An Exploration of Sources, Symptoms and Buffers of Occupational Stress in 9-1-1 Emergency Call Centers

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ABSTRACT

Introduction: 9-1-1 telecommunicators are uniquely exposed to numerous occupational stressors on an ongoing basis. Yet little is known about the sources of occupational stress and symptoms of stress in these workers and even less is known about variables that can serve as stressors or buffers to stress in the 9-1-1 call center work environment.

Objective: We sought to explore the inter-relationships amongst job stressors, potential risk and protective factors, and symptoms of stress in 9-1-1 telecommunicators. Our long-term goal was to use outcomes of this study to guide and conceptualize a stress management intervention that may be targeted and tailored for the 9-1-1 call center work environment and workforce.

Methods: An online survey was administered in April 2013 to 9-1-1 telecommunicators in six call centers in a state in the U.S. Pacific Northwest. The survey collected information regarding self-reported job effort, job reward, overcommitment, technostress, perceived job control, work-related social support, participation in stress reduction programs, mindfulness, and symptoms of stress. Descriptive, bivariate and multivariate analyses were conducted on the sample responses to explore and document independent and joint relationships between stressors, buffers to stress, and symptoms of stress.

Results: Overcommitment was positively associated with higher stress scores while mindfulness—the ability to pay attention to, recognize, and process one's experiences and emotions without judgment and in the moment—was negatively associated with higher symptoms of stress scores after all covariates were considered.

Conclusion: This is one of the first studies to explore the inter-relationships among job stressors, potential risk and protective factors, and symptoms of stress in 9-1-1 telecommunicators. Our findings suggest that the associations between stress, overcommitment and mindfulness provide guidance regarding the benefits of providing mindfulness-based interventions to assist this workforce in managing stress.

INTRODUCTION

The effectiveness of firefighters, police, paramedics, and other emergency first responders depends, in part, upon 9-1-1 telecommunicators who are the first contact for citizens summoning aid for a potentially life threatening crisis. In responding to emergency calls, 9-1-1 telecommunicators are frequently exposed to the chaos and confusion of the callers' crises. Each 9-1-1 telecommunicator fields thousands of calls every year ranging from the trivial (reporting a lost bike) to the potentially life threatening (reporting on a shooting in progress, a patient in cardiac arrest, or an explosion) while simultaneously assimilating information from five to six computer screens during a single 9-1-1 call. Inherent to the task of being the first of the first responders, 9-1-1 telecommunicators must maintain the cognitive and emotional resources needed to perform multiple complex tasks and to make precise and rapid decisions to avert potentially fatal outcomes.

9-1-1 telecommunicators are uniquely exposed to numerous occupational stressors on an ongoing basis. They prioritize and triage incoming telephone calls from the general public that are unpredictable in volume, length and content; col-

lect information needed to dispatch first responders in the field; issue medical instructions to callers while help is on the way; and make rapid, wide-ranging decisions in a work environment over which they have little or no control—all while maintaining their composure—over an 8-, 10-, 12- or 24-hour shift. In addition to providing emergency support to their community, 9-1-1 telecommunicators also perceive themselves as responsible, to some degree, for the safety of police, fire, and emergency medical personnel that they dispatch and monitor in response to the 9-1-1 calls.[1]

The occupational health literature is replete with studies documenting the relationship between work-related stress and a range of adverse outcomes, including reduced productivity, illness, and poor physical and mental health.[2-4] However, research on work-related stress in first responders has primarily focused on police and firefighters and the relationship between their primary trauma exposure and posttraumatic stress disorder (PTSD).[5] While 9-1-1 telecommunicators are not physically present at the scene of a traumatizing event, their secondary or vicarious experiences with callers over the phone can be associated with increased stress-related symptoms, such as hypersecretion of cortisol.[6] Recent investigations of the impact of vicarious trauma exposure in 9-1-1 telecommunicators have reported associations with compassion fatigue (a concept that embraces both burnout and secondary traumatic stress or vicarious trauma), peritraumatic responses and the development of PTSD symptoms.[7-9]

In addition, 9-1-1 telecommunicators are also exposed to potential stressors due to the physical and situational characteristics of their work, some of which have been assessed in occupational health studies conducted in non-public safety call center settings and may be relevant to 9-1-1 telecommunicator work. Rameshbabu et al reported rotating shifts and their accompanying inadequate sleep were negatively associated with physical health outcomes.[10] Long hours of sedentary, high mental demand computer work have been found to enhance the risk for musculoskeletal symptoms which can be associated with psychological distress.[11, 12] Other relevant stressors identified in non-public safety call center research include the fast pace and time-sensitivity of decision-making, tense interactions with upset and sometimes abusive callers, mandatory overtime, pressure to meet call processing time requirements, and negative comments and lack of recognition from supervisors.[12] Workplace conditions such as lighting, ventilation, temperature, break/lunch room availability, and work station ergonomics have also been found to exacerbate work-related stress in non-public safety call centers.[13, 14]

Another source of stress can be the technologies, tools and systems the individual worker must utilize to complete work tasks. 9-1-1 telecommunicator work requires interaction with a variety of technologies and computer-assisted dispatch programs that are continually upgraded to meet public safety needs. Technostress—emotional and physical stress associated with technology and the introduction of new technologies—is associated with decreased job satisfaction, productivity, commitment to the organization, and intention to remain on the job.[15] The impact of technostress can be buffered by organizational and technical support for end users which can reduce technology-related anxiety, stress, and job dissatisfaction.[15]

Given the demands and context of their work, 9-1-1 telecommunicators may be at higher risk for a broad range of physical and mental health consequences due to secondary exposure to traumatic events and physical and situational characteristics.[2-14] However, not all their work-related outcomes are negative. Compassion satisfaction—the positive feelings one derives from helping others, contributing to the greater good, and working with traumatized or suffering individuals—may mitigate or moderate 9-1-1 telecommunicator occupational stress and is a potential resilience factor for preserving work-related mental health as research suggests that compassion satisfaction may protect against or buffer compassion fatigue.[16-17] Reducing work-related stress and its accompanying adverse outcomes in our first responders would benefit the emergency call system on individual and organizational levels by improving 9-1-1 telecommunicators' quality of life and reducing the turnover and absenteeism associated with compassion fatigue.

One stress-reduction approach associated with increasing protective compassion satisfaction is mindfulness training.[17] Mindfulness is the individual's ability to pay attention to and be aware of present moment experience, closely observe and describe sensations, perceptions, thoughts, and feelings, and act with full awareness.[17] One focus of mindfulness training is cultivating inner resources to change a stress reaction into a stress response in which emotional arousal is effectively managed and coped with more positively. Mindfulness has been found to be positively correlated with compassion satisfaction and inversely correlated with compassion fatigue.[17] Mindfulness-based interventions have been associated with fewer PTSD symptoms in combat veterans, and decreased stress, anxiety and depression in a variety of populations.[18, 19] In workplace settings, mindfulness-based stress reduction (MBSR) training programs are associated with fewer post-trauma depressive and physical health symptoms in urban fire fighters and increased post-traumatic growth in police officers repeatedly exposed to traumatic incidents.[20, 21]

While it is possible that a MBSR training program might help buffer 9-1-1 telecommunicator stress, the research base on 9-1-1 telecommunicator stress is limited. To guide designing a stress reduction intervention for 9-1-1 telecommunicators, we sought to learn more about their work-related stress and the social and situational factors that may amplify or buffer the adverse effects of their stress.

Approach and Models Informing the Study

Our approach was two-fold: 1) to collect symptoms and sources of 9-1-1 telecommunicator stress, and 2) to

identify and measure potential buffers and amplifiers to 9-1-1 telecommunicator stress, including job effort-reward and overcommitment, technostress, perceived control, social support, and coping approaches. Our design was informed by Siegrist's (1998) Effort-Reward Imbalance (ERI) Model which considers both situational and personal characteristics (i.e., coping patterns, overcommitment, etc.) in measuring occupational stress.[22] ERI postulates that individuals in a work environment in which there is an imbalance of high effort combined with low reward (e.g., money, esteem, status) will experience an elevated stress level which can be amplified in those individuals who show overcommitment (a motivational pattern of excessive job-related commitment and a high need for approval), an imbalance which negatively affects physical and mental health.[22] However, as noted previously, 9-1-1 telecommunicator work requires interaction with a variety of technologies and another factor potentially amplifying the adverse effects of the job effort/reward imbalance and increasing stress is technostress which we measured using sub-scales of the Technostress Creators scale.[15]

In addition to collecting stress data using the Calgary Symptoms of Stress Inventory (C-SOSI) which measures physical, psychological, and behavioral responses to stressful situations, our approach incorporated social and situational factors that might act as buffers of exposure to workplace stressors, such as participation in stress management training or wellness programs, work-related social support, or perceived job control.[23] To capture these factors we included job demand, satisfaction and work-related support sub-scales utilized by Wiegand et al. (2012) in NIOSH Health Hazard Evaluations and constructs associated with enhanced self-awareness and mindfulness, by utilizing the Mindful Attention Awareness Scale (MAAS).[13, 14, 24] Details regarding development of the instrument designed to collect these data can be found in the Methods section.

The outcomes of this study will guide and conceptualize stress management interventions that may be targeted and tailored for the 9-1-1 telecommunicator workforce.

OBJECTIVES

The objective was to report a cross-sectional study of 9-1-1 telecommunicator stress, sources of stress and potential moderators of stress as framed by the following research question: What is the relationship between job stressors, symptoms of stress, and buffers to stress in 9-1-1 telecommunicators?

METHODS

Design and setting

This was a prospective study using an online survey tool to collect data from telecommunicators at six call centers in a state in the Pacific NW, USA. Data was collected through an online survey open for 3 weeks during April 2013.

Participants

Invitations to participate in the survey were distributed by call center managers using email sent to full-time 9-1-1 telecommunicators in the six call centers in a state in the Pacific NW.

Instrument

The survey was developed to collect sources, symptoms and buffers of stress among 9-1-1 telecommunicators using validated measures and instruments. The survey was pretested by several call center managers and trainers prior to distribution. Survey sections, detailed below, included: Symptoms of Stress, Effort-Reward Imbalance, and Overcommitment, Technostress, Social Support, Coping with Stress, Mindfulness, and Perceived Control. Some items were modified to reflect 9-1-1 telecommunicator work. The survey also included items regarding demographic and professional information.

Symptoms of Stress

The C-SOSI is a 56-item scale with 8 subscales, each consisting of 6-9 items: Depression, Anger, Muscle Tension, Cardiopulmonary Arousal, Sympathetic Arousal, Neurological/GI, Cognitive Disorganization, and Upper Respiratory Symptoms.[23]

Effort-Reward Imbalance and Overcommitment

The Effort-Reward Imbalance (ERI) short form is a 16-item instrument used to measure occupational efforts relative to rewards.[25] The instrument includes 16 statements that reflect Job Effort (*"I have constant time pressure due to a heavy work load"*), Reward (*"I receive the respect I deserve at work"*; *"My job security is poor"*) and Overcommitment (*"As soon as I get up in the morning I start thinking about work problems"*). One item was added to the Overcommitment scale to increase its relevance to 9-1-1 telecommunicator work (*"If I handle a lot of emotional calls during my shift I have trouble sleeping at night"*).

Technostress

Technostress was measured by six items drawn from the Techno-uncertainty (4 items) and Techno-insecurity (2 items) sub-scales of the Technostress Creators scale plus one additional Techno-insecurity item specific to 9-1-1 telecommunicator work.[15] Items were presented as statements to which participants were asked to rate their level of agreement. Example statements included, *"There are always new developments in the technologies we use in our organization"* (Techno-uncertainty) and *"I have to constantly update my skills to avoid being replaced"* and *"The constant changes in technology makes it difficult to do my job well"* (Techno-insecurity).

Social Support

Participants were asked to rate two statements about job-related social support: *"The people I work with (my co-workers) are friendly"* and *"My supervisor is concerned about my welfare"*.[13, 14]

Coping with Stress

Participants were asked, *"How often have you participated in any work-related stress reduction program, such as critical incident debriefing, a peer support group, seeing a mental health provider, resiliency training or any other program or training that had a focus on how to reduce stress?"*

Mindfulness

The 15-item mindfulness scale (MAAS) was included to assess attentional sensitivity to psychological, somatic, and environmental cues.[24] Example statements included: *"I could be experiencing some emotion and not be conscious of it until sometime later"* and *"I find it difficult to stay focused on what's happening in the present"*.

Perceived Control

Participants were asked to agree or disagree with five statements concerning their perceptions of choice and control over their work environment (*"I am given a lot of freedom to decide on how to do my own work"*, *"I am given a lot of freedom to decide the amount of work I do"*, and *"I am given a lot of freedom to decide the pace of my work"*).[13-14]

Demographic and Professional Information

Participants were asked to provide data on their gender, age, race/ethnicity, marital status, having children under the age of 18 (yes/no), number of years of experience as a 9-1-1 telecommunicator and their primary role at the call center (call taker-only, dispatcher-only, both call-taker and dispatcher, supervisor).

Within-Scale Reliability

Given different scales and multiple Likert questions on the survey, Cronbach's alpha test was applied to scales in each section to measure internal consistency/reliability. C-SOSI subscale Cronbach's alphas ranged from 0.77 for the Neurological/Gastrointestinal (GI) subscale to 0.90 for the Muscle tension subscale. On the ERI section, items were collapsed into three scales with Cronbach's alpha of 0.72 (Effort – 4 items), 0.66 (Reward – 4 items) and 0.85 (Overcommitment – 7 items). The ratio between the Effort and Reward scales was calculated (weighed by number of items) per established protocols.[25] Cronbach's alpha for the 7 items in the Technostress section was 0.85 and 0.84 for the mindfulness scale. Two of the five items in the Perceived Control section had very low inter-item correlations and were dropped. The remaining three items were collapsed into one scale with a Cronbach's alpha of 0.83.

Data Analysis

All analyses were conducted using R statistical software (R version 2.15.2 ©2012, R Foundation for Statistical Computing, Vienna, Austria). Descriptive statistics were used to depict the characteristics of the sample and their responses on the independent and dependent variables (N ranged from 144-154 due to missing data on some items). Because survey participants (telecommunicators) identified themselves as either "both call-taker and dispatcher" or "call taker-only" it was not possible to conduct comparisons between different roles. ANOVA and multivariable linear regression were used to explore the association of each independent variable on the C-SOSI score while accounting for call center and role. Because considerable differences between call centers and between roles were observed, call-center and role were adjusted for in each analysis by inclusion as covariates. To determine which independent variables might be targeted for interventions to reduce stress, a multivariable linear model with C-SOSI score as outcome was developed by including all variables associated with C-SOSI in the bivariate.

RESULTS

Overall Sample Characteristics

Table 1 summarizes the demographic and professional characteristics of the 9-1-1 telecommunicator sample (N=154): largely white, female, and the most frequent age group was 30 to 50 years old. The majority (60.4%) was married or living with a partner and 39.1% reported having children under the age of 18 years. A majority (63.0%) reported working as both call taker and dispatcher while 33.1% reported call taking-only and 3.9% dispatching-only. Almost 60% reported working between 5 - 20 years as a 9-1-1 telecommunicator while very few (7.9%) reported having worked more than 20 years.

Table 2 summarizes the SOSI and SOSI sub-scale index scores, rescaled to 0-4 in order to compare the relative scores between sub-scales. Based on these calculations, the survey respondents show highest SOSI index scores on the Muscle Tension, Sympathetic Arousal and Anger sub-scales.

Table 3 summarizes scales measuring stressors and buffers of stress. Perceived Control had a mean score of 1.8 on a 5-point scale and Effort had a 3.8 mean on a 5-point scale. In general, respondents perceived relatively high work-related social support, particularly from friendly co-workers (mean of 3.8 on a 5-point scale).

Relationships between Symptoms of Stress, Individual Stressors, and Buffers to Stress.

As seen in Table 4, the overall SOSI total score was positively associated with *Effort, Effort-Reward Imbalance, Overcommitment, Technostress* and *Coping with stress*, and negatively associated with *Reward* and *Mindfulness*. Results of multivariable linear models with SOSI score as the outcome (Table 5) indicated that only *Mindfulness* and *Overcommitment* were statistically significantly associated with respondent SOSI scores after adjusting for all covariates individually associated with SOSI score. In summary, we found that *Overcommitment* was associated with higher stress scores while Mindfulness was associated with lower stress scores.

Characteristic	Frequency n (%)
Age (n=152)	
18-29 years	41 (27.0)
30-39 years	55 (36.2)
40-49 years	37 (24.3)
50-59 years	17 (11.2)
60+ years	2 (1.3)
Gender (n=151)	
Female	118 (78.1)
Male	33 (21.9)
Race/Ethnicity (n=152)	
Caucasian	149 (98.0)
Years of Experience (n=153)	
Less than 2 years	22 (14.4)
Between 2 and 5 years	28 (18.3)
Between 5 and 10 years	47 (30.7)
Between 11 and 20 years	44 (28.8)
Between 21 and 30 years	11 (7.2)
More than 30 years	1 (0.7)
Parental Status (n=151)	
Has children under 18 years	59 (39.1)
Relationship Status (n=154)	
Married	93 (60.4)

Table 1. Demographic Characteristics of 9-1-1 Telecommunicators.

Symptoms of Stress and Sub-Scale Scores	N	Mean±SD
Symptoms of Stress Index score	154	0.98±0.54
Depression sub-scale	153	0.76±0.63
Anger sub-scale	153	1.20±0.74
Muscle Tension sub-scale	154	1.24±0.86
Cardiopulmonary Arousal sub-scale	154	0.52±0.58
Sympathetic Arousal sub-scale	154	1.81±1.01
Neurological/GI sub-scale	154	0.47±0.68
Cognitive Disorganization sub-scale	154	0.52±0.49
Respiratory Symptoms sub-scale	154	0.98±0.90

Note: Participants were asked to rate the frequency with which they may have experienced specific symptoms in the past week on a 5-point Likert type scale ranging from never (0) to very frequently (4), with higher scores indicating greater stress symptomatology.

SD: Stand Deviation

Table 2. Symptoms of Stress and Sub-Scale Scores for 9-1-1 Telecommunicators. Each item and the overall score have been scaled to a 0-4 range to facilitate comparison.

Stressors and Buffers of Stress	N	Mean±SD
Effort[a]	151	3.74±0.81
Reward[b]	153	3.05±0.73
Overcommitment[c]	151	2.87±0.89
Technostress[d]	149	3.25±0.80
Perceived Control[e]	153	1.75±0.71
Coping with Stress[f]	154	3.08±0.48
Friendly Co-workers[g]	154	3.77±0.83
Concerned Supervisor[h]	154	3.08±1.18
Mindfulness[i]	144	3.87±0.77

[a-c]Participants were asked to rate their level of agreement for each statement on a 5-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5), with higher scores reflecting greater effort[a], reward[b] and overcommitment[c].

[d-h]Items were scored on a 5-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5), with higher scores reflecting greater technostress[d], greater perceived control over one's work environment[e], higher participation in stress reduction programs[f], and higher job-related social[g] and manager[h] support.

[i]Participants were asked to rate each statement on a 6-point scale from Almost Never (1) to Almost Always (6), with a higher score representing a greater degree of mindfulness.

SD: Stand Deviation

Table 3. Stressors and Buffers of Stress in 9-1-1 Telecommunicators.

Covariate*	N	Estimate (95%CI[†])	p-value
Age**	152	-	0.907
Years of Experience**	153	-	0.690
Has children	151	-2.9 (-12.2, 6.4)	0.534
Married	154	-7.5 (-16.5, 1.6)	0.106
Effort	151	12.0 (6.4, 17.5)	<0.001
Reward	153	-15.5 (-21.5, -9.5)	<0.001
Effort-Reward Balance	150	20.6 (14.1, 27.2)	<0.001
Overcommitment	151	19.1 (14.9, 23.4)	<0.001
Technostress	149	13.2 (7.2, 19.3)	<0.001
Perceived Control	153	-6.3 (-12.5, -0.01)	0.050
Coping with Stress	154	17.8 (9.0, 26.5)	<0.001
Friendly Co-workers	154	-2.6 (-8.0, 2.9)	0.353
Concerned Supervisor	154	-2.3 (-6.2, 1.6)	0.252
Mindfulness	144	-22.1 (-26.8, -17.4)	<0.001

** Each estimate is calculated from the linear model SOSI ~ Covariate + Role + Call Center*
*** Factor variables*
[†]95% confidence Interval (CI).

Table 4. Relationship between 9-1-1 Telecommunicator Demographics, SOSI and Stressors and Buffers to Stress. Each Estimate is Adjusted for Role and Call Center By Inclusion as Covariates.

Regression Coefficients	N	Estimate (95%CI)*	p-value
Effort	134	-1.2 (-3.8, 6.3)	0.63
Reward	134	-4.2 (-9.5, 1.2)	0.13
Overcommitment	134	11.4 (6.3, 16.6)	<0.001
Techno Stress	134	-0.7 (-6.1, 4.6)	0.79
Perceived Control	134	1.9 (-3.3, 7.1)	0.47
Coping with Stress	134	6.4 (-1.0, 13.7)	0.09
Mindfulness	134	-14.3 (-19.6, -9.0)	<0.001

**95% confidence Interval (CI).*

Table 5. Regression Coefficients for Multivariable Linear Regression of SOSI Score. Role and Call Center were included as covariates.

DISCUSSION

The study presents the results of an exploratory cross-sectional study investigating stress-related symptomatology and the relationship(s) between individual work stressors, potential buffers to stress, and self-reported symptoms of stress in a relatively large sample (N=154) of professional 9-1-1 telecommunicators. Analyses of survey participants' self-reported stress symptomatology showed that the majority of the most common and frequent stress symptoms are also reported by workers in sedentary, computer-focused work settings and non-public safety call center environments.[11-12] Like non-emergency call center employees, 9-1-1 telecommunicators are required to monitor multiple computer screens, databases and "talk and type" information into various computer-based systems simultaneously and often for many hours without a break. Given these workplace factors and the risk for musculoskeletal symptoms and strain, it would be expected that 9-1-1 telecommunicators might have problems with muscle tension.[12] Thus it is not surprising that the 9-1-1 telecommunicators in this sample reported second highest SOSI scores on the Muscle Tension sub-scale. Elevations on the SOSI Sympathetic Arousal sub-scale were largely due to self-reported sleep problems, including difficulty falling asleep and staying asleep. Self-reported sleep problems have been identified in other worker samples with high work demands and higher physical effort as a potential symptom of work-related stress, as well as in shift workers, and those exposed to trauma.[11, 26] It is possible that the elevated anger scores in the sample may reflect 9-1-1 telecommunicators' vicarious exposure in "real time" and on an ongoing basis to traumatic events relayed by callers or the potential for these events to harm first responders. Over time, this exposure may erode 9-1-1 telecommunicators' assumption or belief in the benevolence of people and the world which may contribute to frequent experiences of anger.

While this study only uncovered an inverse association between symptoms of stress and rewards and mindfulness, it also found that overcommitment and mindfulness were directly related to symptoms of stress after controlling for other variables. All other individual stressors and buffers to stress were shown to have indirect relationships with symptoms of stress which were mediated by overcommitment and mindfulness. Hints to how work overcommitment might lead to stress symptomatology can be gleaned from items on the Overcommitment scale that reflect a form of mental rumination, perseveration, or worry (*"As soon as I get up in the morning I start thinking about work problems"*). Excessive rumination has been repeatedly linked to adverse mental and physical health outcomes and may interfere with effective emotional processing that is integral to making sense of one's experiences throughout the day.[27] Being overly committed psychologically and emotionally to a high-stress job may result in more numerous and/or more frequent stress symptomatology in 9-1-1 telecommunicators.

Notably, the study finding showed that mindfulness, or an ability and willingness to pay attention to, recognize, and process one's experiences and emotions without judgment and in the moment, was associated with fewer symptoms of stress. This association, while not causal, indicates that being more mindful may buffer the effects of stress. This result is consistent with a growing empirical literature that has linked greater mindfulness with healthy functioning and well-being and a demonstrated reduction in pathology resulting from mindfulness-based interventions in a variety of populations and with a variety of clinical presentations, including insomnia, anxiety and depression and anger.[17-21, 26, 28, 29]

It is possible that by facilitating their present-centered awareness, mindfulness interventions may help 9-1-1 telecommunicators by increasing compassion satisfaction in the context of their performance of the multiple duties and tasks of a high-stress job, as well as decrease reliance on coping strategies that are typically associated with adverse outcomes such as avoidance, suppression, and rumination.[16-17] Mindfulness provides a competing alternative to the excessive rumination and worry that may result from over commitment to one's work. That is, one cannot be keenly focused on perceptions in the here and now and worry at the same time. Additionally, mindfulness might be helpful in reducing excessive muscle tension by inducing a state of mental and physical relaxation. In fact, research has shown that mindfulness-based approaches are equally as effective as relaxation training.[30] As such; a mindfulness-based intervention may address many of our key findings which suggest that 9-1-1 telecommunicators may need and benefit from workplace stress management interventions that target their musculoskeletal tension and sympathetic arousal/sleep disturbance, as well as address their symptoms of anger.

Other stress management programs that employ evidence-based interventions should also be considered and tested in this population. For example, cognitive interventions such as thought stopping and scheduled (and compressed) "worry

time" are also shown to reduce rumination and worry.[31] A host of other adjunctive relaxation strategies such as progressive relaxation, biofeedback and gentle stretches have also been shown to increase relaxation and reduce excessive regional and generalized muscle tension.[32-33]

Interestingly, in this study, self-reported prior participation in stress management programs (primarily critical incident debriefing and mental health treatment) was positively related to stress symptomatology. This suggests that the most stressed 9-1-1 telecommunicators may be more likely to seek out stress reduction services and/or that current stress reduction approaches are relatively ineffective for this high stress subsample of 9-1-1 telecommunicators. More research that includes testing novel stress management approaches needs to be conducted to explore the latter interpretation.

Limitations

The results of this study should be interpreted with caution. There is always a question of representativeness of the sample in any survey study. Supporting generalizability of the study findings is the sampling approach in which respondents from multiple call centers throughout the state were invited to respond. Participation in the survey was voluntary and 9-1-1 telecommunicators who responded to the survey may not be representative of 9-1-1 telecommunicators at the targeted call centers nor of 9-1-1 telecommunicators in general. However, the study sample demographics mirror those of the targeted call centers: in the largest participating call centers, the demographic break-down is 80% female and 20% male. Also, 58% of the 9-1-1 telecommunicators at the targeted call centers participated which is considered an adequate to good participation rate, particularly in online survey studies.[34]

Any self-reported measure of stress and coping is limited as there are no objective indicators to cross-validate subjective appraisals (for example, observations of their actual coping behaviors or, in the case of stress symptoms, cross reference symptoms with their medical records or absenteeism). However, this study employed widely-used scales selected for their validity and reliability evaluation.

A final limitation is that this was a cross-sectional study; thus it was not possible to establish causal associations between the studied variables. While it is possible and even likely that overcommitment caused stress in the study sample of 9-1-1 telecommunicators, it is also possible that their reported stress symptoms may have affected their perceptions of feeling overcommitted. Prospective longitudinal studies that include controls need to be conducted to establish causal relationships and the direction of influence among the study variables.

CONCLUSION

This study demonstrated that a mindfulness-based approach to reducing stress could be an effective strategy in these workers if tailored to the unique needs of 9-1-1 telecommunicators. In particular, the study findings indicated that interventions to reduce stress must aim to reduce muscle tension, improve mood management and sleep hygiene, decrease ruminations associated with perceptions of overcommitment, and train 9-1-1 telecommunicators to shift their experience and sustain or increase their compassion satisfaction with mindfulness techniques. In collaboration with Public Safety Answering Points throughout the state, the research group is currently developing a mindfulness-based intervention that includes this guidance to mitigate job-related stress in this workforce. Reducing stress in the first responders will benefit not only the high strain worker population but all who rely on them in an emergency.

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