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Assessing the Mental Health Impact of the COVID-19 Pandemic on US Fire-Based Emergency Medical Services Responders

A Tale of Two Samples (The RAPID Study I)

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Objective: This study aimed to examine the COVID-19 pandemic's impact on fire service safety culture, behavior and morale, levers of well-being, and well-being outcomes. **Methods:** Two samples (Stress and Violence against fire-based EMS Responders [SAVER], consisting of 3 metropolitan departments, and Fire service Organizational Culture of Safety [FOCUS], a geographically stratified random sample of 17 departments) were assessed monthly from May to October 2020. Fire department–specific and pooled scores were calculated. Linear regression was used to model trends. **Results:** We observed concerningly low and decreasing scores on management commitment to safety, leadership communication, supervisor sensegiving, and decision-making. We observed increasing and concerning scores for burnout, intent to leave the profession, and percentage at high risk for anxiety and depression. **Conclusions:** Our findings suggest that organizational attributes remained generally stable but low during the pandemic and impacted well-being outcomes, job satisfaction, and engagement. Improving safety culture can address the mental health burden of this work.

Keywords: firefighter, EMS, pandemic, mental health, safety culture

LEARNING OUTCOMES

After reviewing this article, readers should be able to

- identify the impact of the COVID-19 pandemic on the safety culture, behavior and morale, levers of well-being, and well-being outcomes in the US fire and rescue service; and
- describe the trends observed in safety culture, behavior and morale, levers of well-being, and well-being outcomes in the US fire and rescue service during the first 6 months of the COVID-19 pandemic.

On January 21, 2020, the first known case of coronavirus disease 2019 (COVID-19) was confirmed by the Centers for Disease Control and Prevention when a Washington State resident tested positive. [1] As of June 2022, the United States exceeded 83 million confirmed cases.[2] This abrupt introduction of a highly transmissible and unfamiliar disease necessitated a swift transformation of work for first responders to not only mitigate the spread of this highly contagious disease but also protect their health and safety as they serve the needs of the community.

Before the pandemic, the National Fire Protection Association reported that between 1980 and 2019, the number of calls for emergency medical services (EMS) grew from 5 million to 24.5 million (a 385% increase), whereas the number of fire calls declined from 3 million to 1.2 million (a 57% decrease; Fig. 1).[3] However, the numbers of paramedics and EMTs have not increased accordingly, nor have the numbers of ambulances or recovery resources needed to respond to this increasing community demand. Furthermore, of the 1.1 million estimated US firefighters, 67% are volunteers, meaning that they are not always available to respond.[4]

Working as an EMS provider has a number of features that make it a very stressful occupation: inadequate sleep,[5] insufficient recovery time after each shift,[6] 12-hour shifts,[7] low job satisfaction,[8] and trauma response leading to burnout and posttraumatic stress disorder.[8] The uncertainty and physical demands of the coronavirus pandemic further compound the influence of these stressors. Captain Jeffrey Dill, CEO and Firefighter Behavioral Health Alliance, explained that "COVID-19 hit the fire service so quickly that we never had time to adjust to the stressors that quarantine brings along with the amount of deaths the fire and EMS service responded to on a daily basis."[9]

In their *Field Guide to COVID-19 Care in the Emergency Department*, the American College of Emergency Physicians acknowledged that first responders may experience increased levels of stress and burnout because of the prolonged exposure to emergencies, like the coronavirus pandemic.[9] The development of these negative psychological outcomes after medical disasters, including stress and burnout, result from risk factors like a lack of social support and communication, maladaptive coping, and a lack of training.[10] Mental health risk factors and their diagnoses are often intertwined with subclinical

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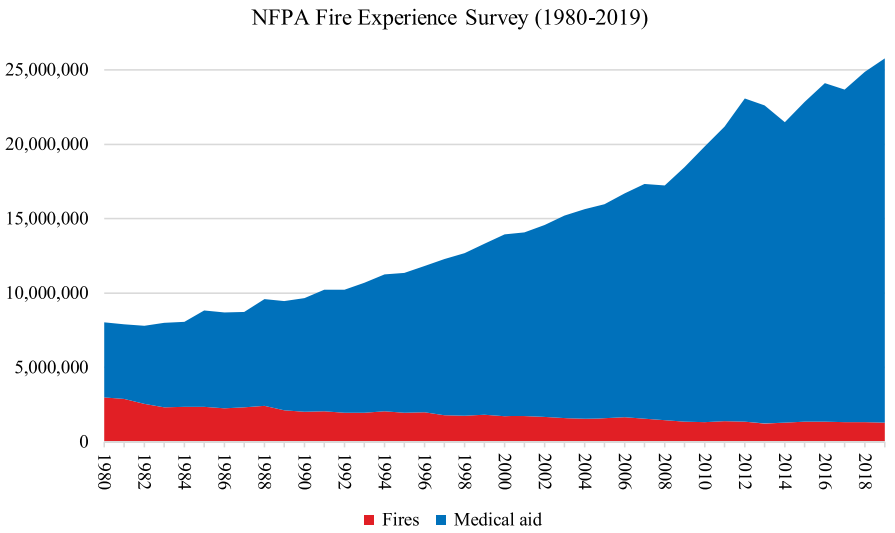


FIGURE 1. NFPA experience survey 2019: number of fire and EMS calls per year. EMS, emergency medical services; NFPA, National Fire Protection Association.

distress responses and behavioral changes, which include symptoms of sleep disturbance, fear, worry, and altered concentration.[11]

In a prior study of safety climate, fire-based EMS responders reported that the 911 system is strained by the high volume of low-acuity calls that occupy much of their workload, divert resources from true emergencies, and lead to unwarranted occupational hazards like speeding to respond to nonserious calls.[12] As a result, firefighters reported high occupational stress, low morale, and desensitization to community needs. To counter these demands, firefighters have called for improvements to the 911 system: better triage, more targeted use of EMS resources, continuing education to align with job demands, and a strengthened social safety net to address the persistent needs of poor and elderly populations.[12] The early months of the pandemic introduced a high degree of uncertainty regarding transmission, impact, and complications of the disease, and a lack of knowledge regarding adequate treatment. These factors were likely to heighten the environmental stressors and psychological strains EMS first responders experienced while providing expected and essential community services.

In response, we quickly combined assessment tools from the Fire service Organizational Culture of Safety (FOCUS) survey and the Stress and Violence against fire-based EMS Responders (SAVER) study, to develop the COVID-19 RAPID Mental Health Assessment (RAPID). Monthly surveys were administered to US fire-based EMS responders from May 2020 to October 2020 to analyze the impact of the pandemic on burnout, job satisfaction, work engagement, and mental health. The purpose was to capture the absolute impact of the pandemic on first responder mental health and track any changes in these outcomes. We also examined organizational and personal factors thought to enable first responses to adapt to these intense work demands.

METHODS

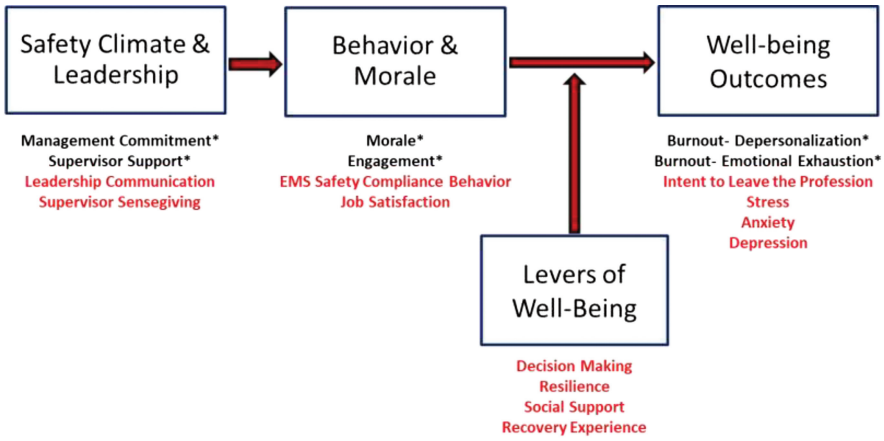
The study protocol was reviewed and approved by the Drexel University Institutional Review Board. The RAPID assessment used the FOCUS survey in conjunction with other validated and novel mental health scales to measure the organizational impact of the coronavirus pandemic on fire-based EMS responders. The foundational research of the SAVER study played a large role in the decision on what mental health metrics to include in the final version. The RAPID assessment focused on four areas visualized in the conceptual framework: safety climate and leadership, behavior and morale, levers of well-being, and well-being outcomes (Fig. 2). In addition to the validated scales listed, three novel scales were developed by the FIRST Center to measure Supervisor Sensegiving (measure of the degree of sensegiving regarding safety priorities and safety protocols related to the coronavirus response), EMS Safety Compliance Behavior, and the impact of COVID-19 on first responders. To ensure the survey questions were appropriate for our demographic and that respondents were able to respond accurately, cognitive testing was performed with two fire service members. Cognitive testing resulted in slight modifications to the EMS Safety Compliance Behavior scale with the addition of an "N/A" answer choice for one item that may not be applicable to all members and an additional item ("I ensure the scene is safe on each call"). In addition, after the first assessment round, we were informed by several participants that there should be a "No Impact" answer choice in response to the impact of COVID-19 scale, and the scale was modified for future assessments.

Our conceptual framework shows organizational safety climate as an upstream predictor of mental health and well-being outcomes (Fig. 2). Fire service safety climate is expressed through two scales: Management Commitment to Safety and Supervisor Support for Safety.[13–16] Changes in safety climate, within multiple industries and the fire service, have been shown to impact organizational outcomes.[13–16] Building on this framework, the items in black were previously included on the FOCUS survey, whereas the items in red are additional scales added to the COVID-19 RAPID. Levers of well-being (Decision Making, Resilience, Social Support, Recovery Experience) were included to assess potential effect modification in the pathway from organizational safety climate to individual first responder well-being during the COVID-19 pandemic.[17] It is believed that these levers may strengthen the effects of these resources, behaviors, and engagement when present, or weaken the effects in their absence.

Two samples comprised this study's population: one from an ongoing research study and another that comprised previous fire service partners. They are described below.

Inclusion and Exclusion Criteria

For both samples, all actively employed 9-1-1 dispatchers, lifeguards, EMTs, paramedics, and single- or dual-role firefighters in the departments were eligible for inclusion in the study. Individuals older than 18 years of all genders, races, and ethnic backgrounds were encouraged to participate. Individuals older than 75 years were excluded from the analysis, as well as individuals with more than 60 years of



Adapted from Demerouti E et al. J App Psy 2001; 86: 499–512, Christian et al. JAP 2009, vol 94(5): 1102-1127, Huang et al. Appl Ergon 2016, vol 55: 248-257, & Taylor et al. Saf. Sci. 2019, vol 118: 126-144
*Indicates items on the current FOCUS survey

FIGURE 2. Expanded safety climate framework.

experience. The exclusion of these individuals allows for the examination of the sample most likely to be actively partaking in patient care or emergency medical response.

Study Population: FOCUS RAPID Sample (FOCUS)

Fire departments who completed a FOCUS assessment between December 2019 and March 2020 (the period just before the beginning of the coronavirus pandemic in the United States) were eligible for participation ($n = 96$). Departments were categorized by FEMA region, previous FOCUS response rate, department roster size, and COVID-19 case counts to create a geographically stratified random sample. Upon selection of the FOCUS study sample, the active participation in EMS response was verified with departments. Of the 96 eligible departments, 33 were recruited, 20 were enrolled, and 17 followed through completing a monthly assessment for 6 months beginning in May 2020 and concluding in October 2020. Participating departments were asked to recruit responses from a minimum of 60% of members each month. During the 6-month study period, 5537 observations were collected. Based on exclusion criteria, 69 observations were excluded (1.25%).

Study Population: SAVER RAPID Sample (SAVER)

Three large metropolitan career fire departments and their labor unions comprised the SAVER sample. Different from the FOCUS RAPID sites, this assessment used a prospective cohort design in which a random sample of 200 EMS responders within each department participated on a monthly basis for the same 6-month period (May through October 2020). The SAVER sample consisted of 2180 observations. Eight observations were excluded from the analysis based on exclusion criteria (0.37%).

Survey Development

The COVID-19 RAPID comprised two tools: the Fire service Organizational Culture of Safety (FOCUS) survey, and the Stress and Violence against fire-based EMS Responders (SAVER) survey.

The FOCUS survey is an industry-specific, fire service safety climate survey that has been previously described.[15,16] Briefly, in its psychometric validation, FOCUS had a negative relationship with injury rates and burnout, and a positive relationship with job satisfaction, work engagement, and safety behaviors.[15,16] FOCUS has two dimensions

COVID-19 RAPID Mental Health Assessment Scales	
Safety Climate & Leadership	**FOCUS – Management Commitment** (Taylor et al., 2019) **FOCUS – Supervisor Support** (Taylor et al., 2019) **Leadership** (Arnold et al., 2000) **Supervisor Sensegiving** (novel – FIRST Center)
Behavior & Morale	**EMS Safety Compliance Behavior** (novel – FIRST Center) **Job Satisfaction** (Blaauw et al., 2013) **Morale** (Sexton et al., 2006) **Engagement** (Schaufeli, 2002)
Levers of Well-Being	**Decision Making** (Siegel & Ruh, 1973) **Resilience** (CD-RISC-10 - Campbell-Sills & Stein, 2007) **Social Support** (F-SozU K6 - Kliem, 2015) **Recovery Experience** (Sonnentag & Fritz, 2007)
Well-Being Outcomes	**Burnout** (Maslach & Jackson, 1981) **Intent to Leave the Profession** (Blaauw et al., 2013) **Stress** (Wolfgang, 1988) **Anxiety** (GAD-2 – Kroenke et al., 2007) **Depression** (PHQ-2 – Kroenke et al., 2003)

FIGURE 3. Components of the COVID-19 RAPID Mental Health Assessment scales.

that express fire service safety climate: Management Commitment and Supervisor Support, both of which reflect memberships' perceptions of their superiors' commitment to safety. The FOCUS survey also contains other previously validated scales such as burnout,[18] work engagement,[19] and job satisfaction.[20] The SAVER survey included all items on the FOCUS survey, plus an expanded mental health assessment (including metrics to assess Anxiety, Depression, Burnout, Engagement, Resilience, Social Support, and Intent to Leave the Profession) and injuries before and after the intervention.

The FOCUS and SAVER assessments were combined and expanded to include additional important organizational factors (i.e., Leadership Communication,[21] Participation in Decision-Making,[22] and two novel scales to measure Supervisor Sensegiving and EMS Safety Compliance Behavior). The complete RAPID survey contained 21 variables arranged in the four domains of the theoretical framework: safety climate and leadership, behavior and morale, levers of well-being, and well-being outcomes (Figs. 2, 3). The assessment also included a question (COVID-19 impact) that assessed how the COVID-19 pandemic impacted individual participants.

Health Communications Campaign

Keeping members engaged and obtaining the goal response rates were demanding for departments. As such, the research team did everything possible to lessen this burden and produced materials to assist with engagement and address survey fatigue. Participating departments were provided with a OneDrive link to the "RAPID toolkit" containing an assortment of resources for departments to use to ensure success of the program. Resources included a calendar of important dates/reminders, FAQ documents, draft press releases, encouragement posters and videos, and email templates to communicate RAPID updates and instructions. As requested by the departments, an encouragement video by the principal investigator was created to share why membership should care about this work and want to participate.

Before each assessment, departments were provided with an updated email template, new poster images, and any additional resources by email. All of these materials were also placed within the RAPID toolkit. Departments were called as an additional reminder of the upcoming assessment and to address any questions or concerns. They were also periodically contacted throughout the 9-day assessment period if their response rate was low to encourage increased participation.

After every survey assessment, site meetings were held with participating RAPID departments. These meetings served as a time for the research team to communicate any updates or findings from the data and collect feedback from sites on how we could assist with survey administration and departmental communication. This also served as a time for departments to discuss challenges and victories with other departments and offer advice and "tips and tricks" for successful survey administration. As an additional encouragement tool, RAPID "Shout-Outs" were created each month starting after the July assessment and included certificates for achievements such as "Top Response Rate," "Most Improved Response Rate," and "Last Minute Motivators." Recordings of the monthly site meetings were recorded and archived.

Data Collection

An online survey, created with Qualtrics, was used to collect data each month via password protected and department specific links. The monthly survey was open for a 9-day interval each month to accommodate the shift characteristics in the fire service. There were approximately 30 days between each assessment, with the assessment days differing slightly between samples. To achieve the targeted response rates, the previously described health communications campaign was used to keep departments in both samples engaged (response rates in Supplemental Table 1, http://links.lww.com/JOM/B229).

Of the scales included in the survey, 19 metrics were scored using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). For ease of interpretability for the fire service, the scores were converted to a 100-point scale (1 = 20, 2 = 40, 3 = 60, 4 = 80, 5 = 100) on the monthly and final reports. For each month, individual responses were averaged and reported as a department-level score. For the variables in which a higher score was desirable, we set an upper level "maintenance score" of 80, indicating that the department was doing relatively good in this area and that more improvement was not necessary especially if other scores were concerning. This cutoff was not empirically based, from analysis or population norms, but was more of a practical benchmark to direct attention to scores where improvement might be needed. For variables in which a lower score is desired (i.e., Depersonalization, Emotional Exhaustion, Stress, and Intent to Leave the Profession), a cutoff of 40 or higher was used to indicate scores signifying a threat to organizational/departmental well-being. This was determined by public health and occupational health psychology subject matter experts on the research team. Anxiety[23] and Depression[24] were presented as a percentage of respondents at high risk for either indicator. These scales consisted of two items scored on a 4-point scale (not at all, several days, more than half the days, nearly every day). An individual at high risk was indicated by a score of greater than or equal to 4 on the scale. If the sum of the items within a scale is greater than or equal to 4, then that individual was categorized as high risk. Individual responses were averaged and reported as a department-level percentage of individuals at high risk.

Each month, COVID-19 impact was assessed with 16 items ranging from sleep impact to fear of transmitting COVID. Respondents could choose as many options as they wanted. After feedback from participants, we included an "It has not affected me," option. For the analysis, if multiple options were selected, in addition to "it has not affected me," the latter was dropped (FOCUS, n = 190; SAVER, n = 48). Because of the addition of this and several items following participant feedback, all COVID-19 impact data collected in the first month (May) were excluded from the analysis.

Analysis Strategy

We reported individual-level (age, years of experience, race and ethnicity, and officer status) and department-level (roster size, number of stations, and call volume on fire and EMS) descriptive statistics for each sample and reported the mean, standard deviation (SD), range, counts, and percentages where applicable. Within each sample, a monthly average for the each of the 21 metrics was calculated for each department, and a pooled average was estimated. In addition, the absolute value for each metric was assessed in comparison to the appropriate cutoff or "maintenance zone." COVID-19 impact was quantified by determining the average number of individuals who endorsed each of the response options (number of individuals who reported the option) and subsequently individuals who reported being impacted by more than one option (identified by the selection of multiple options vs only selecting one option). The linear trend of each variable over the study period was examined using ordinary least squares (OLS) linear regression analysis with time (in months) as the independent variable and the mean of the focal construct (in each department and pooled across the departments) as the dependent variable.[25] The analysis was conducted using R.[26]

RESULTS

FOCUS

The FOCUS analytic sample consisted of 5468 observations from 17 departments. A majority of observations in this sample were White (74.7%), male (90.9%), non-officers (67.1%), and with an average of 11.3 years of experience (SD, 8.7 years; Table 1).

The average age was 39.5 years (SD, 9.8 years). During the study period, departments experienced changes in one to nine metrics, with the pooled FOCUS sample having changes in five metrics (Table 2). Two variables saw decreasing trends—Supervisor Sensegiving and Engagement on Fire—though the pooled average score remained within the maintenance zone of 80 or higher (mean [range], 86 [81–91] and 81 [76–86], respectively). Morale also had a decreasing trend and fell below the maintenance zone thresholds of 80 (mean, 78 [67–86]). The pooled average score for Emotional Exhaustion on EMS (mean, 43 [38–50]) and Intent to Leave the Profession (mean, 40 [33–52]) exhibited increasing trends.

In addition to examining changes in linear trends, we examined the absolute scores for each metric. The pooled FOCUS sample had 13 metrics with concerning levels, highlighted in red (Table 2). Of note, the metrics for Management Commitment to Safety (mean, 71), Leadership Communication (mean, 68), and Decision Making (mean, 61) were below the maintenance zone. Metrics related to mental health and well-being were above the maintenance zone and indicative of worse outcomes (stress [mean, 47], Depersonalization on EMS [mean, 42], Emotional Exhaustion on EMS [mean, 43], and Intent to Leave the Profession [mean, 40]). The FOCUS sample had an average of 39% for respondents at high risk for anxiety and 29% at high risk for depression (Table 2).

FOCUS COVID-19 Impact

Exhaustion or tiredness was endorsed by an average of 400 respondents each month and was the most reported effect in relation to the pandemic (Fig. 4A). Changes in sleep patterns, fear of transmitting COVID-19 to family and friends, and feelings of being overworked are the next most commonly reported effects. Lack of personal protective equipment was the least reported impact of the pandemic. A monthly average of 640 respondents endorsed being impacted by the pandemic in more than one way, which accounts for 22.8% of the total sample.

FOCUS Example Department

Among the 17 departments included in the FOCUS sample, 1 department was selected to reflect the extremes observed within the sample. This department was career, consisted of five stations, and had an average roster size of 90 firefighters per station. During the study period, this department had changes in the linear trends of five metrics. An increase in the average scores for Management Commitment to Safety (mean, 68), Leadership Communication (mean, 65), Morale (mean, 73), and Decision Making (mean, 63) was observed, whereas a decrease in the score for Stress (mean, 50) was noted (Supplemental Table 2, http://links.lww.com/JOM/B230). Similar to the pooled sample, the metrics for safety climate (Management Commitment to Safety [mean, 68], Leadership Communication [mean, 65], and Decision Making [mean, 63]) were far below 80. This department had high average scores for Stress (mean, 50), Depersonalization on EMS (mean, 45), Emotional Exhaustion on EMS (mean, 48), and Intent to Leave the Profession (mean, 42). An average of 59% of respondents reported high risk for anxiety and 37% reported high risk for depression.

SAVER

The SAVER analytic sample consisted of 2172 observations from three departments during the study period. Individuals in this sample were predominantly White (61.1%), male (85.6%), non-officer (85.5%), and with an average of 10.5 years of experience (SD, 7.4 years; Table 1). The sample had an average age of 38 years (SD, 8.5 years).

TABLE 1. COVID-19 RAPID Mental Health Assessment Departments: May–October 2020 (n = 20)

	FOCUS (17 Departments)		SAVER (3 Departments)	
	n = 5467		n = 2172	
Observations	**Mean ± SD**	**Min–Max**	**Mean ± SD**	**Min–Max**
Age, yr	39.5 ± 9.8	18–75	38.5 ± 8.5	21–73
Years of experience	11.3 ± 8.7	0–60	10.5 ± 7.4	0–47
Individual-level characteristics	***n***	**%**	***n***	**%**
Sex				
Male	4971	90.9	1859	85.6
Female	362	6.6	300	13.8
Missing	135	2.5	13	0.6
Race/Ethnicity				
White	4086	74.7	1328	61.1
Black/African American	593	10.8	249	11.5
Hispanic	134	2.5	272	12.5
Asian	40	0.7	37	1.7
Native American, Alaskan Native	85	1.6	5	0.2
Native Hawaiian, Pacific Islander	13	0.2	2	0.1
Other	262	4.8	67	3.1
Multiracial	255	4.7	212	9.8
Officer status				
Nonofficer (paramedic, EMT, firefighter, dispatcher, lifeguard)	3669	67.1	1856	85.5
Officer (lieutenant, captain)	1407	25.7	263	12.1
Leadership (battalion chief, commissioner)	392	7.2	53	2.4
Department-level characteristics	**Mean**	**Min–Max**	**Mean**	**Min–Max**
Roster size	107	18–601	1641	952–2695
No. stations	5	1–26	61	57–67
Call volume (per month)				
Fire	126	10–546	4297	540–8019
EMS	781	10–4681	16,654	11,299–22,297

TABLE 2. Results of Linear Trend Analysis for FOCUS and SAVER Samples

RAPID Results (Averages May 2020-October 2020)	FOCUS Sample (n=17)		SAVER Sample (n=3)	
	All Department Average	All Department Range	All Department Average	All Department Range
SAFETY CLIMATE & LEADERSHIP				
FOCUS-Management Commitment to Safety	71	46-87	54	50-57
FOCUS-Supervisor Support for Safety	84	79-92	81	75-86
Leadership Communication	68	45-82	↓ 57	56-59
Supervisor Sensegiving	↓ 86	81-91	↓ 82	78-85
BEHAVIOR & MORALE				
EMS Safety Compliance	93	89-96	91	89-92
Job Satisfaction	78	67-85	72	67-75
Morale	↓ 78	67-86	↓ 74	70-79
Engagement (EMS)	73	67-78	↓ 65	63-66
Engagement (Fire)	↓ 81	76-86	72	68-80
LEVERS OF WELL-BEING				
Decision Making	61	44-75	↓ 49	45-51
Resilience	81	76-84	↓ 82	80-83
Social Support	79	75-83	80	76-82
Recovery Experience	70	65-73	71	69-75
WELL-BEING OUTCOMES				
Stress	47	44-50	51	48-53
Burnout-Depersonalization (EMS)	42	34-50	↑ 51	49-54
Burnout-Depersonalization (Fire)	37	31-41	↑ 37	33-40
Burnout-Emotional Exhaustion (EMS)	↑ 43	38-50	51	47-54
Burnout-Emotional Exhaustion (Fire)	40	37-44	↑ 36	33-39
Intent to Leave the Profession	↑ 40	33-52	40	35-46
	% High Risk (Average)	All Department Range	% High Risk (Average)	All Department Range
Anxiety	39%	25-59%	38%	27-49%
Depression	29%	19-46%	32%	25-43%

Arrows adjacent to average score shows the direction of the statistically significant change ($p<0.05$) over the six month study period.

Scores in red indicate average scores of concern.

The pooled sample had between 5 and 12 metrics change over the study period (Table 2). There were decreases in Leadership Communication, Supervisor Sensegiving, Morale, Engagement on EMS, Decision Making, and Resilience. Supervisor Sensegiving (mean [range], 82 [78–85]) and resilience (mean, 82 [80–83]) remained within the maintenance zone, whereas Leadership Communication, Job Satisfaction, Morale, Engagement on EMS, and Decision Making fell well below. Increasing trends for Depersonalization on EMS (mean, 51 [49–54]), Depersonalization on Fire (mean, 37 [33–40]), and Emotional Exhaustion on Fire (mean, 36 [33–39]) were observed.

The pooled sample had 12 metrics of concern, highlighted in red (Table 2). The metrics measuring aspects of safety climate and leadership

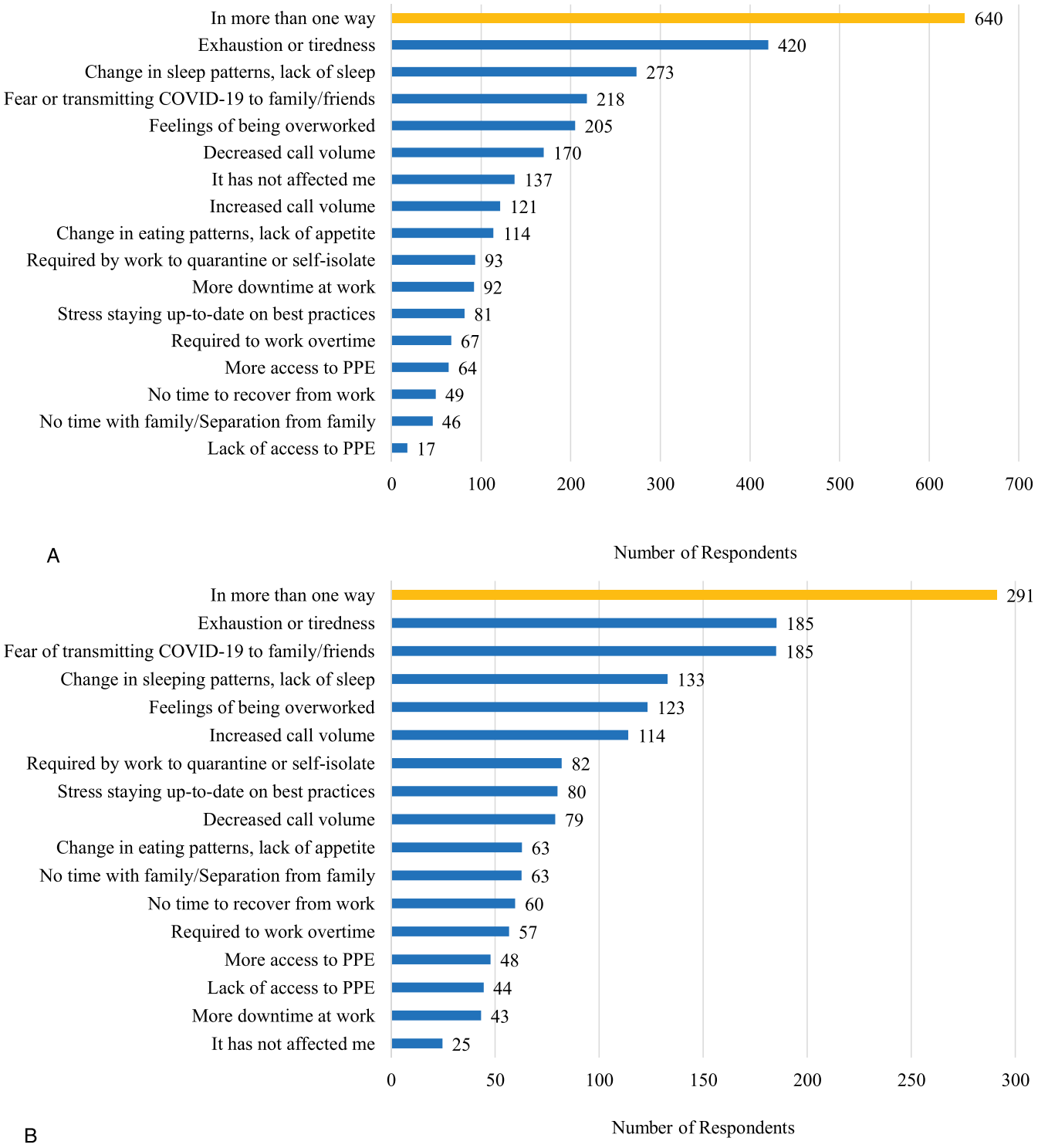


FIGURE 4. (A) FOCUS sample: average reported COVID-19 impact (June 2020–October 2020). (B) SAVER sample: average reported COVID-19 impact (June 2020–October 2020).

(Management Commitment to Safety [mean, 54], Leadership Communication [mean, 57], and Decision Making [mean, 49]) had average scores below the maintenance zone. Stress (mean, 51), Depersonalization on EMS (mean, 51), Emotional Exhaustion on EMS (mean, 51), and Intent to Leave the Profession (mean, 40), metrics assessing mental health and well-being, had high scores and indicate undesirable outcomes. Among the pooled sample, an average of 38% of respondents were at high risk for anxiety and 32% were at high risk of depression.

SAVER COVID-19 Impact

Exhaustion or tiredness and fear of transmitting COVID-19 to family/friends were the most endorsed responses, with an average of 185 respondents each month selecting these experiences (Fig. 4B). Changes in sleep patterns, feelings of being overworked, and increased call volume were the next most commonly reported effects. An average of 25 respondents per month reported not being affected by the pandemic. A monthly average of 291 respondents endorsed being impacted by the pandemic in more than one way, which accounts for 79.5% of the total sample.

SAVER Example Department

Among the three metropolitan departments included in the SAVER sample, one department was selected to reflect the extremes observed. During the study period, this department had changes in the linear trends of 11 metrics. Decreasing trends in the average scores for Supervisor Sensegiving, Job Satisfaction, Morale, Engagement on EMS, Engagement on Fire, and Resilience were observed, along with increasing trends in the average score for Depersonalization on both EMS and Fire, Emotional Exhaustion on EMS and Fire, and Intent to Leave the Profession (Supplemental Table 2, http://links.lww.com/JOM/B230). Management Commitment to Safety (mean, 50), along with Leadership Communication (mean, 56), and Decision Making (mean, 51) had low scores similar to the pooled sample. Stress (mean, 48), Depersonalization on EMS (mean, 54), Depersonalization on Fire (mean, 40), and Emotional Exhaustion on EMS mean, 53) had high average scores, indicating worse well-being outcomes. This exemplar department had an average of 27% of observations at high risk for anxiety and 25% at high risk for depression.

Additional result tables for all participating departments are available. Please contact the authors or visit the FIRST Center Web site for more information (drexel.edu/dornsife/FIRST).

DISCUSSION

In this study, we sought to understand the impact of the first 6 months of the COVID-19 pandemic on the mental health and well-being of fire-based EMS responders using two separate samples of fire departments. We observed concerningly low and decreasing scores on Management Commitment to Safety, Leadership Communication, Supervisor Sensegiving, and participation in Decision Making. These led to concerningly high and increasing mental health impacts as measured through Burnout (Emotional Exhaustion and Depersonalization), Intent to Leave the Profession, and percentage of members at high risk for anxiety and depression. In general, fire departments in the SAVER sample had more negative organizational and well-being indictors than those in the FOCUS sample.

Changes in Linear Trends

In the SAVER sample, linear changes occurred in nine metrics. Leadership Communication, Supervisor Sensegiving, and Decision Making exhibited decreasing trends, whereas trends for Depersonalization on EMS, Depersonalization on Fire, and Emotional Exhaustion on Fire increased. The SAVER sample had high scores for Depersonalization on EMS, Emotional Exhaustion on EMS, and Intent to Leave the Profession. These metrics indicate exacerbation of stress from the pandemic and the need for additional resources from departments. In the FOCUS sample, trends of linear change were observed in five metrics. Sensegiving, Morale, and Engagement on Fire exhibited decreasing trends, whereas Emotional Exhaustion on EMS and Intent to Leave the Profession exhibited increasing trends. These results likely reflect the shift in work that occurred within the fire service at the beginning of the pandemic. Individuals who previously may have devoted the majority of their time responding to fire calls may have had to shift to responding to more EMS calls. This change may explain the decreases observed in Engagement on Fire, as well as increases in Emotional Exhaustion on EMS and Intent to Leave the Profession.

We observed changes in many of the study metrics across 6 months, but also observed relative stability for several other metrics during this same time frame suggesting that well-being during the pandemic is a complex issue. For example, Supervisor Sensegiving remained higher than 80 in both samples, as well as Supervisor Support for Safety. This indicates that department members have positive perceptions of their direct supervisor's (e.g., captain, lieutenant) approach to managing safety of their crew and the station level safety climate, especially with regard to safety priorities and protocols related to the COVID-19 pandemic. Members of these departments showed strong resilience scores, and yet, we also note that their scores indicate increases in anxiety and depression. Thus, even as some areas show improvement, others show decreases, painting that complex picture of both increased effort and challenging well-being circumstances across departments of varying sizes and shapes.

In addition, although some suboptimal trends or levels of the metrics were noted, not all metrics of the departments were deteriorating or within the concerning ranges regardless of the challenges due to the COVID-19 pandemic. Specifically, scores for station level safety climate (Supervisor Support for Safety) and safety compliance behaviors of the EMS responders (EMS Safety Compliance) remained within desirable ranges over the study period. This might be attributable to the preparedness and effectiveness of the emergency response system supporting fire-based EMS in the United States through their safety and health initiatives and development programs. Also, fire-based EMS responders are highly resilient as supported by the data. That being said, the pandemic is an ongoing challenge. Adaptive, functional, and sustainable performance of EMS responders as well as their well-being warrant strategic and persistent managerial/organizational supports.

Indicators of Concern

The SAVER sample had 12 metrics with average scores outside of the maintenance zone. Management Commitment to Safety, Leadership Communication, and Decision Making had the lowest average scores, while high levels of Emotional Exhaustion on EMS, Stress, and Depersonalization on EMS were observed. The average score for Intent to Leave the Profession was also high. The FOCUS sample had 13 metrics with average scores outside of the maintenance zone. Management Commitment to Safety, Leadership Communication, and Decision Making had low average scores. High levels of burnout, high intent to leave the profession, and high percentages of individuals with anxiety and depression were noted. The results provide an indication of the specific areas that department leadership needs to address, including firefighter depression and anxiety. Efforts need to be made to leverage existing resources and identifying new resources to support these essential workers.

The FOCUS and SAVER samples are not directly comparable, but some key attributes may explain difference between them. First, the SAVER sample included metropolitan fire departments, meaning that they serve large populations and have incredibly demanding call volumes. As shown in Table 2, there are great differences in the roster size, number of stations, and call volume. The FOCUS sample was mostly career, but the department sizes and call volumes were much smaller. These attributes may be skewing the results more positively among the FOCUS sample. Previous work by Geczik et al[27] showed that the size and organization type of a department impact Management Commitment to Safety scores (ie, the larger a department, the lower the score), but not Supervisor Support for Safety scores. The RAPID study affirms Geczik et al. observing that Supervisor Support for Safety scores were similar between the samples and within the "maintenance zone". This indicated that even during an incredibly stressful period, station-level officers were able to strongly convey

their support for safe work. The size of the department has been shown to modify the associations between safety climate and its subsequent outcomes, like safety behaviors and organizational outcomes, with safety climate generally being lower among career departments.[27]

Consistent with the results found in our study, Srikanth et al[28] found that 23.8% of EMS providers were considering leaving the profession within 6 months. However, the study was only inclusive of a small sample from Puget Sound, Washington. The sample of fire-based EMS responders in our study was larger and likely more representative of the variation experienced in the US fire service as a whole. Hendrickson et al[29] also found a large portion of first responders and healthcare workers with a decreased likelihood to remain in the profession as a result of working during the pandemic. These results are consistent with workforce trends that were observed during the prior pandemics. Although we are not aware of any published comprehensive assessment of the mental health impact of the pandemic among all industries, there has been a substantial amount of research examining the healthcare workforce, specifically pertaining to emergency department and hospital environments.[30–35] These studies found results consistent with our study, with individuals reporting higher emotional exhaustion and increased depression and anxiety symptoms.[30–35] It is important to note that during the pandemic, mental health was being widely assessed, yet there was no coordination as to what metrics were being used. Thus, it is difficult to truly compare findings across studies.

Practical Implications

In addition to implications for research during a pandemic, there are some practical implications for leaders and members of fire departments. Regarding the impact of COVID-19 on departments and respondents, the most common reported effect was exhaustion or tiredness. In the SAVER sample, fear of transmitting COVID-19 to family/friends was also the most reported effect. Many more people in the FOCUS sample reported not being affected by the pandemic, and this could be due to the department not experiencing a peak during the study period. In addition, the SAVER departments are all within major metropolitan areas and likely experienced increasing cases loads in the early stages of the pandemic. As a whole, it is clear that individuals were not impacted in only one way, as a large percentage of each sample endorsed many of the response options.

Because of these variable experiences, the key practical implication from the current study is the need for flexible response to dynamic situations that unfold over time. Although these organizations traditionally and consistently respond to disasters and emergencies, the COVID-19 pandemic presented a disaster with ongoing emergency properties that created a sustained fight or flight response among an entire population of people. From our data and observations, those leaders of departments who acted quickly and deliberately to changing dynamics in their organization experienced less dramatic shifts in well-being among their members.

Future Directions

The validated scales included in this study were, in part, derived from previous FOCUS assessments. To date, FOCUS has been assessed in more than 500 fire departments nationwide, with 60,000+ respondents. As a result of feedback received on the RAPID survey from participating departments, the next iteration of the FOCUS survey (version 3.0) will be modified and expanded to include several new validated scales that proved to be valuable data for the fire and rescue service. New scales never before included on FOCUS will focus particularly on the role of leadership and scales that are useful as mental health diagnostics. Not only are this data useful to understand the stressors found within the fire service from a public health perspective, but they will also provide objective data to the departments who seek solutions to mitigate stress. One fire chief reflected on the utility of the RAPID data within their own department: "This data has been an extremely helpful tool in helping us to identify possible issues, reflect on ways to mitigate those issues, and to confirm issues we suspected existed, giving us the opportunity to discuss these with the Town management and Governance" (Department E). This department has been able to use the data to reflect on their current policies and implement new revised ones to address the needs of their department: "Our first reflection was the reinforcement of how stressful being an on-call department member is during time of crisis. The stress and anxiety level of responding during a pandemic and the effect on our families definitely had an impact on our members well-being. We also noticed our trend of higher anxiety did not decrease as the pandemic eased for us, indicating the effects of other issues going on in the Town. Our Leadership and Management Communication skills scores did not come as a surprise to us. We know we have some leadership issues to address as all organizations do, but also made us realize that during the pandemic when we could not meet and train in person, communication naturally went down. This stresses to us the importance of in-person trainings and regular meetings with members. This is definitely a piece of information that is so valuable, you cannot place a value on it." This partner department exemplifies the purpose of the assessment tool and has used the data to reflect, find solutions, and work to enact change. Another fire chief reflected, "I believe this data will be used in the future to help responders' diagnosis and better manage stress from future pandemics, our lives, and our jobs," highlighting the importance of expanding the FOCUS survey with these valuable mental health metrics (Department K).

Limitations

Even though our study had many strengths and occurred during a very unique situation and time frame, it is not without some limitations. First, because of the unpredictable nature of the pandemic, our original selection of departments as cases or controls based on their COVID case counts at the beginning of the study period had to be dropped. During the study, some of the control departments experienced an uptick in cases and thus were no longer a control. Regardless of these limitations, the data captured by this study allow for a snapshot of the impact of the pandemic on EMS first responders within the US fire service, as the FOCUS sample was geographically stratified by FEMA region. In both samples, the data were collected at the individual and department levels. However, we were unable to track individual respondents across months because no unique identifier was used. The data can only be assessed at the department level. Although challenging, future work may look for ways to link between individuals, their station, and their department to allow for a more comprehensive multi-level analysis of these dynamic contexts.

In addition, although the pandemic was unpredictable in nature, the variation in timing of the pandemic shows that location and external situational circumstances had a major impact on the nature of the results. The timing of the data collection demonstrated both the growing and complex nature of the wellness issues, with some departments hit hard by the pandemic and experiencing deficits in wellness and others not. This demonstrates the challenges of field research during a pandemic in ways that are simply not anticipatable.

Another limitation of our study was the variation in response rates, especially when COVID was strongly impacting a department's community. This is likely one reason for the low response rates within some departments at various months. However, the average response rates for the FOCUS and SAVER samples were between 58% and 60% overall. The last limitation is that each department reacted differently to the pandemic based on resources, personnel, and other department-specific circumstances. Although the diversity of the departments within each sample can strengthen the generalizability to other US fire departments, specific differences between departments within our samples have not yet been assessed.

CONCLUSIONS

The COVID-19 RAPID Mental Health Assessment showed that the fire and rescue service should address current and future job satisfaction, work engagement, and morale in the industry by improving management commitment to safety, especially in the area of leadership communication. We are also concerned about the lack of perceived involvement in decision-making among firefighters. This metric was consistently low in both samples (average score, 55/100). There is strong evidence that shared decision-making can improve safety in healthcare settings, and this should be explored in the fire service.[22]

Burnout as a reflection of work stress is of incredible concern given that the call volume in EMS is increasing, and leaving the profession is on the minds of those currently in the role. Although all aspects of fire department work were impacted, the increased levels of Emotional Exhaustion and Depersonalization on EMS runs should be considered a leading indicator of a work environment at great risk for high turnover and poor safety outcomes.

Finally, the percent of fire department members who score at high risk for anxiety (38%–39%) and depression (29%–32%) may reflect the persistent nature of the work, the impact of the pandemic, or both. We must act to address the mental health burden of this work if we are to ensure a healthy workforce that provides effective, efficient, and meaningful patient care and community service.

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