)
Fire service	80 (12.2%)	10 (11.8%)	29 (3.9%)
Law enforcement	11 (1.7%)	3 (3.5%)	5 (0.7%)
Other public safety	33 (5.0%)	5 (5.9%)	8 (1.1%)
None	371 (56.6%)	43 (50.6%)	143 (19.3%)
Years of field experience			
<1	21 (3.2%)	3 (3.5%)	25 (3.4%)
1–5	135 (20.5%)	18 (21.2%)	57 (7.7%)
6–10	145 (22.0%)	15 (17.6%)	42 (5.6%)
11–15	74 (11.2%)	5 (5.9%)	17 (2.3%)
16–20	42 (6.4%)	2 (2.4%)	17 (2.3%)
21–25	38 (5.8%)	8 (9.4%)	13 (1.7%)
>25	41 (6.2%)	10 (11.8%)	15 (2.0%)
Agency type			
Municipal (government)	418 (63.4%)	44 (51.8%)	154 (20.7%)
Private, hospital-based	78 (11.8%)	17 (20.0%)	33 (4.4%)
Secondary agency response			
N/A; no secondary services	54 (8.2%)	13 (15.3%)	13 (1.7%)
Critical care	31 (4.7%)	0 (0.0%)	7 (0.9%)
MIH	411 (62.4%)	48 (56.5%)	167 (22.4%)
Continuous Variables			
	Mean ± SD	Mean ± SD	Mean ± SD
Shift length (in hours)	15.55 ± 5.97	15.43 ± 5.32	14.55 ± 5.29
Annual call volume	41,909.62 ± 25,922.35	40,766.66 ± 26,338.41	42,379.89 ± 25,064.19
OHCA	354.54 ± 201.79	331.90 ± 186.15	345.15 ± 194.79
IPV	10.54 ± 8.26	8.49 ± 6.76	10.15 ± 8.02
Death of a child	13.98 ± 11.39	15.26 ± 12.48	14.25 ± 11.59
Electrocution and/or burns	50.00 ± 27.99	47.54 ± 24.20	49.25 ± 26.72
Suicides	42.65 ± 30.50	27.45 ± 27.07	39.76 ± 30.45
Multisystem or significant trauma calls	373.34 ± 779.42	498.78 ± 861.33	467.78 ± 881.06
Homicides	17.07 ± 10.19	13.63 ± 10.48	15.79 ± 9.99
Psychiatric calls	1,519.13 ± 1,191.35	1,213.24 ± 1,036.91	1,412.95 ± 1,155.55
High-risk childbirth	70.90 ± 111.87	114.88 ± 141.18	83.15 ± 124.34
Family or domestic violence	94.98 ± 69.34	70.08 ± 65.91	90.13 ± 69.51
Obvious deaths	424.95 ± 563.43	601.42 ± 742.96	478.13 ± 612.55
MCI	118.37 ± 154.69	84.71 ± 127.84	115.19 ± 150.56

VT = vicarious trauma; CF = compassion fatigue; BO = burnout; NSS = no stress syndrome; MIH = mobile integrated health care; HEMS = helicopter EMS; OHCA = out-of-hospital cardiac arrest; IPV = intimate partner violence; MCI = mass casualty incident.

in the no-stress group (30 [30.53%] vs 42 [5.6%]), whereas the proportion of those currently in counseling was lower in the veteran group compared to the no-stress group (0.8% vs 3.9%). Irrespective of stress syndromes, the proportion of veterans who had considered suicide was over 1.5 times higher than in the no-stress group (32 [35.2%] vs 157 [23.1%]); however, in veterans for whom the effects of stress syndromes were present, that number surged to 12 times that of the no-stress group (26 [31.0%] vs 19 [2.6%]).

Life Events

The LEC-5 was used to quantify the proportions of stressful material experienced by EMS personnel with prior military service (Figure 1). For veterans with the likelihood of any stress syndrome, the rate of events directly experienced or that were considered part of their job duties was 2–4 times higher than in veterans without stress syndromes. In nearly every category of events that had been witnessed or learned about, those rates were 1.5–3 times higher in veterans with any stress

TABLE 4 Childhood Trauma Profile of EMS Professionals Stratified by Prior Military Service Compared to the Overall Sample

	Civilian EMS 496 (64.4%) n (%)	Military 61 (71.8%) n (%)	NSS 187 (24.3%) n (%)
Physical abuse	116 (23.4%)	29 (32.6%)	32 (17.1%)
Emotional abuse	162 (32.7%)	37 (41.6%)	39 (20.85%)
Sexual abuse	74 (14.9%)	14 (15.7%)	21 (11.2%)
Physical neglect	36 (7.3%)	6 (6.7%)	4 (2.1%)
Emotional neglect	116 (23.4%)	17 (19.1%)	18 (9.6%)
Parental divorce	221 (44.6%)	44 (49.4%)	82 (43.8%)
Maternal domestic violence	57 (11.5%)	13 (14.6%)	10 (5.3%)
Substance abuse in the home	159 (32.1%)	26 (29.2%)	34 (18.1%)
Familial depression, mental illness, or suicide	142 (28.6%)	26 (29.2%)	24 (12.8%)
Incarcerated family member	38 (7.7%)	8 (9.0%)	9 (4.8%)
Continuous Variables	Mean ± SD	Mean ± SD	Mean ± SD
ACEs total score	2.26 ± 2.29	2.47 ± 2.27	1.46 ± 1.78

NSS = no stress syndrome; ACEs = Adverse Childhood Experiences Questionnaire.

syndrome compared to those without—ratios similar to that of EMS professionals in general (Figure 2). Notwithstanding the presence of stress syndromes, when veterans were compared to their civilian EMS peers, the rates of events that they had experienced directly were almost always higher in the population of EMS personnel with prior military history.

Predictive Utility of Prior Military Service

Hierarchical linear regression was performed to ascertain the predictive utility of military experience in EMS personnel with VT. VT was used because, as a primary stress syndrome, it most closely resembles PTSD—the most frequently diagnosed mental health issue among OIF/OEF veterans.³⁰ Table 6 shows the variables entered into the final regression model and unique criterion variance.

Collinearity statistics, including tolerance and variance inflation factor (VIF), were all within accepted limits, indicating that the assumption of multicollinearity had been met. Histograms, residuals, and scatter plots indicated that the assumptions of normality, linearity, and homoscedasticity were all satisfied, respectively.

On block 1, sociodemographic variables, such as age, sex, and minority status accounted for 3.5% of the variance in IESR total score, $R^2 = .035$, $F(3,74) = .904$, $p = .443$. When occupational characteristics (shift length, annual income, and years of field experience) were entered on block 2, they accounted for an additional, but not statistically significant, 4.8% of the variance in total IESR score, $\Delta R^2 = .048$, $\Delta F(3,71) = 1.25$, $p = .381$. Suicidality, knowing an EMS provider who had committed suicide, and the presence of CF or BO as characteristics indicative of stress were entered on block 3 and accounted for an additional and significant 22.4% of the model variance, $\Delta R^2 = .224$, $\Delta F(4,67) = 5.42$, $p = .001$. Military characteristics, including years of service, prior history of a combat deployment, prior history of combat patrols or other dangerous duty, and engagement of the enemy accounted for an additional 14.6%

of model variance, $\Delta R^2 = .146$, $\Delta F(5,62) = 3.31$, $p = .010$. In total, these predictors accounted for 45.4% of the variance in IESR total score, $R^2 = .454$, adjusted $R^2 = .321$, $F(15,62) = 3.43$, $p < .001$.

Squared semipartial correlations were used to identify the unique predictive utility of independent variables. Sex alone accounted for 5.9% ($sr^2 = .059$, $p = .012$) of model variance, while shift length accounted for an additional 4.1% ($sr^2 = .041$, $p = .036$). The potential presence of cumulative stress syndromes, such as VT or BO, accounted for 7.8% ($sr^2 = .078$, $p = .004$) and 4.0% ($p = .037$), respectively. When military variables were assessed, neither military experience nor a history of a combat deployment was significant. However, performing combat patrols or other dangerous duties during a deployment did account for 6.6% ($sr^2 = .066$, $p = .008$) of the model variance, while the number of years of military service accounted for 6.1% ($sr^2 = .061$, $p = .011$) of the variance in the IESR total score. There were also negative associations: for every added year of age or total years of military service, the total IESR score was reduced by 0.48 and 1.07 points, respectively. Sex was also negatively associated in that females had, on average, scores that were nearly 12 points lower than their male counterparts, which could be the result of several factors. Namely, there was a low number of female veterans enrolled in the study. Because of the timing of service, the majority of female prior Servicemembers were not in positions of offensive or defensive combat arms—a procedural change that did not occur until 2015.³¹ In the final model, these five predictors accounted for a significant portion of unique criterion variance.

Discussion

Nearly three-quarters of the EMS personnel with prior military service surveyed as part of this study scored high enough to have a stress syndrome, which was a 7.4% relative increase compared to a similarly employed group of nonmilitary EMS personnel.

Impact of Adverse Childhood Experiences

The ACEs questionnaire was used to quantify the presence of childhood trauma and evaluates childhood trauma material in ten categories: physical, emotional, or sexual abuse; physical or emotional neglect; domestic violence; substance abuse; history of depression, mental illness, or suicide within the family; parental divorce; and whether any member of the household was incarcerated. There is an association between scores on the ACEs and reduced life expectancy or impaired physical and mental health.^{32–34} Individuals with scores ≥ 4 are 12.2 times more likely to ever attempt suicide.^{35,36} Overall, 26 (29.2%) veterans had scores ≥ 4 ; however, when the sample was narrowed down to veterans who likely had stress syndromes or in female veterans alone, the prevalence increased by 5.2% and 20.8%, respectively. Mean total scores were highest in the veteran population when compared to nonmilitary EMS personnel and to those without any stress syndrome.

Suicidality and the Potential for Contagion

When evaluating the likelihood of any stress syndrome, EMS personnel with prior military service had higher rates of prior counseling for stress-related events when compared to

FIGURE 1 Potentially traumatic events (PTEs) experienced by EMS personnel with prior military service.

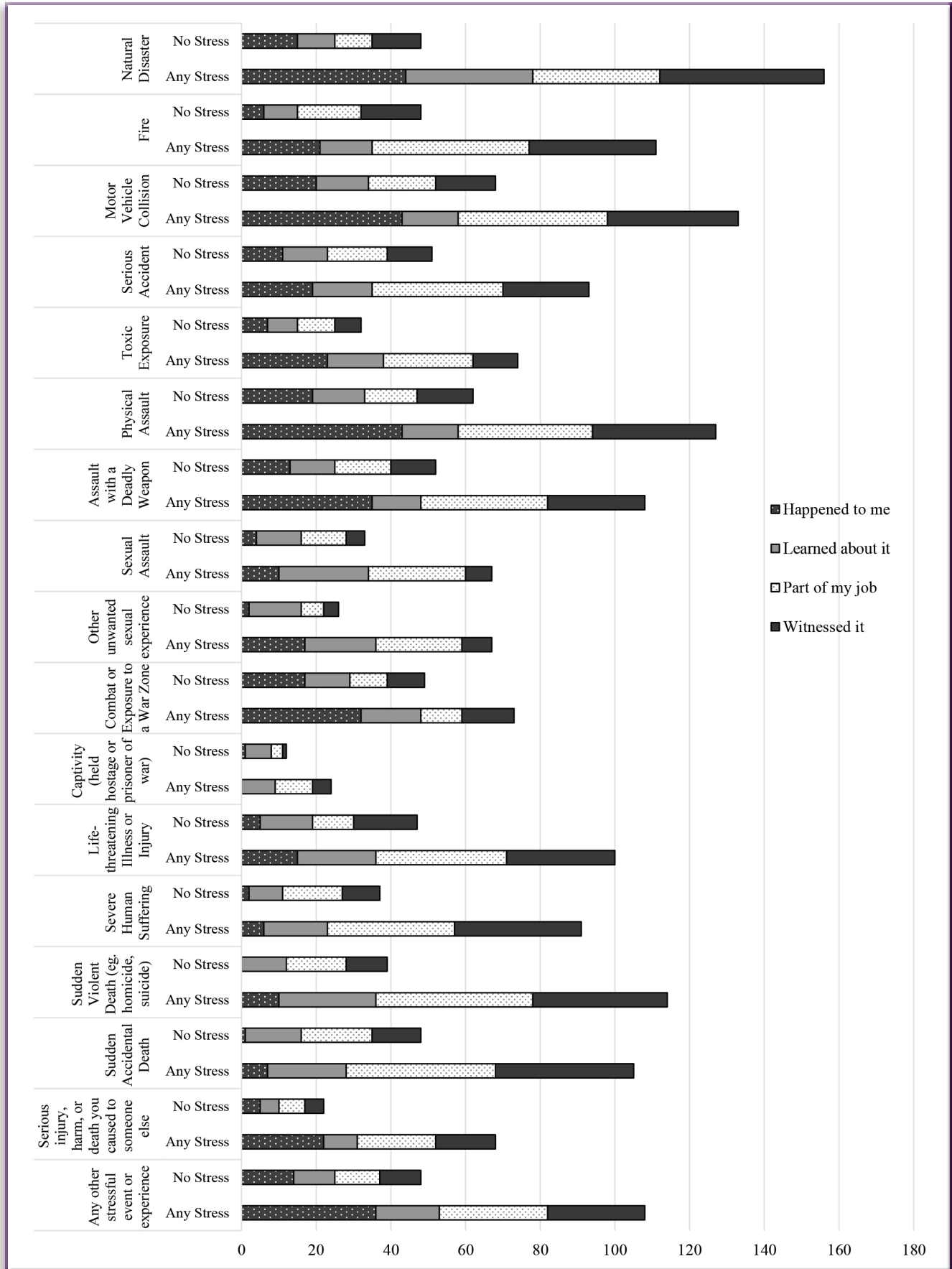
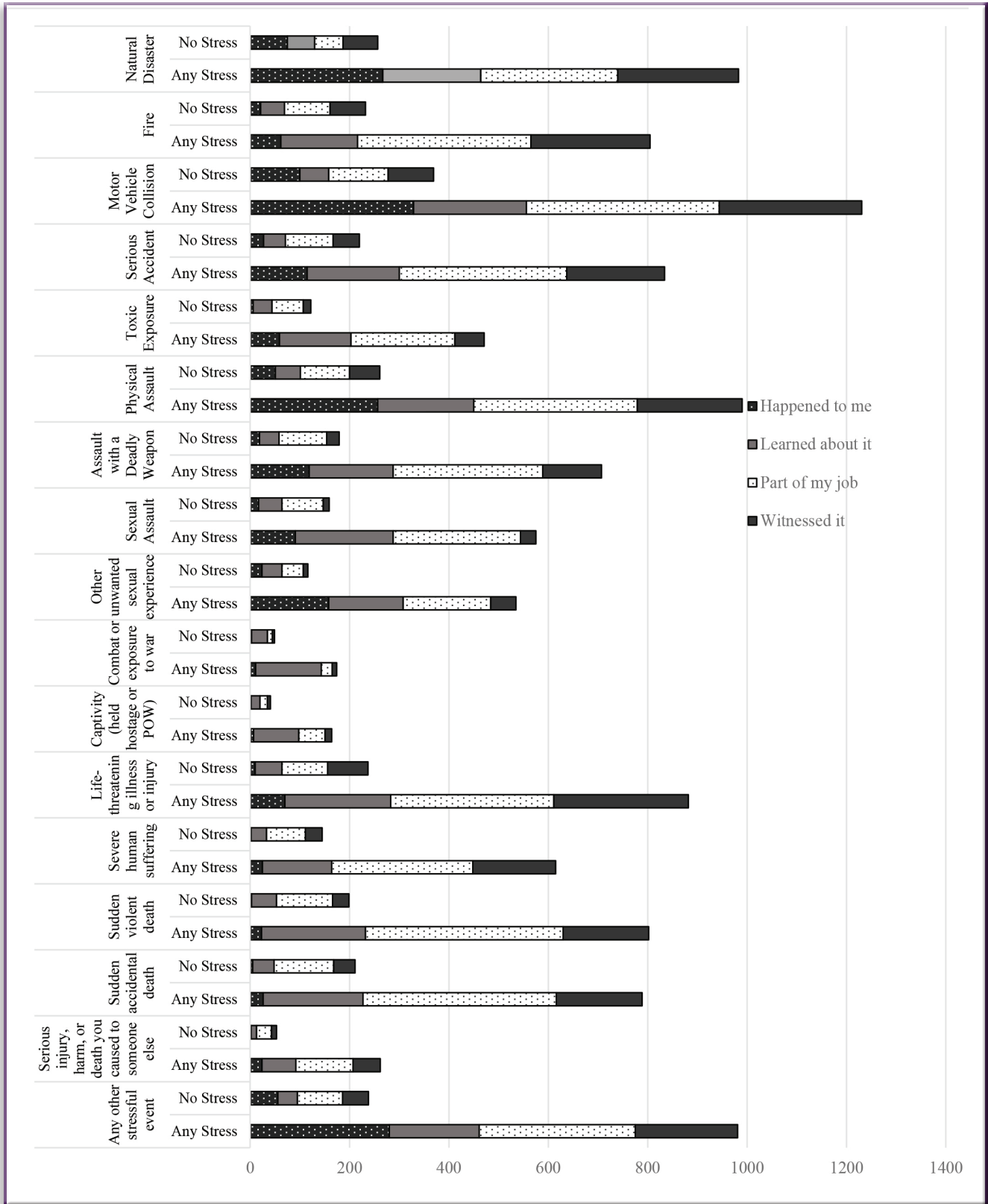


FIGURE 2 Potentially Traumatic Events (PTEs) Experienced by EMS Personnel without prior military service.



their civilian EMS counterparts and those without stress syndromes. However, only 4.8% identified as currently being in counseling. This is alarming given that the proportion of veterans who reported suicidality was nearly 14 times higher when compared to those EMS providers without any stress syndrome (35.3% vs 2.6%). Suicidal ideation is one of the

strongest predictors of a future suicide attempt and previous reports have demonstrated a linkage between suicidality and PTSD.^{30,37} However, these studies look solely at the veteran's war-time experience without accounting for the potential of additional exposure to traumatic material in the lives of veterans after separating from military service.

TABLE 5 Resource Profile of EMS Professionals Stratified by Prior Military Service Compared to the Overall Sample

	Civilian EMS 496 (64.4%) n (%)	Military 61 (71.8%) n (%)	NSS 187 (24.3%) n (%)
Employment resources			
Incident debriefing	404 (61.4%)	42 (49.4%)	162 (21.8%)
Departmental chaplain	49 (7.5%)	5 (5.9%)	45 (5.9%)
CIT	287 (43.6%)	31 (36.5%)	112 (15.1%)
EAP	304 (46.2%)	42 (49.4%)	122 (16.4%)
Exercise programs	41 (6.2%)	2 (2.4%)	15 (2.0%)
Time off	153 (23.3%)	24 (28.2%)	75 (10.1%)
Prior history of counseling for a stress-related event	170 (25.8%)	30 (35.3%)	42 (5.6%)
Currently in counseling	30 (4.6%)	4 (4.8%)	2 (0.3%)
Has considered suicide	140 (28.2%)	26 (31.0%)	19 (2.6%)
Knows an EMS professional who has considered or committed suicide	245 (37.2%)	31 (36.5%)	64 (8.6%)

NSS = no stress syndrome; CIT = crisis intervention team; EAP = employee assistance program.

TABLE 6 Partial Regression Coefficients and Squared Semipartial Correlations (sr^2) for Each Predictor on Each Block of a Hierarchical Linear Regression Predicting IESR Total Score ($n=770$)

Predictor	B	Std. Error B	β	sr^2	p Value
Block 1					
Sex	-11.90	9.29	-0.307	0.059	.012
Minority status	-0.018	6.15	-0.008	—	.939
Age	-0.475	4.61	-0.009	—	.941
Block 2					
Shift length	0.715	0.33	0.219	0.041	.036
Annual income	-0.662	1.60	-0.046	—	.680
Years of field experience (>5)	0.692	4.81	0.144	—	.886
Block 3					
Ever considered suicide	2.22	4.49	0.494	—	.623
Knew an EMS provider who committed suicide	3.99	4.08	0.979	—	.331
Has CF	12.71	4.27	2.972	0.078	.004
Has BO	8.86	4.16	2.133	0.040	.037
Block 4					
Served in the military	9.73	6.49	1.498	—	.139
Years of service	-1.065	0.41	-0.298	0.061	.061
Deployed to a combat theater	5.75	6.44	0.892	0.013	.376
Performed combat patrols or other dangerous duty	19.12	6.98	2.740	0.066	.008
Engaged (or was engaged by) the enemy	-5.15	7.76	-0.663	—	.510

IESR = Impact of Events Scale-Revised.

The postulate that exposure to suicide will increase suicidality in others, whether or not the person who died was known personally, is known as suicide contagion. It may result in point-clustering, which is when it occurs in specific geographic areas or within particular populations.³⁸⁻⁴⁰ A previous longitudinal study by Ursano et al. revealed that US Army soldiers were 1.4–2.3 times more likely to have a suicide attempt if they had been exposed to a completed suicide in their unit.³⁷ These odds had a direct linear relationship as the number of unit suicides increased.⁴¹ Additional studies have shown the contagion effect of suicide on various populations, including the military, particularly when media coverage of the event is present and after controlling for various other factors.^{37,41,42-45,46-49} Compared to EMS providers without any stress syndrome, the proportion of veterans who knew another EMS provider who had committed suicide was 4.2 times higher (36.5% vs 8.6%), making EMS personnel in general, and veterans specifically, a unique group primed for prevention strategies.

Potentially Traumatic Experiences

The LEC has been used to quantify the rates of PTEs in combat veterans with a known association between the severity of PTSD symptomatology and the exposure to trauma, particularly as it relates to the frequency of exposure.^{27,50} Increases in exposure to PTEs have also been associated with suicide attempts and other stress syndromes.^{27,51} In this study, veterans who potentially had any stress syndrome had rates of PTEs that were 2–4 times higher in nearly every category than in their civilian EMS counterparts without stress syndromes.

The Impact of Prior Military Service

In this report, hierarchical linear regression demonstrated that neither the isolated background of military service nor the presence of one or more combat deployments were predictors of VT in this population of EMS personnel. However, the experience of combat patrols or other dangerous duty performed by deployed military personnel was both significant and predictive. This suggests that it is not military service or combat deployments alone that promote the development of stress syndromes, but the exposure to PTEs during combat operations that are uniquely predictive of VT. These results are consistent with prior studies that have shown that the development of PTSD or other mental health illness are directly related to the frequency and intensity of duties in the combat theater.^{35,52-55}

Limitations

There are several limitations to this study. Generalizability to other populations is unknown. North Carolina is particularly unique in its military presence, having one of the most extensive military footprints in the country and, to a varying degree, representative of all branches of service.^{25,26} The military is the second largest overall employer in the state.²⁶ Intrinsically, this study may have a higher proportion of prior service EMS personnel when compared to other geographic areas.

It is possible that data on female prior service alone was not reliable given the sample size. In addition, given the time that these female veterans likely served in the military, it is possible that they were in noncombat military occupational specialties (MOS) and were not directly involved in combat operations.

The potential for anosognosia was an additional concern, which presented as a modified Hawthorne effect. Anosognosia has been associated with stress syndromes and presents as the limited self-awareness of one's condition; in this context, a person with a disability does not recognize that they are ill or minimizes the associated difficulties.⁵⁶⁻⁶⁰ Anosognosia is a biological process characterized by the aforementioned symptomatology and damage to the right hemisphere of the brain. It has been linked with PTSD and traumatic brain injury in multiple studies.⁴⁸⁻⁵² This effect manifested itself as inappropriate affect (e.g., overly aggressive refusal to participate without provocation), which is a symptom of stress syndromes. However, this effect was small given that the overall survey completion rate was 98.3%.

Because this study was cross-sectional, causal relationships could not be observed and only a personal trauma profile and the history of prior military service could be described at a singular point in time.

As a final point, this study did not account for EMS personnel who may have had experience as defense contractors, and as such, may have had similar exposures to those in military service deployed overseas to a combat theater.

Conclusion

In this study, EMS personnel with prior military service who identified as having a stress syndrome had experienced PTEs at a rate 2–4 times higher than in respondents without stress syndromes, regardless of how that event was experienced. The exposure to combat patrols or other dangerous duties while deployed, as well as lower total years of military service were significant and unique predictors of VT in this population. Additional research should focus on the panoptic experience of EMS personnel who are exposed to stressful material, particularly in those with prior military service. Studies that focus on causality for critical incident stress are needed, particularly those related to the intricate association between the circumstances in an individual's life, such as childhood trauma, occupational impact, sociodemographic factors, military service history, and life experiences, and the development of stress syndromes that have been shown to impact overall health. Equally important is the potential for the study of individuals in high-stress occupations, such as the military or public safety officials, who seem to be immune from traumatic stress. Such elucidations would contribute to the scopic understanding of how traumatic stress affects both the public safety and military communities. This study may induce the development of abatement measures, and awareness or outreach strategies for critical incident stress in EMS systems.

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Author Contributions

GKR conceived the study concept, recruited participants, collected and coded the data, ran the statistical analysis, and

wrote the first draft. MWH assisted with the statistical analysis and subsequent edits of the manuscript.

References

1. Figley CR. Compassion fatigue: psychotherapists' chronic lack of self care. *J Clin Psychol.* 2002;58(11):1433–1441.
2. Sabin-Farrell R, Turpin G. Vicarious traumatization: implications for the mental health of health workers? *Clin Psychol Rev.* 2003;23(3):449–480.
3. Creamer M, Bell R, Failla S. Psychometric properties of the Impact of Event Scale – Revised. *Behav Res Ther.* 2003;41(12):1489–1496.
4. Weiss DS, Marmar CR. The Impact of Event Scale–Revised. In: Wilson JP, Keane TM, eds. *Assessing psychological trauma and PTSD.* New York, NY: Guilford Press; 1997.
5. Asukai N, Kato H, Kawamura N, et al. Reliability and validity of the Japanese-language version of the Impact of Event Scale–Revised (IES-R-J): four studies of different traumatic events. *J Nerv Ment Dis.* 2002;190(3):175–182.
6. Beck JG, Grant DM, Read JP, et al. The Impact of Event Scale–Revised: psychometric properties in a sample of motor vehicle accident survivors. *J Anxiety Disord.* 2008;22(2):187–198.
7. Newland C, Barber E, Rose M, Young A. CRITICAL STRESS. Survey reveals alarming rates of EMS provider stress & thoughts of suicide. *JEMS.* 2015;40(10):30–34.
8. McCann IL, Pearlman LA. Vicarious traumatization: a framework for understanding the psychological effects of working with victims. *J Trauma Stress.* 1990;3:131–149.
9. Kadambi MA, Truscott, D. Vicarious trauma among therapists working with sexual violence, cancer, and general practice. *Can J Counsel.* 2004;38(4):260–276.
10. Pearlman LA, Saakvitne KW. *Trauma and the therapist: countertransference and vicarious traumatization in psychotherapy with incest survivors.* New York, NY: W.W. Norton & Co; 1995.
11. Pearlman LA & Mac Ian PS. Vicarious traumatization: an empirical study of the effects of trauma work on trauma therapists. *Professional Psychol Res Pract.* 1995;26(6):558–565.
12. Baird S, Jenkins SR. Vicarious traumatization, secondary traumatic stress, and burnout in sexual assault and domestic violence agency staff. *Violence Vict.* 2003;18(1):71–86.
13. Busch J. (2014, February, 28). Preventing Provider Suicide.
14. <http://www.emsworld.com/article/11320416/firefighter-behavioral-health-alliance-ffbha-seeks-to-prevent-suicides-with-data-on-ems-fire-service>. Accessed September 7, 2017.
15. Helm H. Managing vicarious trauma and compassion fatigue defining vicarious trauma and compassion fatigue. https://www.lianalowenstein.com/artcile_helm.pdf. Accessed 21 October 2020.
16. Abberley P. The concept of oppression and the development of a social theory of disability. *Disability Handicap Society.* 1987;2(1):5–19.
17. Sidanius J, Pratto F. *Social dominance: an intergroup theory of social hierarchy and oppression.* New York, NY: Cambridge University Press; 1999.
18. Lee J, Possemato K, Ouimette PC. Longitudinal changes in combat-related Posttraumatic Stress Disorder among Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn veterans with hazardous alcohol use: the role of avoidance coping. *J Nerv Ment Dis.* 2017;205(10):805–808.
19. Stovall-McClough KC, Cloitre M. Unresolved attachment, PTSD, and dissociation in women with childhood abuse histories. *J Consult Clin Psychol.* 2006;74(2):219–228.
20. Cai WP, Pan Y, Zhang SM, et al. Relationship between cognitive emotion regulation, social support, resilience and acute stress responses in Chinese soldiers: exploring multiple mediation model. *Psychiatry Res.* 2017;256:71–78.
21. United States Census Bureau. 2010 Census Urban Area Delineation Program. <https://www2.census.gov/about/partners/sdc/events/steering-committee/2013-04/2013-ratcliffe.pdf>. Accessed 21 October 2020.
22. North Carolina Department of Commerce. Where the jobs are: supply and demand for labor in North Carolina's regions. 1 December 2016. <https://www.nccommerce.com/blog/2016/12/13/where-jobs-are-supply-and-demand-labor-north-carolina%E2%80%99s-regions>. Accessed 21 October 2020.

23. Suburban Statistics. Population demographics for North Carolina 2016 and 2015. 5 July 2016. <https://suburbanstats.org/population/how-many-people-live-in-north-carolina>. Accessed 22 October 2020.
24. Emergency Medical Services Performance Improvement Center (EMSPIC). About us. <https://www.emspic.org/about>. Accessed 22 October 2020.
25. University of North Carolina (UNC) Carolina Population Center. Data snapshot: North Carolina veterans. <https://www.ncdemography.org/2013/11/11/data-snapshot-north-carolina-veterans/>. Accessed 22 October 2020.
26. Department of Military and Veterans Affairs. Military bases in North Carolina. <https://www.milvets.nc.gov/services/military-bases-north-carolina>. Accessed 22 October 2020.
27. Gray MJ, Litz BT, Hsu JL, et al. Psychometric properties of the life events checklist. *Assessment*. 2004;11(4):330–341.
28. Bae H, Kim D, Koh H, et al. Psychometric properties of the Life Events Checklist-Korean Version. *Psychiatry Investig*. 2008;5(3):163–167. doi:10.4306/pi.2008.5.3.163
29. Lim HK, Woo JM, Kim TS, et al. Reliability and validity of the Korean version of the Impact of Event Scale-Revised. *Compr Psychiatry*. 2009;50(4):385–390.
30. Jakupcak M, Cook J, Imel Z, et al. Posttraumatic stress disorder as a risk factor for suicidal ideation in Iraq and Afghanistan War veterans. *J Trauma Stress*. 2009;22(4):303–306.
31. Rosenberg M, Phillips D. All combat roles now open to women, Defense Secretary says. *New York Times*. 3 December 2015. <https://www.nytimes.com/2015/12/04/us/politics/combat-military-women-ash-carter.html>. Accessed on 22 October 2020.
32. Kawamura N, Kim Y, Asukai N. Suppression of cellular immunity in men with a past history of posttraumatic stress disorder. *Am J Psychiatry*. 2001;158(3):484–486.
33. McCall-Hosenfeld JS, Mukherjee S, Lehman EB. The prevalence and correlates of lifetime psychiatric disorders and trauma exposures in urban and rural settings: results from the national comorbidity survey replication (NCS-R). *PLoS One*. 2014;9(11):e112416.
34. Flannery DJ, Singer MI, Wester K. Violence exposure, psychological trauma, and suicide risk in a community sample of dangerously violent adolescents. *J Am Acad Child Adolesc Psychiatry*. 2001;40(4):435–442.
35. Conrad N. Stress and knowledge of suicidal others as factors in suicidal behavior of high school adolescents. *Issues Ment Health Nurs*. 1992;13(2):95–104.
36. Murphy A, Steele M, Dube SR, et al. Adverse Childhood Experiences (ACEs) questionnaire and Adult Attachment Interview (AAI): implications for parent child relationships. *Child Abuse Negl*. 2014;38(2):224–233.
37. Mann JJ, Ellis SP, Waternaux CM, et al. Classification trees distinguish suicide attempters in major psychiatric disorders: a model of clinical decision making. *J Clin Psychiatry*. 2008;69(1):23–31.
38. Swanson SA, Colman I. Association between exposure to suicide and suicidality outcomes in youth. *CMAJ*. 2013;185(10):870–877. doi:10.1503/cmaj.121377
39. Cox GR, Robinson J, Williamson M, et al. Suicide clusters in young people: evidence for the effectiveness of postvention strategies. *Crisis*. 2012;33(4):208–214.
40. O’Carroll PW, Mercy JA, Steward JA; Centers for Disease Control and Prevention (CDC). CDC recommendations for a community plan for the prevention and containment of suicide clusters. *MMWR Suppl*. 1988;37(6):1–12.
41. Ursano RJ, Kessler RC, Naifeh JA, et al. Risk of suicide attempt among soldiers in army units with a history of suicide attempts. *JAMA Psychiatry*. 2017;74(9):924–931.
42. Gould M, Jamieson P, Romer D. Media contagion and suicide among the young. *Am Behav Sci*. 2003;46(9):1269–1284.
43. Mueller AS. Does the media matter to suicide? Examining the social dynamics surrounding media reporting on suicide in a suicide-prone community. *Soc Sci Med*. 2017; 180:152–159.
44. Yildiz M, Orak U, Walker MH, et al. *Death Stud*. 2019;43(6): 365–371.
45. Sareen J, Holens P, Turner S. Report of the 2016 Mental Health Expert Panel on Suicide Prevention in the Canadian Armed Forces. 28 March 2017. <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/health/2016-report-of-the-mental-health-expert-panel-on-suicide-prevention.html>. Accessed 22 October 2020.
46. Cerel J, Maple M, van de Venne J, et al. Exposure to suicide in the community: prevalence and correlates in one U.S. state. *Public Health Rep*. 2016;131(1):100–107.
47. Cerel J, van de Venne JG, Moore MM, et al. Veteran exposure to suicide: prevalence and correlates. *J Affect Disord*. 2015;179: 82–87.
48. Cerel J, McIntosh JL, Neimeyer RA, et al. The continuum of “survivorship”: definitional issues in the aftermath of suicide. *Suicide Life Threat Behav*. 2014;44(6):591–600.
49. Bolton JM, Au W, Leslie WD, et al. Parents bereaved by offspring suicide: a population-based longitudinal case-control study. *JAMA Psychiatry*. 2013;70(2):158–167.
50. King DW, Vogt DS, King LA. Risk and resilience factors in the etiology of chronic posttraumatic stress disorder. In Litz BT, ed. *Early intervention for trauma and traumatic loss*. New York, NY: The Guilford Press.
51. Bryan AO, Theirault L, Bryan CJ. Self-forgiveness, posttraumatic stress, and suicide attempts among military personnel and veterans. *Traumatology*. 2015;21(1):40–46.
52. Hoge CW, Castro CA, Messer SC, et al. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med*. 2004;351(1):13–22.
53. Hoge CW, Auchterlonie JL, Milliken CS. Mental health problems, use of mental health services, and attrition from military service after returning from deployment to Iraq or Afghanistan. *JAMA*. 2006;295(9).
54. Smith TC, Ryan MA, Wingard DL, et al. New onset and persistent symptoms of post-traumatic stress disorder self-reported after deployment and combat exposures: prospective population-based US military cohort study. *BMJ*. 2008;336(7640):366–371.
55. Grieger TA, Cozza SJ, Ursano RJ, et al. Posttraumatic stress disorder and depression in battle-injured soldiers. *Am J Psychiatry*. 2006;163(10):1777–1860.
56. Le Berre AP, Sullivan EV. Anosognosia for memory impairment in addiction: insights from neuroimaging and neuropsychological assessment of metamemory. *Neuropsychol Rev*. 2016;26(4): 420–431.
57. Sullivan EV. War-related PTSD, blast injury, and anosognosia. *Neuropsychol Rev*. 2012;22(1):1–2.
58. Hunter BD, Else RC, eds. TBI, PTSD, and psychiatric drugs: a perfect storm for causing abnormal mental states and aberrant behavior. In *The Attorney’s Guide to Defending Veteran’s in Criminal Court*. Minneapolis, MN: Veteran’s Defense Project; 2014:255–262.
59. Prigatano GP. Anosognosia after traumatic brain injury. In: Prigatano GP, ed. *The study of anosognosia*. New York, NY: Oxford University Press; 2010.
60. Kekelidze ZI, Portnova AA. *Zh Nevrol Psikhiatr Im S S Korsakova*. 2009;109(12):4–7.



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