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Heather R. Cotter



Editor's Note

By Heather R. Cotter, IPSA Executive Director, Founder and Editor-in-Chief



Thank you for your interest in the **Third Edition** of the *IPSA Journal*. This scholarly resource is available to all public safety professionals. The IPSA was fortunate to have several public safety authors and peer reviewers contribute to this executive-level, peer-reviewed publication.

The *IPSA Journal* is an opportunity for individuals interested in scholarly research and writing about public safety for public safety. It's an opportunity to publish manuscripts about leadership issues and best practices applicable to all facets of public safety. Our readers represent the entire public safety community: law enforcement, fire service, EMS, telecommunications, public works (water, sanitation, and transportation), public health, hospitals, security, private sector, and emergency management. In this Third Edition, readers will see the following peer-reviewed manuscripts:

1. ***Effects of Coping Strategies on Post Traumatic Stress Levels Among EMS Responders***
by Chih Ren Nicholas Koo, Michael Speaker Yuan and Chad Newland
2. ***The Critical Need for Federal Public Safety and First Responder Science and Innovation***
by David J. Alexander, Ph.D.
3. ***Preventing School Violence through Team Leadership***
by Amery E. Bernhardt
4. ***Alcohol Abuse among Police Officers and Firefighters***
by Gregory L. Walterhouse

Each paper was researched by the authors, includes a literature review, offers key discussion points and they were all peer-reviewed. The IPSA has a systematic process in place for approval, rejection and resubmissions of manuscripts. The IPSA enlists peer reviewers made up of public

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Stay safe,

Heather R. Cotter

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IPSA Journal

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Effects of Coping Strategies on Post Traumatic Stress Levels Among EMS Responders

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Effects of Coping Strategies on Post Traumatic Stress Levels Among EMS Responders
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Abstract

Emergency Medical Services (EMS) is an industry that aims to care for the sick and injured. However, many responders become unable to care for their own mental health needs as a result of their work. Research suggests that EMS breeds a culture where expressing emotions may be a sign of weakness, leading many responders to neglect their own emotional needs, driving them to become depressed.

The objective of this study was to learn how different coping strategies, risk factors, and malleable factors can alter post traumatic stress levels. This study builds upon previous research by improving sample size and diversity, and specifically targeting EMS personnel. The results demonstrated that coping strategies account for a large part of the total variance in post traumatic stress levels when factoring in risk factors and malleable factors [$R^2=.58$]. Malleable factors are factors that EMS agencies can manipulate to promote the mental health of their EMS responders. Results reflect that Active Emotional Coping, and Avoidant Coping were the only two types of coping that were statistically significant in altering post traumatic stress levels. Avoidant Coping increased levels of post traumatic stress, whereas Active Emotional Coping decreased levels of post traumatic stress. Of the malleable factors, only peers and management fostering an environment where mental health was supported were significant in decreasing post traumatic stress. EMS agencies will hopefully become better prepared to use evidence based strategies to help their responders prevent, screen, and assist with post traumatic stress on the job and at home.

Key Words: Emergency Medical Services, EMS, PTSD, Stress, Coping Strategies, Critical Incident Exposure

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Introduction

Jesse, an Emergency Medical Technician (EMT) in New York State, began his career as a youth member at his local ambulance station. He still recalls his first patient: a child entrapped in a vehicle after a motor vehicle collision. When he turned 19, he became a certified New York State EMT and started working in the 911 system. Day after day, seeing severely sick and injured people began to take a psychological toll. Jesse described feeling numb and alone, having no one to turn to or confide in. Jesse later relied on drugs up to self medicate, and even contemplated suicide. Fortunately for Jesse, he reached out for help and was able to receive mental health treatment (Goldsmith, 2016).

The taboo subject of mental health, suicide, and post traumatic stress has long been a well kept secret within EMS. In recent years, the steady increase in first responder-related suicides has shed light on this problem (Venteicher, 2017). In a culture where expressing emotions may be a sign of weakness, this population often neglects their own emotional needs, driving them to mental illness (Newland, 2015). Critically stressful events are rampant in the field of EMS (Donnelly, 2012). The industry is in need of evidenced informed guidance of how to better support their responders. Past research on post traumatic stress among EMS personnel has frequently lacked adequate sample sizes that accurately reflected the diverse population of EMS responders from the United States as a whole. Most studies focus on one geographic location or agency, and therefore findings may not be generalizable. Also, many of these previous studies focused on fire-based emergency medical services and are not representative of the entire EMS population.

Literature Review

Research suggests that 9% of EMS workers meet the clinical criteria for Post Traumatic Stress Disorder (PTSD), with another 10% having symptoms of PTSD, but for periods less than one month (Blumenfield & Bryne, 1997). Another study found that 40% of responders who had symptoms of post traumatic stress did not seek any form of help. One quarter of those responders who reported not getting any help said it was due to fear of detrimental impact on their professional reputation (Abbot et al., 2015).

While some research on post traumatic stress in law enforcement and fire service personnel is present, the body of research on EMS specifically is limited. One study in 2017 investigated suicidal ideation in firefighters and EMS personnel (Martin, Tran & Buser, 2017). The study's sample consisted of 3036 firefighters from a large urban fire department. All firefighters in this urban fire department were cross-trained to provide emergency medical care. The researchers found that their sample reported higher rates of suicidal ideation, plans, and attempts compared to the general public and military population. Furthermore, they found that there were high rates of post-traumatic stress symptoms among the sample surveyed. There was a significant positive relationship between levels of post traumatic stress, depression and suicidal ideation. Fire services may have more access to resources than other non-fire based services (Moore, 1997). Thus, research is required to reflect the overall EMS population which consists of a multitude of services such as third services, private services and volunteer services.

Newland et al, 2015 looked at the prevalence of post traumatic stress in 4,021 EMS responders in from across the United States and how different support structures impacted levels of post traumatic stress. Their data revealed that providers nationwide are experiencing high levels of critical stress, and they have significantly higher rates of suicidal ideation and suicide

attempts than the overall population. Their survey also assessed the availability and effectiveness of Employee Assistance Programs (EAP), in house peer counseling or critical incident stress debriefings (CISM), and private therapy programs. Their analysis revealed that no single mental health treatment modality was more effective than any other, but that responders benefited from a culture where their mental health was supported. Their qualitative data revealed that one of the ways that support could be more effective was to more effectively train peers and therapists about the specific challenges that first responders face.

Donnelly (2012) looked at occupational-related stress and the coping mechanisms used by EMS workers. Utilizing the National Registry of Emergency Medical Technician's database, Donnelly sent out an internet-based survey. Donnelly used a power analysis to determine that a sample size of at least 1500 responders would produce adequate results. A sample of $n=12,000$ was used to account for the response rate of internet surveys. In order to meet inclusion criteria, subjects had to be currently certified by the NREMT and have an email on file. The survey yielded 1,633 responses ranging from different levels of licensure including Emergency Medical Technicians (EMTs) and Paramedics (EMT-Ps). Donnelly measured symptoms of post-traumatic stress, types of critical incident exposures, and levels of occupational stress. Data analysis reflected that exposure to both chronic and critical incident stressors increased the likelihood a responder would develop a reaction to a critical incident. Furthermore, the data indicated that high levels of alcohol use, chronic stress, and critical incident stress were positively correlated with higher levels of post traumatic stress.

Haddock et al (2012) looked at the alcohol use of 656 male firefighters selected from eleven professional, and thirteen volunteer fire departments in the central United States from 2008 to 2010. Haddock assessed frequency and intensity of alcohol use along with a screening

tool to assess a potential problem with drinking. Firefighters were also asked if they had driven vehicles while intoxicated in the last thirty days. Fifty six percent of respondents admitted to binge drinking within the last month. Nine percent of career firefighters and ten percent of volunteer firefighters admitted to driving while intoxicated. This paints a picture of widespread alcohol use and abuse. This not only takes a toll on first responders physical health, but can significantly impact their mental health as well.

Essex and Scott (2009) investigated coping strategies among volunteer EMS responders and their effects on overall mental health. This study recruited 130 volunteer EMS responders from six ambulance services in Suffolk County, New York. Data collection occurred via surveys distributed during personnel meetings. The study measured chronic stress, burnout and coping strategies. The researchers found that 99% of the volunteers had symptoms of depersonalization, and 92% exhibited signs of emotional exhaustion. The authors noted that helpful coping strategies included speaking with colleagues, and thinking about positive benefits of work. The unhelpful strategies included suppression and distraction. The study also found different results between men and women. Women were less likely to use coping mechanisms such as crude humor and suppression. Responders who had been in EMS for six or more years were more likely than less experienced responders to internalize thoughts or feelings.

Prati, Palestini, Pietrantonio (2009) focused on the effects of different coping strategies on the professional quality of life of emergency workers. 1200 Italian firefighters, civil protection officers, and emergency medical workers were surveyed about their personal and professional quality of life and their coping strategies. The researchers found that emergency workers were more likely to use coping techniques of acceptance, active coping, and positive reframing. They were less likely to use coping strategies such as substance use, behavioral disengagement, and

denial. Researchers also found that avoidance was a negative factor affecting the workers' professional quality of life. This impacted what the researchers defined as "compassion satisfaction." The researchers defined compassion satisfaction, as the satisfaction/benefits that one may feel when assisting those who are injured or suffering.

Holland (2011) studied the dangers of detrimental coping strategies among EMS responders. This study involved 180 EMS responders in Durham County, North Carolina. Surveys were distributed during continuing education meetings. The researcher measured the effectiveness of coping strategies on reducing the negative effects of personally disturbing incidents or critical incidents. Holland defined critical incidents as any event that is sufficiently disturbing to overwhelm or threaten to overwhelm an individual's normal coping mechanisms. After analyzing the data, the researcher found that responders who utilized the coping strategy of avoidance had 19 times the rate of traumatic stress. There was a significant positive relationship with five specific types of critical incidents which included: pediatric deaths, care of family/friends, care of victims of a disaster, and care of victims of a crime. Responders who utilized detrimental coping methods reported higher levels of traumatic stress

The goal of this study is to learn what coping strategies EMS personnel use and how these coping strategies impact post traumatic stress levels. The coping strategies that we investigated were Active Emotional Coping, Avoidant Coping, and Problem Focused Coping. In Carver's 1997 study, he defined Active Emotional Coping as problem solving or attempting to change the roots of his or her problem. Carver goes on to define Active Emotional Coping as attempting to diminish negative emotions that stem from the stressor. Avoidant Coping is defined as a maladaptive form of coping where the user utilizes coping methods to distract or

avoid the stress in Schnider et al.'s 2007 research study. This study will also explore how different risk factors and malleable factors (Table 2) affect levels of post traumatic stress.

Methods

We conducted a cross-sectional survey of EMS responders to understand the relationships between coping strategies, risk factors, and malleable factors on levels of post traumatic stress. We hypothesized that increased rates of Problem Focused and Active Emotional Coping would be associated with decreased levels of post traumatic stress, and Avoidant Coping would be associated with increased levels of post traumatic stress.

We also wanted to investigate the effects of risk factors that EMS agencies can monitor and control to reduce post traumatic stress in their employees. It was hypothesized that lower post traumatic stress levels would be seen if responders were working in agencies that encouraged post traumatic stress management and fostered a culture where mental health was valued. Finally, we wanted to see how these interventions, combined with coping strategies and risk factors, would impact overall levels of post traumatic stress.

Ethical Review. The study was reviewed and approved by the University of San Francisco's Institutional Review Board. All participants received a statement of informed consent which accompanied the survey.

Measures

Demographics and EMS Focused Questions. Standard Demographic information was collected and additional EMS specific demographic questions were included (service type, call type/volume, setting, workload, licensure level, and years of service). This procedure allowed for more sensitive differentiation between types of EMS services that may utilize different types of

coping strategies. Furthermore, certain EMS focused stress management questions were extracted from Abbott et al. (2015).

Coping Strategies. In order to assess for coping strategies used by EMS responders, we utilized the BRIEF Cope Scale (Carver, 1997). The 28 question BRIEF Cope Scale was developed as a shortened version of the original 60 question “Cope Inventory”. Carver developed the BRIEF Cope Scale, as an alternative to assess for coping after he noticed participants becoming fatigued during the 60 question Cope Inventory. The BRIEF Cope Scale’s 28 questions assess 14 different coping strategies (Table 1). The inventory is presented in a Likert scale from one to four with one being “I haven't been doing this at all,” and four being “I’ve been doing this a lot.” A 1997 study conducted by Carver looked at coping strategies of hurricane survivors to confirm the reliability of the “BRIEF Cope Scale.” Carver found that all 14 coping strategies in the assessment reflected minimally acceptable reliability standards of cronbach alpha value of 0.5 or above. In order to improve reliability of the “BRIEF Cope Scale”, the researchers utilized a three factor model which divided the 14 coping styles into 3 subcategories: Problem Focused Coping, Avoidant Coping, and Active Emotional Coping (Table 1). A 2007 study by Schnider, Elhai, and Gray which evaluated coping strategies in college students who reported a traumatic loss, found the cronbach alpha value of the 3 subscales to be above 0.8. Using the methods described in Schnider et al.’s 2007 research, we parceled the subscales accordingly.

Post Traumatic Stress. To assess for post traumatic stress symptoms, we utilized the Post Traumatic Stress Checklist- Civilian Version (PCL-C). The PCL-C is an assessment tool utilized to screen for post traumatic stress levels and a potential post traumatic stress disorder diagnosis. The PCL-C consists of 17 questions and is assessed on a Likert scale from one to five

with one being “Not at all” and five being “Extremely”. The scores on the PCL-C were summed. According to Andrykowski, Cordova, Studts, & Miller (1998) scores greater than 50 were indicative of a conditional PTSD diagnosis, with the need for further assessment and intervention.

Sampling and recruitment. The researchers elected not to utilize open social media groups on platforms like “Facebook”, and “Reddit” as a source of distribution. Due to the open nature of these social media websites, there is no way to control the population actually taking the survey. This risks non EMS responders taking the survey and tainting data. Departments across the United States were approached based on service type, geography and department size and asked to distribute the surveys to their responders. The researchers utilized the relationships of “Tenzinga”, a public safety performance management company, the connections of “Treatment Placement Specialist- An Acadia Healthcare Initiative”, and personal relationships with individual departments, agencies and unions across the United States as a means for the survey distribution. Individual departments were tasked with, and had the choice of how they distributed the survey. Survey distribution and data collection began in January 2018 and ended in July 2018. In total 25 departments and agencies, all of whom were providers in a 911 or emergency setting across the United States elected to participate in the study with a total of 694 EMS responders answering.

Data Management and Analysis. The survey was created and distributed on the Qualtrics online survey platform. At the conclusion of the survey distribution phase survey data was imported to IBM SPSS Version 25 for statistical analysis. Univariate descriptive analysis and hierarchical multiple regression were utilized to analyze data.

Results

The study included 694 EMS professionals. 82% categorized themselves as male and 17.2% as female, with 0.8% preferring not to answer, and a mean age of 38.2 years old. Of the respondents, 4.7% are Emergency Medical Responders (EMRs), 35.2% Emergency Medical Technicians (EMTs), 10.5% Advanced/Intermediate Emergency Medical Technicians (AEMT/EMT-Is), 47.1% Paramedics (NRPs), 1.3% Critical Care Paramedics (CCPs), .5% Registered Nurses (RNs), and .7% other. 53.8% of the participants categorized themselves as Fire based EMS, 37.5% as Private Based Ambulance EMS, 2.5% categorized themselves as Third Service Based EMS, 2.4% categorized themselves as Nonprofit Based EMS, 1.3 % categorized themselves as Volunteer Based EMS, and 2.5% categorized themselves as Other Type of EMS.

Prevalence of Coping Strategies. The first objective of the study was to determine the prevalence of coping strategies among EMS personnel. The descriptive statistics, including the means, standard deviations, minimums, and maximums of the 14 coping strategies are presented in Table 3 in a descending order of the means. It is apparent from this table that the top three strategies used by EMS responders are acceptance, self-distraction, and humor. On the other hand, the bottom three strategies are behavioral disengagement, substance use, and instrumental support. To further investigate the prevalence of the coping strategies used by EMS responders, we used the degree of use of each specific strategy on the basis of the participants' responses to the BRIEF Cope scale. More specifically, we attributed a coping strategy to a participant if they reported using the coping strategy "at least a little bit" or more frequently. Based on this definition, Table 4 shows that of the 535 EMS responders responding to the BRIEF Cope scale, 77.8% indicated the use of acceptance as a coping strategy. The second most frequent strategy

was self-distraction with 64.3% of the participants indicating the use of this strategy. Humor was used by 57.4% of the responders who participated in this study. Only 22.6% of the participants used behavioral disengagement.

Predicting Post Traumatic Stress. The second objective of the study was to examine if the three subscales of the BRIEF Cope scale; namely, Active Emotional Coping, Problem Focused Coping, and Avoidant Coping predict post traumatic stress levels after controlling for some known risk factors such as gender, or veteran status (See Table 1 for a complete list). We hypothesized that Active Emotional Coping, Problem Focused Coping, and Avoidant Coping would predict post traumatic stress levels after accounting for several risk factors indicated in Table 1. More specifically, we hypothesized that whereas Active Emotional Coping, and Problem Focused Coping would be negatively associated with post traumatic stress; Avoidant Coping would be positively associated with this outcome. To test this hypothesis, hierarchical multiple regression analysis was performed between post traumatic stress as the criterion variable and the eight risk factors as predictor variables in the first block (i.e., Model 1) and the three coping strategies (i.e., Active Emotional Coping, Problem Focused Coping and Avoidant Coping) as predictor variables in the second block (i.e., Model 2). Table 5 displays effect size measure (R^2), unstandardized (B) and standardized regression coefficients (β). The predictors in the first block explained 13% of the variance in post traumatic stress ($R^2 = .13$, $F(11, 520) = 6.94$, $p < .001$). When the predictors in the first block were examined individually, only age and perception of critical incidents statistically significantly predicted post traumatic stress (see Table 5, Model 1). Adding the three coping strategies (i.e., Active Emotional Coping, Problem Focused Coping and Avoidant Coping) in the second block explained an additional 42% of the variation in post traumatic stress ($\Delta R^2 = .42$, $F(3, 517) = 159.95$, $p < .001$). The examination of

individual predictors in the second block revealed that, as expected, Active Emotional Coping negatively predicted post traumatic stress but Problem Focused Coping was not a statistically significant predictor. Moreover, in support of our hypothesis, Avoidant Coping strongly positively predicted post traumatic stress.

Malleable Factor Impact. The third objective of the study was to investigate whether 9 malleable factors such as availability of counseling, availability of critical incident stress management (see Table 2 for a complete list) predict post traumatic stress after controlling for the nine risk factors and the three coping strategies. We hypothesized that all malleable factors would predict post traumatic stress after accounting for the eight risk factors and three coping strategies. In particular, we hypothesized that after controlling for risk factors, and coping strategies, all malleable factors would decrease levels of post traumatic stress. To test this hypothesis, hierarchical multiple regression analysis was performed between post traumatic stress as the criterion variable and the eleven risk factors as predictor variables in the first block and the three coping strategies as predictor variables in the second block and the nine malleable factors in the third block (i.e., Model 3). Again Table 5 (Model 3) displays effect size measure (R^2), unstandardized (B) and standardized regression coefficients (β). The addition of the malleable factors explained an additional 4% of the variance in post traumatic stress ($R^2 = .04$, $F(9, 508) = 4.94$, $p < .001$). The examination of individual predictors in the third block (i.e., Model 3) revealed that among the malleable factors, peers fostering an environment where mental health was supported and management fostering an environment where mental health was supported were the only statistically significant negative predictors of post traumatic stress. Overall the final model (i.e., Model 3) explained 58% of the variance in post traumatic stress among a sample of EMS responders.

Discussion

The present study sought to investigate the effects of coping strategies EMS personnel use and how they affects the symptoms of post traumatic stress. Furthermore, this study explored how different risk factors and malleable factors can affect coping mechanisms and levels of post traumatic stress. Our final regression model reflects that the perception of a critical incident, Active Emotional Coping, peers fostering an environment where mental health was supported, and management fostering an environment where mental health was supported were the only factors that positively impacted responder's mental health, whereas the use of Avoidant Coping was found to increase levels of post traumatic stress.

Major Findings. When factoring only risk factors in the regression model the only two factors that significantly impacted post traumatic stress were the perception of critical incident stress and age. Critical stress was defined as “the stress we undergo either as a result of a single critical incident that had a significant impact upon you, or the accumulation of stress over a period of time.” All participants are active EMS responders and likely experience critical incidents due to the nature of their jobs, however some participants did not report experiencing any critical incident exposure. Age was a protective factor with older participants reporting decreased post traumatic stress levels. Perception of what participants considered to be critical stress may explain the difference in their levels of critical stress. Although this study did not investigate resilience, resilience may uncover the reasons why responders may not experience post traumatic stress even though they work in areas of high stress.

When coping strategies were analyzed in conjunction with risk factors, age no longer significantly impacted post traumatic stress levels, however perception of critical incidents did. Avoidant and Active Emotional Coping significantly impacted the variance in post traumatic

stress levels. Avoidant Coping heavily increased post traumatic stress levels, whereas Active Emotional Coping decreased post traumatic stress levels.

Finally when risk factors, coping strategies and malleable factors were analyzed concurrently, Avoidant and Active Emotional Coping remained significant, as well as perception of critical incidents. This combined model also indicated that when responders felt that their managers and peers fostered an environment where their mental health was supported, their post traumatic stress levels were negatively impacted. This indicates that agencies should support both a working and managerial culture that proactively supports mental health. From questions that looked at the frequency and use of employee support structures, it is clear that EMS responders are underutilizing these structures. Some 48.5% of responders have never sought support. Of those responders who did not seek support 22.2% said that it was because there was no support available to them. More concerning however, 36.2 % of responders said that they did not seek out mental health support because they did not want it on their record. 27.9 % of responders were also concerned about how they would be seen by their fellow responders. Finally 13.7% were concerned about what their managers would think of them.

Similar Studies. Our findings about the relationship between coping strategies and post traumatic stress are confirmed by past research. A similar 2010 study conducted by Landen and Wang suggested that the utilization of Avoidant Coping strategies were non-conducive to the wellbeing of firefighters. Another study by Nelson and Smith (2016) investigated police officers found that Active Emotional Coping strategies were negatively associated with overall levels of post traumatic stress, which is congruent with our results. Although this study looked at police officers, their work and critical incident exposure may be similar and relatable to EMS responders.

Our study not only assessed for coping strategies, we also assessed for malleable factors which are factors EMS agencies can manipulate to promote the mental health of their EMS responders. A similar study by Nelson and Smith (2016) investigated Jamaican police officers and the effects of occupational stress and coping. Researchers found that poor relationships with peers and managers were associated with increased depressive symptoms.

Limitations

Although our research study found significant results that are applicable into clinical and field practice, there were a few limitations that the study faced. Due to the distribution method of the survey, the data may be affected by a response bias. Another limitation that this study faced was that we had a low population of third service, non-profit, and volunteer EMS responders who answered the survey. Although we tried our best to create a representative sample in terms of a mixture of different types of agencies and different settings, these populations were not as well represented. Another limitation of this study was that we did not include emergency medical dispatchers as a option for licensure level. Dispatchers are a integral part of the EMS system who face under recognized post traumatic stress. Also, some of the data collected for malleable factors and risk factors were from dichotomous answers (yes, no) therefore respondents may have been unable to select an option that fit them best. The scale that was used to measure post traumatic stress also was potentially limited. The PCL-C tool is designed for civilian use, whereas other tools such as the PCL-M is designed for military use. The United States EMS population does not fit perfectly into the civilian category or the military category due to the unique stressors that EMS responders face on a day to day basis, so there may have been an impact on reported post traumatic stress levels.

Recommendations

One of our objectives of the study was to see what types of risk factors put EMS responders at the highest risk for developing symptoms of post traumatic stress. This study revealed that when looking at risk factors without factoring coping strategies and malleable factors, only age and perception of a critical incident yielded significant results. This means that demographic and set factors other than age and perception of a critical incident are not predictive for post traumatic stress. Age did come out as significant, and was negatively correlated with post traumatic stress. This indicates that younger responders are at higher risk for developing post traumatic stress. Utilizing this information, EMS agencies and departments can focus more of their efforts on providing support and education about stress to younger responders as they are more susceptible to being impacted by post traumatic stress throughout their careers.

Our data also reflects that two particular forms of coping, Active Emotional Coping and Avoidant Coping, largely correlate with overall levels of post traumatic stress. Our findings suggest the use of Active Emotional Coping strategies decreases the overall levels of post traumatic stress, whereas the use of Avoidant Coping strategies increases the levels of post traumatic stress. EMS agencies can focus their efforts on promoting and teaching Active Emotional Coping strategies and screening for the use of Avoidant Coping strategies which are not conducive to the wellbeing of responders. Agencies should also provide continuing education about available resources and support to responders throughout their careers. This prepares for when a problem arise, responders are able to identify, address the problem and seek help with an established network of care.

Lastly, our study investigated what malleable factors EMS management can use to better help their responders. What our study found was that of all the malleable factors that we looked

at (Table 2), only peers fostering an environment where mental health was supported and management fostering an environment where mental health was supported came out as significant in decreasing overall levels of post traumatic stress. Our results suggest that these two factors may be the most effective ways an agency can help decrease the levels of post traumatic stress. These findings are clinically significant and applicable to the field. This points to the need for EMS agencies to foster a culture where mental health is not stigmatized. Peers and management should be actively reaching out to support their responders to develop a culture where mental health is valued. This is an important finding for smaller agencies and departments that may not have the resources, such as extensive employee assistance programs that larger departments may have. The findings suggest that promoting and encouraging mental health by both peers and management is more effective in combating symptoms of post traumatic stress than any other malleable factors that we looked into. Most importantly this is something that can be implemented by departments of all sizes with little financial impact.

One key distinction includes the availability of Critical Incident Stress Management teams or CISM. Our study only assessed if CISM was available and correlated this with post traumatic stress levels. We found that CISM teams did not significantly impact post traumatic stress levels. This does not imply that CISM is not a useful tool overall, as this may be a factor incorporated in peer and management support. Furthermore CISM services are more related to mitigating stress either right after, or shortly after the incident (Cardinal, n.d.). This may not have been reflected in our study, which focused on cumulative stress. More research is needed to look at the levels of critical stress immediately after critical incidents. The availability of counseling was also assessed in this study, however it was not significantly correlated with lower post

traumatic stress levels. This does not mean counseling is not effective, further assessment of the effectiveness of counseling is needed.

Conclusion

The mental health of our first responders is an often-overlooked issue that significantly impacts not only their life saving work, but also their personal lives. Line of duty deaths are decreasing every year yet PTSD, and deaths from suicide are on the rise in the first responder community (Heyman, Dill, & Douglas, 2018). Our study did yield clinically applicable interventions that may begin to help our first responders. However there needs to be continuing research in order to help save our first responders lives. Our final model only accounted for 58% of variance of overall post traumatic stress, meaning that there are other factors that affect post traumatic stress that we did not account for. Future research could benefit by looking at a more diverse sample of the United States EMS population by including more members from different types of services such as volunteer, non-profit, and third service providers. The field of first responder psychology could also benefit from the development of a first responder specific scale to measure post traumatic stress instead of relying on tools designed for civilians and military personnel. There also needs to be further exploration of the impact of agency culture on post traumatic stress, as it was shown to significantly impact stress levels. Finally, future research needs to assess the how post traumatic stress levels are impacted by other factors such as substance use disorder, family dynamics such as marital status and addiction combined with mental health. Utilizing the information that was derived from our research study's results we hope that EMS agencies and departments can better help their personnel cope with post traumatic stress. It is clear and evident that post traumatic stress from exposure to traumatic incidents is a

problem impacting many first responders. In order for our first responders to help us, we need to help them.

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Figures

Table 1

Problem Focused Coping	Active Emotional Coping	Avoidant Coping
Active Coping	Venting	Self Distraction
Planning	Positive Reframing	Denial
Instrumental Support	Humor	Behavioral Disengagement
Religion	Acceptance	Self Blame
	Emotional Support	Substance Use

Table 2

Risk Factors	Malleable Factors
Gender	Availability of Counseling
Years of Service	Psychological Pre-screening
Veteran Status	Peer Encouragement of Stress Management After a Critical Incident
Career Prior To EMS	Management Encouragement of Stress Management After a Critical Incident
Educational Level	Peer Fostering Environment of Mental Health
Type of Service	Management Fostering Environment of Mental Health
Service Setting	Availability of Critical Incident Stress Management
Perception of a Critical Incident	Hours Worked
Patient Contacts Per Shift	Management Requiring Mental Health Support After a Critical Incident Exposure

Table 3

Descriptive Statistics for 14 Coping Strategies Used by the Participants

Variable	N	Min	Max	M	SD
Acceptance	535	1.00	4.00	2.52	.92
Self-Distraction	577	1.00	4.00	2.12	.88
Humor	535	1.00	4.00	2.09	.99
Active Coping	576	1.00	4.00	1.97	.89
Positive Reframing	562	1.00	4.00	1.91	.84
Planning	563	1.00	4.00	1.88	.88
Emotional Support	575	1.00	4.00	1.83	.82
Religion	527	1.00	4.00	1.83	1.00
Self-Blame	563	1.00	4.00	1.79	.89
Venting	563	1.00	4.00	1.78	.75
Denial	563	1.00	4.00	1.78	.75
Instrumental Support	564	1.00	4.00	1.65	.78
Substance Use	577	1.00	4.00	1.59	.89
Behavioral Disengagement	576	1.00	4.00	1.39	.66

Notes: N = number; Min = minimum; Max = maximum; M = mean; SD = standard deviation

Table 4

Number and Percentage of Participants Who Reported Using Each of the 14 Coping Strategies

Variable	No Not at all		Yes, at least a little bit	
	N	%	N	%
Self-Distraction	206	35.7	371	64.3
Denial	299	53.1	264	46.9
Behavioral Disengagement	446	77.4	130	22.6
Self-Blame	330	58.6	233	41.4
Substance Use	386	66.9	191	33.1
Venting	299	53.1	264	46.9
Positive Reframing	259	46.1	303	53.9
Humor	228	42.6	307	57.4
Acceptance	119	22.2	416	77.8
Emotional Support	287	49.9	288	50.1
Active Coping	254	44.1	322	55.9
Planning	280	49.7	283	50.3
Instrumental Support	339	60.1	225	39.9
Religion	307	58.3	220	41.7

Note: Yes, at least a little bit includes participants who selected “I've been doing this a little bit” or higher in their response to each of the questions pertaining to the strategies.

Table 5

Summary of Hierarchical Regression Analysis for Variables Predicting Critical Stress

Variables	Model 1			Model 2			Model 3		
	B	SE	β	B	SE	β	B	SE	β
Male	-2.03	1.67	-.05	-1.43	1.21	-.04	-.43	1.20	-.01
Age (<i>yrs</i>)	-.23	.11	-.16*	-.15	.08	-.10	-.17	.08	-.12
Years of Service (<i>yrs</i>)	.14	.12	.09	.11	.09	.07	.14	.09	.09
Veteran Status (yes)	1.59	1.69	.04	2.12	1.22	.05	1.57	1.20	.04
Career Prior to EMS (yes)	-1.56	1.27	-.06	-1.13	.92	-.04	-1.59	.90	-.06
Educational Level (<i>yrs</i>)	.05	.35	.01	-.33	.25	-.04	-.31	.25	-.04
<i>Service Type</i>									
Private (yes)	2.38	1.37	.08	-.75	1.01	-.03	-.27	1.14	-.01
Other (yes)	-1.26	2.09	-.03	-1.23	1.51	-.03	-.68	1.55	-.01
<i>Service Setting</i>									
Urban (yes)	1.89	2.59	.07	1.05	1.88	.04	.10	1.83	.00

Mixed (Urban & Rural) (yes)	3.04	2.58	.11	1.50	1.87	.05	.77	1.82	.03
Perception of a Critical Incident (yes)	9.06	1.39	.27**	3.60	1.04	.11**	3.22	1.02	.10**
Problem Focused Coping				-.68	.81	-.03	-.19	.79	-.01
Active Emotional Coping				-2.11	.98	-.10*	-1.88	.96	.09**
Avoidant Coping				17.95	.88	.75**	15.93	.94	.66**
Availability of Counseling services (yes)							-.11	.99	.00
Psychological Pre-screening (yes)							1.06	1.02	.03
Peer Encouragement of Mental Health After Critical Incident Exposure (yes)							.90	.91	.03
Management Team Fostering Environment of Mental Health (yes)							-3.82	1.17	.13**

Hours Worked Per Week (hrs)			.01	.03	.01
Peer Fostering Environment of Mental Health (yes)			-3.96	1.31	.10**
Management Encouragement of Mental Health After Critical Incident Exposure (yes)			-1.75	1.15	-.06
Management Requiring Mental Health After Critical Incident Exposure (yes)			.69	.96	.02
Availability CISM service (yes)			-.43	1.20	-.01
R^2	.13	.55		.58	
F for change in R^2	6.94	5		4.94	

Notes: B= unstandardized coefficient; β = standardized coefficient; SE = standard error; For service type, the reference was “Fire-based Service” and for service setting “Rural” was the reference.

Table 6

If you did seek support, how helpful was it?

Never Sought Any Mental Health Assistance	48.5%
Unsure	4.1%
Not Helpful At All	4.4%
Somewhat Helpful	24.0%
Very Helpful	19%

Table 7

If you experienced critical stress but did not seek help, what prevented you from doing so?

No Help Available	22.2%
Did Not Want It On My Record	36.2%
Concerned About What My Peers Would Think	27.9%
Concerned About What My Management Would Think	13.7%

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The Critical Need for Federal Public Safety and First Responder Science and Innovation

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The Critical Need for Federal Public Safety and First Responder Science and Innovation
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Abstract

Public safety issues continue to grow across our country in scale and type, while our public resources remain limited and scarce. For all these events, first responders are the first line of defense in saving lives, protecting property, and keeping Americans' safe and secure. Rising to meet current and emerging public safety challenges will require new innovations in equipment, capabilities, and practice designed to operate at all levels of society from local, regional, continental and global scales. These new innovations in public safety must be based on key advances in next generation research in science and technology that is also used to inform policy and decision makers. There is bipartisan support on the need for public safety and First responder science and innovation. This article examines the critical role the federal government plays in this regard, makes clear that public safety and first responder science and innovation is a national imperative, and outlines a policy roadmap for achieving objectives.

Key Words: Public safety, First Responders, Homeland Security, innovation, science, policy.

Introduction

*“History shows that the United States has moved forward in astonishing ways thanks to national investment in basic research and advanced technology.”
Mitt Romney 2012 presidential campaign speech (Meyer 2016).*

In the 2001, state of Homeland Security address, then Secretary Janet Napolitano declared that “Homeland security begins with hometown security.” She went on to say that “we are all safer when local law enforcement works together with the communities and citizens they serve, and their partners in the Federal government and the private sector, to protect against the threats we face” (DHS 2011). Since that speech, public safety issues continue to grow across our country in scale and type, while our public resources remain limited and scarce. We must ask ourselves, are we, as a nation:

1. Doing everything we should to make sure that our communities are safe, secure, and resilient?
2. Are we making sure public safety officials and first responders have what they need to be as effective as possible?
3. Are we ensuring that public safety officials and first responders are as safe as possible under the perilous conditions they often face when delivering the critical services, we all depend upon?
4. Are we ensuring that public safety and first responder equipment, technology, information, and training needs are keeping pace with the evolution of threats, including those from terrorists?

This paper seeks to answer these questions through a succinct discussion of the evolving threat landscape, limited research and development funding, and the role of the Federal government in

spurring innovation to address the Nation’s complex public safety challenges. It will also present a series of recommendations for further action.

Literature Review

Public Safety, first responders and the evolving threat landscape

The public safety threats facing society are more complex than ever before in history and are evolving as never before. These challenges range from terrorism and emergency incidents such as chemical and biological attacks, global pandemics, active shooter and violent extremism to natural hazards such as fires, earthquakes, super-storms and floods. For all of these events, first responders are the first line of defense in saving lives, protecting property, and keeping Americans’ safe and secure.

The public safety and first responder community is significant in the number of practitioners and the scope of impactful services provided. There are more than 70,000 state and local organizations across the U.S., representing more than 3,000,000 individual public safety officials and first responders.

We all rely on public safety and first responders to keep us safe - police, fire, emergency medical, dispatch and 9-1-1 call centers.

The response to every event starts at the local level. It starts when a citizen calls 9-1-1 or local officials call dispatch for backup. The response in New York City on September 11, 2001, started with a 9-1-1 call. As active shooter events in San Bernardino (2015), Orlando (2016), Columbus (2016), and Fort Lauderdale (2017) were unfolding, local responders were putting themselves in harm’s way to save lives and to apprehend and bring down the perpetrators.

Terror tactics continue to evolve, and the frequency and severity of natural disasters are increasing. Responders face multiple threats to their health and safety, and civil unrest is

increasing in many countries, endangering the safety of responders as they attempt to maintain the peace and separate opposing factions. Additionally, the role of both traditional and non-traditional media continues to evolve. Terror and other attacks are becoming easier to plan, while prevention, mitigation and response are becoming increasingly more difficult. Many jurisdictions have little capacity to address more than one complex incident at a time (Martin, 2017).

Responders have been targeted victims of shooting and stabbing attacks. Of the 64 officers shot and killed in the United States in 2016, 21 were ambushed – the highest total in more than two decades (Cotter 2017). Responders report that they encounter an increased willingness to harm those in uniform. Anonymous online threats in July 2016 called for gangs to attack “anyone in blue” and stated that “firefighters and police are on the same side.” Emergency responders and citizens feel increasingly vulnerable to groups that they believe are targeting them for violence (Cotter 2017).

Resilience to disasters at all level of society – national, state, and local – is increasingly more complex. Human settlement and development is at constant tension with natural systems and hazards. Changing global weather patterns and sea level rise pose additional challenges to sustainability. Thirty-nine percent of the U.S. population lives in coastal shoreline counties – development in these areas continues to grow (NOAA 2013). Human construction and residential activity alters the landscape, causing areas to become more fully exposed to weather conditions. This increases the likelihood of floods and exacerbates the impacts of hurricanes, earthquakes, tornados, and other natural phenomena. Ultimately, placing more people in harm’s way when disaster strikes.

The emergence and proliferation of new mobile and content-rich, near real time and social media technologies are shifting human behaviors. Bystanders now rush towards the area of

greatest danger to capture images and video of ongoing incidents. Responders must now try to protect additional members of the public, while trying to neutralize threats. The behavior of civilians and potential victims are endangering emergency responders (e.g., rescue of those that refuse to evacuate in advance of hurricane landfall) and putting communities at greater risk.

It is obvious that threats of all types—terrorism, technological and natural hazards— and the consequences of these threats – fatalities, injuries, and damages - are increasing due to many factors, and often difficult to predict in terms of occurrence, prevalence and ways. Building a culture of preparedness that is underpinned by continuous innovation will drive our overall resiliency – ability to adapt, survive, recover, and rebound stronger from the threats we face now and in the future.

While first responder operating budgets are becoming more constrained and funding for research and innovation more limited; public safety threats and hazards continue to trend upward. Violent extremism, mass shootings and active shooter incidents are on the rise (Figure 1). Climate is changing and natural hazards are becoming more intense, resulting in more frequent and costlier disasters (Figure 2). We must ask ourselves as a Nation:

1. Are we spending enough to ensure that our public safety is more effective, and our first responders are safer in today's world?
2. Are we investing in the necessary research and development needed to keep pace with the changing threat landscape?

Discussion

Role of the federal government in spurring public safety and first responder innovation

Rising to meet current and emerging public safety challenges will require key advances in the next generation of public safety research designed to operate at all levels of society from

local, regional, continental and global scales. It will require continuous innovation in public safety theory and infrastructure to advance detection and monitoring capabilities; simulation, modeling and informatics; equipment and instrumentation; as well as observational strategies. Such broad and comprehensive activity necessitates a community approach based on collaboration and synthesis across disciplines and between university, government, and industry organizations that study, service or perform public safety functions.

The federal government plays a vital role in this regard, in incubating new ideas that are harvested by the private sector to grow our economy and strengthen our country. “Federal government spending on science and technology is an investment that produces a larger economy in the future — generating wealth, jobs and tax revenue” (Atkinson and Ezell 2012). “If you take any major information technology company today, from Google to Intel to Qualcomm to Apple to Microsoft and beyond, you can trace the core technologies to the rich synergy between federally funded universities and industry research and development.” (Peter Lee, vice president of Microsoft Research). The need for fundamental scientific advances and practical solutions for the public safety and first responder community is widely recognized, and collaborative investment should not be delayed until crisis conditions trigger rapid and inadequately prepared responses to our public safety challenges.

Limitations

Federal Research and Development Funding for Public Safety and First Responders

Despite the critical nature of their work and the rapidly changing threat environment, U.S. federal government spending on research to develop technologies to make public safety more effective and first responders safer is even more limited. In the Defense and Intelligence community, it is well understood that advancing technological capability and spurring innovation

allows the U.S. to retain advantage and superiority over adversaries. This attitude is not just a necessity; it is deeply rooted in the culture. Research and development is an essential function that is championed across the rank and file and more importantly by policymakers and appropriators. This ethos remains elusive for the public safety and first responder communities. Research and development funding for Homeland Security represents less than 1% (0.38%) of the total federal research and development budget as proposed in fiscal year 2018 (FY18) (EOP 2017). This figure pales in comparison to research and development funding allocated to Defense and Intelligence which accounts for more than 56% (56.93%) of the total federal research and development budget. (Table 1). The FY18 proposed budget included an increase of 17% (\$13.6 billion) in defense research and development. This 17% increase in the FY18 annual Defense budget for R&D is nearly as much as the entire amount of R&D funding that DHS received between the years 2005-2017. DHS ranks just as low when considering non-Defense research and development funding at just under 1% (0.99). DHS represents a small fraction of the overall federal research and development budget and has been on the decline for the last decade from a high of nearly \$1.2 billion in 2006 to less than \$575 million as proposed in 2018 (EOP 2017, Knezo 2006). This is a 49.5% overall decrease (of which there is a 27.5% reduction between FY17 and FY18) at the same time that threats and hazards to the country are becoming more complex.

The situation is even more distressing, when we drilldown into these research and development budgets and examine the investments for public safety and first responders. In the federal government, only the National Institute of Justice (NIJ) and the Science and Technology Directorate (S&T) within the U.S. Department of Homeland Security (DHS), have significant first responder research programs. NIJ focuses primarily on law enforcement (with about \$36

million in research funding). DHS S&T, uniquely, has statutory responsibilities to perform research to support all first responders (with about \$45 million in funding). Aggregately, this means the federal government spent about \$27 per capita on first responder research and innovation in fiscal year 2016. By way of comparison, the U.S. spent over \$10,959 per pupil on primary education in 2013, according to the Organization of Co-operation and Development (OECD 2016).

Recommendations

Public safety and first responder science and innovation is a national imperative. It is obvious, as this paper outlines, that the evolution and prevalence of public safety threats and the consequences to the Nation are increasing. *Strengthening National Resilience* to the threats we face, now and in the future, depends on continuous innovation and adequate investment in public safety and First Responder research and development to advance the new science and technologies necessary to achieve this aim.

While very limited, Federal investment in research for the DHS Science and Technology Directorate has generated significant results to public safety, first responders, and society in general (Cotter 2018). Some of these benefits include saving first responder lives and lowering injuries through better, stronger, and more interoperable personal protective equipment and communications; enhancing indoor tracking capabilities to monitor the safety of fire fighters and rescue crews in dangerous operating environments; faster and more effective search and rescue capabilities for finding persons in peril; improved alerting capabilities to notify responders, public works and individuals to take protective measures in advance of adverse conditions; and new sensors to enable smarter critical infrastructure and more resilience communities. More results and outcomes from DHS S&T funded research are listed in Table 2. Regardless of these

outcomes, federal funding for the DHS Science and Technology remains a fraction of over-all government spending in research and development. Accordingly, the policy roadmap for advancing public safety science and innovation within the U.S. should encompass three major components:

1. Coordinating a national strategy for public safety and first responder innovation,
2. Expanding the innovation pipeline for public safety research, and
3. Incubating the science and technology marketplace for the public safety community.

1. Coordinating a national strategy for public safety and first responder research

U.S. legislators should strengthen the Science and Technology Directorate (S&T) within the U.S. Department of Homeland Security. The country would inordinately gain from this federal leadership through spillover effects from technologically vibrant industries, and inventive activity. “A cutting-edge scientific or technological center”, such as DHS S&T, “can create a variety of spillovers that promote innovation, quality, skills acquisition, and productivity in industries that would drive high-tech investment.” (Bernanke 2011).

The DHS S&T has broad statutory authorities to pursue research, development and innovation (RD&I) to support public safety and first responder needs across all disciplines but lacks adequate resources to accomplish its mandates. S&T research focuses on increasing first responder safety and effectiveness. In addition to law enforcement, this includes fire, emergency medical service, public safety answering points (911 call centers), and emergency managers. These authorities also make the role supplied by DHS S&T unique in mitigating barriers to research, development, and innovation in the public safety and first responder communities.

2. Expanding the Innovation Pipeline for Public Safety Research

U.S. legislators should support a public-private research coalition with federal participation from the DHS S&T to achieve national priorities for public safety and first responder innovation. This public-private partnership should endeavor to: Expand the innovation pipeline for public safety research, Incubate the technology marketplace for the public safety community, and Develop the necessary workforce to support the public safety community. As Secretary Janet Napolitano stated in a speech at George Washington University, “the Department of Homeland Security – indeed, the whole Federal government and the military – cannot, itself, deliver security. Real security requires the engagement of our entire society, with government, law enforcement, the private sector, and the public all playing their respective roles” (DHS 2011).

The linchpin of innovation policy is a collaborative partnership between government and industry (Atkinson and Ezell 2012). The federal research community has a successful track record from these types of public-private partnerships. Examples of innovations that received critical federal support through public-private partnerships include space exploration and satellites, global positioning systems, the internet and broadband communications. Federal R&D underwrote the techniques that opened up the earth observing, broadband communications, location-based services, lithium-ion battery, and biochemical detection industries. These industries are some of the fastest growing in the U.S. and represent well over \$1 trillion in economic output. (U.S. Labor Statistics and Boston Consulting Report) (BCG 2012).

To achieve similar results for the public safety and first responder community, public and private sector equities should band together in partnership with Congress to form a coalition of Public Safety technology, research and innovation organizations. The charter of this public-

private research coalition should be to organize and extend the national public safety research portfolio, particularly to develop shared research and development infrastructure for investigating public safety concerns and the complex environments associated with public safety missions as well the diverse and evolving threats facing our first responders. Such a public-private research coalition would provide the following national benefits:

- Enhancing public safety by developing, supporting, and operating shared research infrastructure.
- Improving and promoting access to data, information and analytics for public safety and first responders.
- Articulating and advocating priorities for community level public safety research and observations.
- Facilitating interactions among the diverse public safety science and industry communities.
- Promoting interdisciplinary education centered in public safety and first responder science to develop the vibrant workforce and requisite competencies and disciplines needed to combat the evolving threat environment.
- Translating scientific advancements into effective tools for public safety officials and first responders including management and policy.
- Spurring innovation across government, academia, national labs, commercial sector, and citizens.
- Supporting smart, collaborative investment in research, development, and innovation for public safety and first responders.

3. Incubating the Technology Marketplace for the Public Safety Community

U.S. legislators should formulate a public safety science and innovation act that authorizes the objectives set forth and supply the necessary funding for implementation and sustainment. This innovation act should include resources for DHS S&T to ensure adequate funding for research, development, and innovation across the public safety and first responder communities. This act should:

- a) Support the development and coordination of a national strategy for public safety and first responder science and innovation.
- b) Provide for federal representation, participation, and support for a national public safety research coalition.
- c) Incubate the technology marketplace with federal funds, matching contributions from state, local, and private sector equities. Federal funds should be issued through the national public safety research coalition under the administrative oversight of DHS S&T. Federal matching funds and eligibility requirements should be set forth in approved guidelines. Federal matching funds should not be released before adequate third-party contributions have been raised.
- d) Establish an innovation portfolio that includes a mix of investments that build capability at all levels of society.

A Call to Action

“Since 1945, no country has invested more in basic research than the United States. Over the past six decades, this strategy has led to training of generations of scientists, opened new technical fields, launched new business sectors, provided the underpinning of our economic prosperity, and provided critical national security capabilities” (Lemnios and Shaffer 2009).

U.S. legislators should act now to support public safety and first responder innovation. There is bipartisan support for Federal research and innovation funding on this issue. Science and innovation are vital to American security and prosperity. According to The Heritage Foundation, “federal participation in science and technology has aided the nation in meeting national security needs and exploring the frontiers of human knowledge” (Spencer et al. 2016). To produce the best outcomes for federal investment in science and technology innovation, the Heritage Foundation outlined two fundamental criteria for establishing national science policy: “(1) It should meet a clear government objective, and (2) be developed *only* when the private sector is not already addressing, or does not have the capacity to address, the need” (Spencer et al. 2016). Public safety is a specific, narrow government objective. National defense and homeland security are clear constitutional responsibilities of the federal government. The public safety and first responder markets have several constraints that curtail private sector investment - the limited size of the market and the low-price points necessary for product penetration, and significant lag time in moving innovation to market. This underscores the important role that federal funding plays in mitigating the reluctance of the private sector to invest sufficient market capital, by offsetting some of the financial risks necessary to pursue innovation in the public safety and first responder communities.

We need not wait two decades to achieve the same innovation rewards from new research investment in the public safety and first responder communities. We are in an age of rapid breakthroughs and ingenuity. Smart federal investment in research, development, and innovation for public safety and First Responders benefits not only homeland security, it will also strengthen our economic security. This enables not just a high social return on federal investment (empowering fire, police, and emergency medical technicians and community resilience) but also a high economic return by removing some of the barriers from the private investment capital markets.

With the collaborative support and leadership of our world class institutions, the U.S. could do for public safety what it was able to do for other national priorities. The federal government, industry, and research communities have successfully banded together to advance other topics and disciplines, such as water, weather, geospatial, high-performance computing, cancer, and human genome sequencing to name a few. These nationally supported public-private research and innovation coalitions were critical toward accelerating outcomes, benefits and return on investment from taxpayer funds. The industries they spawned remain some of the fastest growing in U.S. economic output and have helped the U.S. remain strong and globally competitive.

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Tables and Figures

Table 1:

Fiscal Year 2018 (FY18) proposed US Government Research Budgets by Federal Agency

Agency	FY18 Proposed R&D (\$ billions)	Percent of Federal Total
DOD	85,171	56.93%
HHS	26,144	17.48%
DOE	13,436	8.98%
NASA	10,322	6.90%
NSF	5,370	3.59%
USDA	2,102	1.41%
DOC	1,563	1.04%
VA	1,357	0.91%
DOT	945	0.63%
Interior	798	0.53%
DHS	564	0.38%
EPA	277	0.19%
All Others	1,557	1.04%
Total R&D:	149,606	100%

Source: US Government, Executive Office of the President 2017

Table 2:

Selected Results from DHS S&T funded Research and Innovation for Public Safety and First Responders

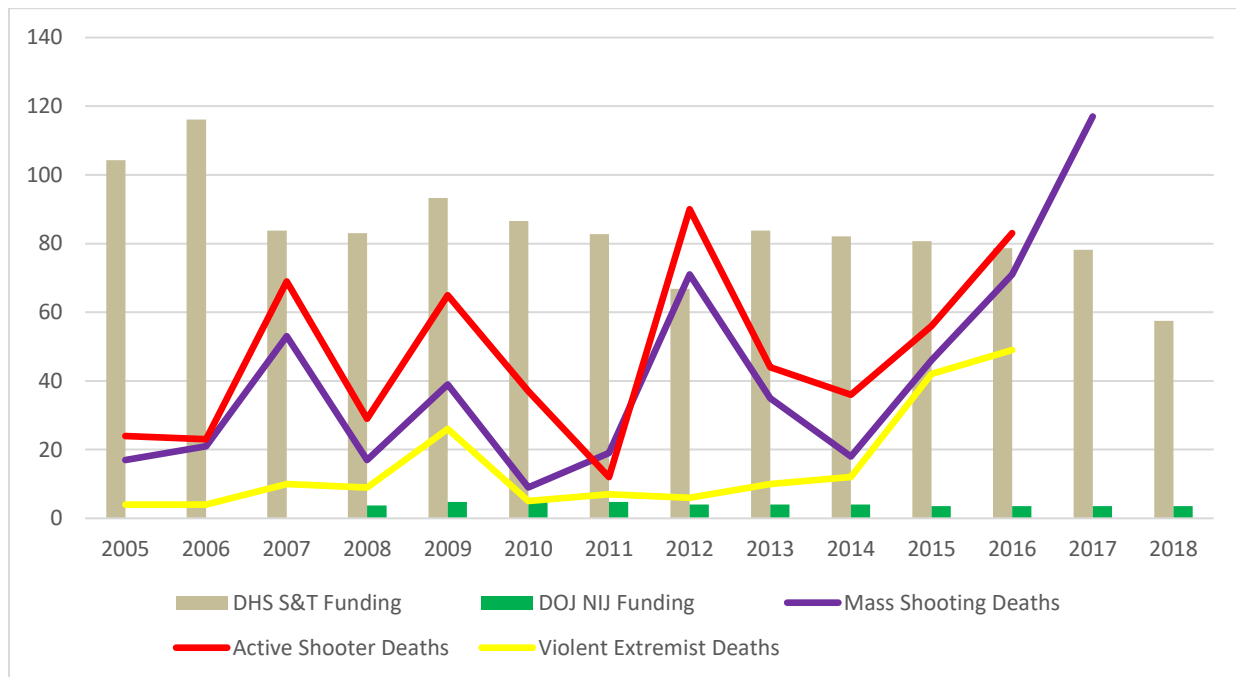
<ul style="list-style-type: none"> • Transitioned 47 products and completed 80 other projects that have resulted in knowledge products such as standards, concepts of operations and other guidance for DHS Operating Components, public safety officials, and first responders.
<ul style="list-style-type: none"> • Developed 14 FRG technologies, which have resulted in \$19 million in revenue for 34,000 low-cost units sold to date by commercial partners and now in use by first responders.
<ul style="list-style-type: none"> • Aided in identifying over 475 child exploitation victims, in coordination with ICE's Homeland Security Investigations, using advanced facial recognition tools.
<ul style="list-style-type: none"> • Improved emergency management mutual aid in 40 states, reducing time to identify resources from 72 hours to as little as 30 minutes.
<ul style="list-style-type: none"> • Partnered with 14 countries and over 40 startups to increase technology development globally and bring new technology to market more efficiently.
<ul style="list-style-type: none"> • Deployed the Web Based HURREVAC hurricane evacuation decision support system, in coordination with FEMA and the U.S. Army Corps of Engineers, during Hurricanes Harvey and Irma in 2017, and Hurricane Matthew in 2016, providing enhanced situation awareness and informing local evacuation planning and decision-making effecting of millions of people.
<ul style="list-style-type: none"> • Deployed the Android Team Awareness Kit (ATAK) to enhance situational awareness at national and border security events. ATAK has already saved lives during emergency response activities by enabling 300 unique users across 17 agencies participating in the hurricane response (i.e. Hurricane Harvey, Hurricane Irma, Hurricane Maria) to share information and awareness via ATAK, which impacted 3,000 rescues.
<ul style="list-style-type: none"> • Supported search and rescue units across the globe, including FEMA's Urban Search and Rescue teams, by rapidly locating survivors buried in collapsed building after earthquakes through the use of Finding Individuals for Disaster and Emergency Response (FINDER).
<ul style="list-style-type: none"> • Improved Land Mobile Radio (LMR) interoperability through the Project 25 Compliance Assessment Program which has a rigorous process to ensure radio systems are demonstrated to be compliant to standards and interoperable. The program impacts well over a million devices in use today.
<ul style="list-style-type: none"> • Developed and implemented the Eye-identify system at the FLETC CBP Field Operations Academy providing enhanced impostor detection training.
<ul style="list-style-type: none"> • Developed and demonstrated adaptive training capability for enhanced visual search skills resulting in reduced false alarms and increased threat identification performance.
<ul style="list-style-type: none"> • Supported radiation detection training for over 2,000 law enforcement officers.

<ul style="list-style-type: none"> Published over 1,000 System Assessment and Validation for Emergency Responders (SAVER) Reports—FRG’s version of Consumer Reports® for responder technologies.
<ul style="list-style-type: none"> Published the Radiological Dispersal Device (RDD) Response Guidance: Planning for the First 100 Minutes, co-branded with FEMA and the Department of Energy’s National Nuclear Security Administration, which was incorporated into FEMA preparedness planning and training.
<ul style="list-style-type: none"> Integrated the Rad Decontamination App into FEMA’s RadResponder toolkit.
<ul style="list-style-type: none"> Created the Toolkit for Radiological Operations Support Specialist (ROSS), a FEMA National Incident Management System position developed with S&T, which is posted to RadResponder for first responder access.
<ul style="list-style-type: none"> Supported state and local law enforcement teams in seizing tens-of-millions dollars of illicit funds using the prepaid card reader technology.
<ul style="list-style-type: none"> Developed the Smoke and Particulate Resistant Structural Turnout Ensemble, the first turnout gear to offer firefighters protection from exposure to hazardous, cancer-causing chemicals.
<ul style="list-style-type: none"> Developed and tested the Pat-down Accuracy Training Tool (PATT), a mannequin with embedded sensor technology that provides objective feedback on pressure, sequence and coverage during pat-downs at four airports and the TSA Academy.

Source: Cotter 2018

Figure 1:

Incidents of Active Shooter, Mass Shootings, and Violent Extremism in US compared to Federal Research & Development funding for DHS and DOJ from 2005-2018



Sources: FBI 2013; Follman et al. 2018; GAO 2017; DOJ 2018; CRS 2018.

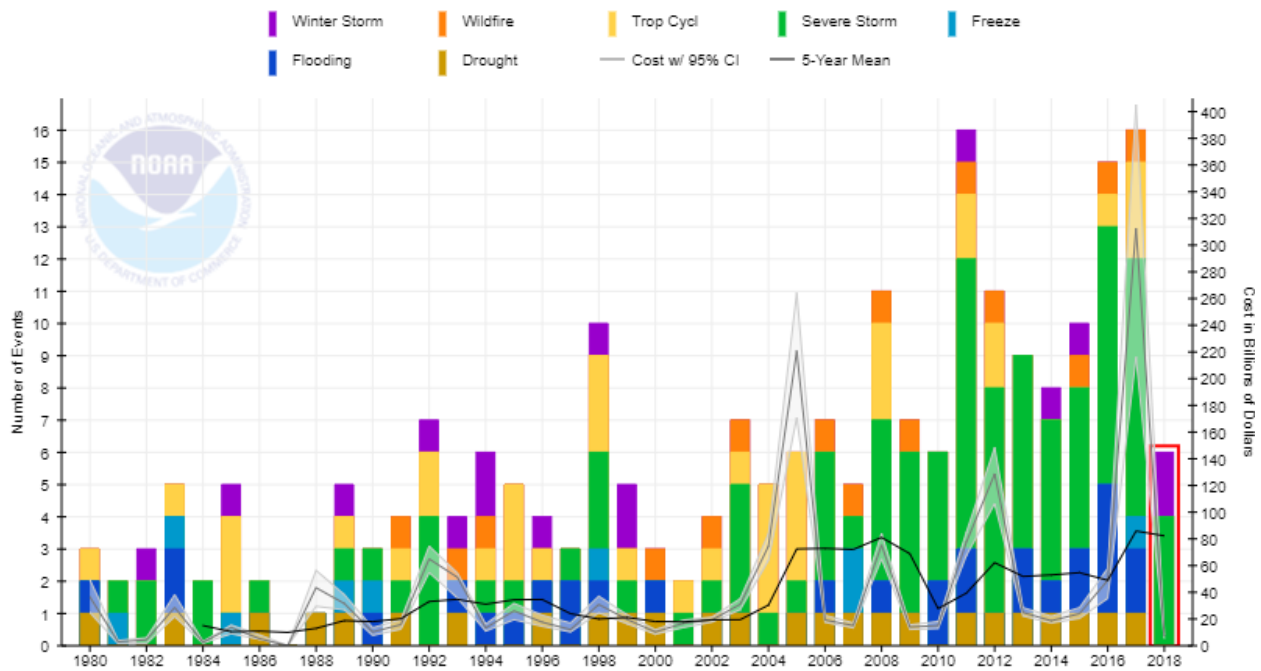
Notes:

DHS and DOJ Budget authority is depicted in tens of millions of dollars; figures are rounded off.

DHS budget figures exclude National Bio and Agro-defense Facility (NBAF) match funding of \$404M in 2014, \$300M in 2013, and \$23M in 2006.

Figure 2:

Billion Dollar Events in the US by Disaster Type from 1980-2016 (CPI-Adjusted)



Sources: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2018). <https://www.ncdc.noaa.gov/billions/>.

Author Biography

Dr. David J. Alexander is a senior program manager at the US Department of Homeland Security, Science and Technology Directorate (DHS S&T). He has spent his entire career working with First responders, emergency management, and law enforcement communities to utilize advanced technologies to strengthen our ability to protect the homeland, respond to disasters and develop our economic and community resiliency. Dr. Alexander has been a national advocate for growing a culture of preparedness across disciplines – “train like you fight, fight like you train, correct what doesn’t work.” During his tenure with DHS, he has worked in various senior capacities within Headquarters Management, FEMA operations, and S&T research and development. Before coming to DHS, Dr. Alexander acquired practical experience across the local, state, federal, and private sectors. While at the state of South Carolina, he administered the Statewide programs for E-911, Legislative redistricting, and health and demographic mapping. He holds several advanced degrees from the University of South Carolina (BA 1993, MS 1997), Colorado Technical University (MBM 2005), and George Mason University (PhD. 2016). Dr. Alexander also serves on the National Geospatial Advisory Committee and as an advisor to the US Geospatial Intelligence Foundation Board of Directors.



Preventing School Violence through Team Leadership

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Abstract

The use of threat assessment teams to prevent school violence is gaining momentum in the school community. The use of a multidisciplinary team involving law enforcement, mental health, and school officials is a method supported by collaborative research between the United States Secret Service and the United States Department of Education. This paper will explore how to implement and lead a threat assessment team. The structure is built on the four frames of organizational theory including human resources, structural, political, and symbolic. The leadership involves the theories of authentic and servant leadership with a focus on overcoming the challenges of cultural differences, issues of trust, critical decision-making skills, conflict, and legal requirements. Through effective leadership, the team will overcome challenges by focusing on goals, creating a healthy psychological environment, using fair process, and building trust. Leadership will bring this team together to create its own culture and help prevent violence within the school community.

Key Words: Authentic, leadership, servant, school, violence, threat, assessment, team, human resources, structural, political, symbolic.

Introduction

There have been current events that have brought attention to the threats that schools face from violent attacks. Some of these threats come from outside, but some come from within the school community. People want to ensure that children are safe in schools, especially from within. One measure which has gained more prevalence in combatting the inside threat has been the concept of a threat assessment team. A threat assessment team is a multidisciplinary team consisting of members from law enforcement, mental health professionals, and the school community with a primary goal of identifying and mitigating threats to the school. This article will discuss the importance of a threat assessment team, the organizational approach to implementing the team, the leadership of the team, challenges that can arise, and solutions to those challenges.

Why threat assessment teams?

This topic is a professionally significant issue for law enforcement and the school community. Many people in society have a sincere interest in understanding effective measures that they can implement to make schools safer. According to the United States Department of Education (2013), it is important for schools to collaborate with multiple disciplines to assemble functioning school safety plans and teams. These plans help with procedures during responses, but they also play an important preventative role in laying the foundation for processes that focus on other aspects of school safety. One of these aspects involves the formation of a threat assessment team. This team consists of representation from law enforcement, the school district, mental health professionals, and the community (New York State Education Department (NYSED), 2013). An important concept that becomes critical is collecting and analyzing information. The processes must also be capable of assessing threats that arise from students,

parents, faculty, and other members of the community. An identified threat needs an adequate response. There will be mitigation plans formed to provide this response (U.S. Department of Education, Office of Elementary and Secondary Education, & Office of Safe and Healthy Students, 2013).

Literature Review

The supportive research for threat assessment team methods came from the coordination between the United States Secret Service and the United States Department of Education where there was an examination of 37 cases of targeted violence involving schools from 1974 to 2000 (Vossekuil, Fein, Reddy, Borum, & Modzeleski, 2004). Implementing threat assessment teams in schools across the nation is a worthwhile endeavor that requires answers to key questions. Two main questions will guide this research: What type of leadership will be needed to overcome the hurdles that exist? What is the best way to implement this leadership into this multidiscipline organization?

Organizational Approach

The organizational theory, specifically the four frames approach, provides some basic framework on which to build this team. The four frames include human resources, structural frame, political frame, and symbolic frame (Roth & Elrod, 2015). The process requires that a structure and procedure be in place to facilitate the operation. Without an identified structure and procedure, this team may flounder in ambiguity and inefficiency. Along with the structure, there will need to be people to fill the roles, political support from multiple agencies, and public acknowledgment of the symbolic importance of the team.

Human resources

An important emphasis should be on team member selection (Graney, 2011). A threat assessment team needs to bring school officials, law enforcement officers, and mental health professionals together in an environment where they can successfully evaluate and mitigate threats. The essential people will need to be brought together appropriately.

Structural frame

According to the Virginia Department of Criminal Justice Services (VDCJS, 2016), there will need to be a team leader, triage team, and full threat assessment. This team will need to obtain the threat, analyze the information, classify the threat, mitigate the threat, and document the incident (VDCJS, 2016). It is imperative that a team leader is identified to establish operational control. The next component involves the triage team which would be the first to handle a threat of an imminent nature when there is not enough time to bring the full team together or wait for a scheduled meeting. Leadership should not be from the law enforcement discipline. Instead, the leadership should be from a representative of the school. Law enforcement provides valuable insight from a safety perspective. However, a school official is in a more appropriate position to view the students from a holistic perspective. According to Graney (2011), the leadership of a behavioral assessment team needs to establish clear goals and mission for the team. Clear goals provide clarity for each member to focus energy. This leader will need to be the central point of contact for all threats and will need to have the authority to make immediate critical decisions. An example of a critical decision is the need to refer an imminent violent threat directly to law enforcement for immediate mitigation.

Another important feature is the central repository for all threats. The entire team will have access to the central repository, but all of the information must pass through the team leader

before entering the central repository. The leader can fulfill the necessity of having one person maintain situational awareness of all the reported threats. For example, a teacher hears a student make a threat, and the teacher reports it to the team leader.

The team leader will decide to either send the threat to the triage team for immediate mitigation or forward it to the full threat assessment team for evaluation. A member of the triage team should be able to act as the team leader in cases where the team leader is unavailable. Having succession adds strength to the overall team's process. A triage team provides the leader with immediate feedback. For example, if a threat is on the border of serious or imminent, the triage team will assist the team leader in deciding on the immediate response. Regardless of whether or not the threat goes through the triage team, it will eventually make it through the full threat assessment team. The full threat assessment team will evaluate the threat, classify the threat, and design a mitigation plan to address the threat (VDCJS, 2016). The mitigation plan may include counseling, disciplinary actions, or some ongoing assessment (VDCJS, 2016). There will be different circumstances that this team faces and training will include the appropriate methods to handle case management (Graney, 2011).

Political frame

The nature of a multidisciplinary team brings together different agencies with differing purposes and agendas. Unwavering commitment from a police agency, school district, and other community organizations will be needed to accomplish the mission. The formation of the team can come from a myriad of agreements between agencies such as Inter-Municipal Agreements (IMA), Memorandum of Understanding (MOU), or legislation that requires the cooperation. An example of legislation that supports these teams exists in the Virginia Code § 22.1-79.4 Threat assessment teams and oversight committees.

Symbolic frame

Even though it may be unknown if an attack was prevented, it is possible to provide limited information to the school community regarding threats. This information includes general information that a threat was received and mitigated through the threat assessment team's diligent investigation and case management. Bringing attention to the success of the team can provide the momentum needed for community support and acceptance into the school culture (Roth & Elrod, 2015).

Team leadership

A crucial component of building and sustaining this team will be the leadership. Two types of leadership which will be instrumental in the success of this team will be authentic leadership and servant leadership.

Authentic leadership

The use of authentic leadership will provide the guidance this team needs to accomplish the mission. Authentic leadership provides positive psychological support to create a transparent and ethical work climate which fosters the self-development of team members (Lyubovnikova, Legood, Turner, & Mamakouka, 2017). When the team leader provides accurate and relevant information to the threat assessment team, the leader is building a transparent environment where members can appreciate the honest and open working environment. The members can contribute in a positive and open environment bringing individual strengths and abilities to the forefront. Self-development in this atmosphere is easy to recognize and encourages others in similar behaviors.

Servant leadership

Using servant leadership will provide social stability to build a successful team. The servant leader puts the team and community first with an emphasis on healing, awareness, and stewardship (Parris & Peachey, 2013). The team leader will be coordinating school faculty, law enforcement, and mental health professionals through sensitive and possibly hazardous situations. The leader can lead the team through the example of serving the team. For example, if a serious threat comes in after hours, the team leader does not designate someone else to handle the coordination. Instead, the leader will take the initiative and invest time and energy into the investigation of the threat. Others conduct some of the investigations, but the leader will maintain the coordination and will be committed to the mission. Serving others demonstrates an example that can foster stewardship from the other team members.

Discussion

Bringing together individuals from different disciplines and different organizations can pose challenges. Recognizing the problems that may arise ahead of time can provide an advantage to overcoming them. Five main obstacles can surface during the implementation of a threat assessment team. These obstacles include cultural differences, trust issues, critical decision-making skills, conflict and accountability, and legal issues.

Cultural differences

Organizational culture involves the norms and practices that influence the behavior of the members (Robbins & Judge, 2017). There are at least three organizational cultures to consider when discussing threat assessment teams. These cultures include law enforcement, mental health, and education. The topic of violence can be viewed differently by educators and police officers.

For example, an officer may investigate numerous cases of physical assaults each month, while the educator may rarely experience these types of events.

Some organizational cultures develop as a result of repeated circumstances that reinforce stereotypes. An example from law enforcement came from research Myhill and Bradford (2013) conducted, where police officers viewed the citizens as the problem to be overcome instead of as collaborative partners to help find solutions. Another example involves educators withholding important information regarding student behavior for fear that law enforcement will overreact and make unnecessary arrests. The engrained values in the different cultures can pose an obstacle to team collaboration.

Trust issues

If a team is going to function properly, the members must have confidence in each other and be able to be vulnerable amongst the team members (Lencioni, 2002). It is natural for individuals coming from different organizations to be apprehensive about trusting other members of the team. The lack of trust might be more prevalent if there were negative relationships between the organizations in the past. For example, if the school did not cooperate in a law enforcement investigation, or if law enforcement made a past arrest of a student when the school was trying to handle the discipline within the educational institution. Failure to build trust amongst the team can become an inhibitor to the operations.

Critical decision-making skills

The information that comes into the threat assessment team may need immediate action to prevent a tragedy. The team or team leader may not have experience with life or death decisions. For example, the team leader may receive information that a student called in a bomb

threat during the state-mandated exams. It will take sufficient skill to manage this situation with all of the competing interests.

Conflict and accountability

When different perspectives come together, there will be opposing opinions and contradictory recommendations which can create conflict. It is also important for members of the team to uphold individual and team responsibilities. Holding individuals accountable can also create tension and conflict within the team. Regardless of the cause, conflict is needed for the threat assessment team to grow (Lencioni, 2002).

Legal issues

There are legal requirements by which the members of the team must abide. These requirements include the Health Insurance Portability and Accountability Act (HIPAA), the Family Education Rights and Privacy Act (FERPA), and juvenile offender laws. Some of these laws require confidentiality of certain information that may inhibit the sharing of information amongst team members. Information sharing is a fundamental aspect of the threat assessment team, and the lack of sharing could lead to ineffective mitigation plans.

Limitations

The challenges located in this research are not necessarily generalizable to all communities. For example, the issue of police culture researched by Myhill and Bradford (2013) was done in the United Kingdom. While there may exist cultural similarities amongst law enforcement, it cannot be presumed to represent the culture of all police departments throughout the world. Also, the challenges presented in this article are not exhaustive. Communities may face obstacles that are specific to the organizations within that region.

There are also significant legislative differences between nations and even states within the United States. There exists foundational legal guidance in the United States such as the Family Education Rights and Privacy Act (FERPA) and the Health Insurance Portability and Accountability Act (HIPAA), but local legislation may be drastically different. Changing legislation may also prove to be considerably challenging.

Recommendations

The five obstacles of cultural differences, trust issues, critical decision-making skills, conflict and accountability, and legal issues can create formidable obstacles to the successful implementation and operation of a threat assessment team. Anticipating these challenges in advance can provide the edge needed to prevail. The characteristics of authentic, and servant leadership will become paramount in this discussion.

Overcoming culture differences

The ultimate goal of a team leader should be to enable the team to create its own organizational culture. However, some recommendations can be employed to help overcome preexisting cultural differences. Charman (2015) recommends that cultural boundaries can be crossed by uniting behind a common goal. The goal of keeping the children safe can rise above the differences in organizational behavior to force collaboration. The use of teamwork training, organizational structure, and structured communication procedures can play an integral part in keeping the individual team members' cultures in line with the overall mission (Dietz et al., 2014). The use of fair process provides an effective way of gaining the commitment of team members by incorporating engagement, explanation, and clear expectations (Kim & Mauborgne, 2015). Involving the team members in the development of protocols and training needs can create an atmosphere of engagement. The leader will need to effectively communicate the

reasoning behind decisions and identify the expectations of each team member throughout the process.

Building team trust

The authentic leader's ability to create a healthy psychological environment will be fertile ground for building trust. Covey (2013) reminds leaders that "[t]rust is the highest form of motivation" (p. 187). Creating a healthy atmosphere of trust will require active listening (Kumari, 2017), emotional intelligence (Bradberry & Greaves, 2009), and a strong reliance on reputation (Turaga, 2013). There may be limited time for the leader to build a reputation of trustworthiness, so every opportunity must be seized. Opportunities for one's reputation begin with arriving at meetings on time and following through with all tasks, even the menial tasks.

An important part of trust involves becoming vulnerable (Lencioni, 2002) to the team members by expressing one's opinions or acknowledging a lack of understanding. The servant leader can set the example by opening the door for others to follow. For example, the team may receive information that a student posted a threat on an obscure social media site. If the leader expresses ignorance regarding the social media site, it can set the tone that questions are acceptable and appropriate. Acknowledging one's ignorance in front of the team members may be difficult. However, it provides an example of vulnerability for others to follow.

Developing critical decision-making skills

In the heat of battle, mistakes may occur, but the decisions still need to be made. Failure to decide at a critical moment could cost human life. There may be a lack of information, but a decision based solely on a minimal amount of data is better than no decision. It takes a combination of both intuition and analysis to understand critical decision-making (Wheeler, 2011). The team leader may lack the experience in threat assessments, but relying on

experienced professionals from the law enforcement and the mental health profession can prove invaluable. The triage team would be the most appropriate venue for these imminent decisions.

Working through conflict

Teams need conflict to grow and reach their full potential (Lencioni, 2002). Conflict can be constructive or destructive depending on the methods on which or the motives from which it occurs. On the one hand, arguing for the sake of arguing serves no purpose but only creates unnecessary tension and wastes time. On the other hand, arguing to express a difference of opinion is critical to understanding the different perspectives that exist. There will be differing opinions and perspectives from the team members. Successful conflict resolution can result when the members focus on the respect due to others during disagreements (Kumari, 2017).

Lencioni (2002) informs leaders that accountability is essential, but the motive behind the accountability should be a commitment to the growth of the team member (Parris & Peachey, 2013). The servant leader approach to building the community will hold individuals accountable with the best intentions motivating the decisions.

Legal justification

Understanding the legal requirements of one's occupation is an essential part of being a professional, and these requirements may manifest themselves within a threat assessment team. Mental health professionals may fear to disclose information surrounding a patient based on HIPAA, teachers may fear revealing educational records based upon FERPA, and law enforcement officers may be reluctant to share juvenile arrest records. Confidentiality is an essential part of working within a threat assessment team, and members must maintain a high standard. There are exceptions within legal requirements to aid in protecting the lives of individuals and others. For example, there is a law enforcement exception to share information

due to health and safety for FERPA and HIPAA when an individual is a danger to himself or others (U.S. Department of Education et al., 2013). A team leader can help inspire the team to focus on the goal (Kumari, 2017) and work collaboratively with a win/win mentality (Covey, 2013) to find legal solutions to sharing information.

Conclusion

This research informs the process of leading a team of multiple disciplines and agencies to protect children within schools across the nation. There are challenges that the formation of a threat assessment team will encounter, but there are solutions. Incorporating the four frames of organizational theory will provide a more holistic approach. The formation of a team that crosses disciplines and agencies requires the characteristics of authentic and servant leadership.

Overcoming the challenges of cultural differences, issues of trust, critical decision-making skills, conflict, and legal requirements will require commitment. Effective leadership will bring the team together with a focus on the mission of providing a safe environment in schools.

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Alcohol Abuse among Police Officers and Firefighters

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Abstract

Some authors have suggested that a culture of alcohol consumption has been associated with police officers and firefighters for as long as these professions have existed. Abusive alcohol consumption by police officers and firefighters both on and off duty has presented problems for many departments. Abusive consumption of alcohol has also been associated with post-traumatic stress symptoms and suicide. The purpose of this qualitative meta-synthesis literature review is twofold. First, to determine if abusive consumption of alcohol is predominant among police officers and firefighters. Second, if so, what are the contributing factors? This literature review analyzed the current primary source literature related to alcohol consumption by police officers and firefighters. The findings strongly suggest that police officers and firefighters, particularly those between the ages of 26-34, to be most at risk of consuming alcohol at excessive levels and exhibiting traits of binge drinking and other at-risk behavior. Younger males appear to be more at risk compared to females and older males. Younger females do exhibit risk of binge drinking. The data also suggests that a correlation exists between critical incidents, PTSS, depression, abusive consumption of alcohol and suicidal ideation. While a strong correlation between general work-related stress and abusive alcohol consumption was not identified, there does appear to be a link between social and cultural aspects of the police and fire service and alcohol consumption.

Key Words: Alcohol, Binge, Culture, Firefighter, PTSD, Police Officer, Stress, Suicide

Introduction

Perception of police officers and firefighters has been greatly influenced by their depiction in the media, in particular television (Weir, et al., 2012). The perception is that police officers and firefighters have highly stressful jobs, are often socially isolated and abuse alcohol as a coping mechanism. However, some researchers challenge the validity of these assumptions.

But, do police officers and firefighters participate in abusive alcohol consumption based on standardized alcohol screening tests, national guidelines and at greater levels compared to the general population? If so what are the contributing factors? The purpose of this paper is to find answers to these questions.

This research methodology consists of a qualitative meta-synthesis literature review, whereby a review and qualitative analysis of relevant primary source studies will be conducted in an attempt to synthesize, draw inferences, and develop recommendations with regards to alcohol consumption among police officers and firefighters.

For the purpose of this paper the term “police officer” generally refers to law enforcement officers employed at the local level of government. The term “firefighter” includes all firefighters whether career, part-paid or volunteer. In order to keep this research narrow and focused, it does not include other public safety employees for example emergency medical services personnel, 911telecommunicators and corrections officers.

This research examines four broad categories related to alcohol consumption by police officers and firefighters. First, alcohol consumption in general will be examined to determine if alcohol consumption by police officers and fire fighters exceed national guidelines, result in hazardous or harmful drinking patterns based on standardized alcohol screening tests, or is consumed greater than the general population. Second, factors contributing to alcohol

consumption will be examined including job-related stress, critical incident stress, and organizational culture. Third, the consequences of excessive alcohol consumption will be examined including the impact on physical, mental and behavioral health. And fourth, an attempt will be made to identify those most at risk of hazardous consumption of alcohol.

This research is important as hazardous and harmful alcohol consumption can adversely impact the personal and professional lives of police officers and firefighters; as well as the operational aspects of the public safety organizations they represent. By identifying if a problem exists with alcohol consumption among police officers and firefighters and identifying the causal factors and who is most at risk; department administrators will be better prepared to address the problem.

Literature Review

Alcohol Consumption

Health benefits have been reported with measured consumption of alcohol but drinking too much can lead to a wide range of serious health problems. *The Journal of the American Medical Association* (JAMA) reports that moderate consumption of alcohol decreases the risk of stroke while heavy consumption actually increases the risk. This is consistent with the United States Department of Agriculture and the United States Department of Health and Human Services guidelines.

Weir et al. (2012), compared subjects from several protective service occupations (PSO) with those from various non-protective service occupational categories to compare alcohol consumption and abuse. Two questions were the focus of the study. First, do PSO's use alcohol more frequently compared to other occupational groups? Second, if PSO's do use alcohol at a higher rate compared to other occupational groups what is the cause? The researchers found that

“Taken as a group, there were no significant differences between PSO’s and non-protective service occupations in terms of frequency of alcohol consumption during the past 12 months” (Weir, p. 77). The researchers also found that when they inspected the genders separately male PSO’s used alcohol significantly less frequently than male non-protective service occupations. However, a study of firefighters produced a different result.

Haddock et al., (2015) studied 954 male firefighters from 20 career departments in 14 states representing each of the four major U.S. Census Bureau Regions. The results revealed that 85% of participants consumed alcohol, almost half reported excessive drinking, and about one third reported episodes of heavy alcohol use when not on duty, with the highest-level alcohol intake found among those with the fewest years of service. Current research indicates that the prevalence of episodic heavy drinking found among firefighters is double the prevalence found in adult males in the general U.S. population.

A study conducted by Davey, et al., (2001) revealed risky alcohol consumption by police officers. The study on the impact of stress and culture in the Australian State Police Service consisted of 749 participants with 86% male, 12% female and the remainder not indicating their gender. The age of participants ranged from 18-60. The participants were surveyed by questionnaire. Personal drinking behavior was then measured using the Alcohol Use Disorders Identification Test (AUDIT) which yields scores from 0 to 40. Scores less than 8 indicate low risk, 8-13 indicate hazardous drinking patterns and scores above 13 indicate harmful alcohol consumption. The results revealed that over a third of the participants showed risk of problem alcohol consumption based on their AUDIT scores. From this data the authors conclude that alcohol intervention strategies are needed in the police service (Davey, et al, 2001).

A large-scale study conducted by Ballenger et al., (2011) also included male and female officers. In this study male and female police officers from three large urban police departments were surveyed using widely recognized survey instruments. Alcohol use was assessed against the National Institute on Alcohol and Abuse and Alcoholism (NIAAA) guideline which defines at risk behavior as greater than 2 drinks per day or 14 drinks per week for men and greater than 1 drink per day or 7 per week for women (Ballenger, et al., 2011). The study found that about 11% of males and 16% of females engaged in at-risk levels of alcohol consumption during the prior week with over a third of males and females reporting an episode of binge drinking during the past month. The study also found that 3.4% of male officers and 3.7% of female officers reported consuming more than 28 drinks in the week prior to assessment which is double the NIAAA recommendation for males and four times the recommendation for females. Additionally 18% of males and 16% of females reported “significant lifetime histories of adverse social and interpersonal consequences related to alcohol” (Ballenger, et al., 2011, p. 27). The authors of the study concluded that officers in this study were more likely to binge drink compared to the general population with female officers two to three time more so. This study found no significant difference between males and females excessive consumption of alcohol. These findings are similar to that of Haddock et al. (2015).

Finding that little research had been conducted on alcohol use among firefighters, researchers studied 656 participants from 11 career and 13 volunteer fire departments (Haddock, et al., 2012). The results of their research are concerning. Career firefighters were found to drink heavily approximately 10 days a month which is about half their days off duty. Fifty-eight percent of career firefighters and 40% of volunteer firefighters reported drinking three or more drinks and binge drinking on days that they consumed alcohol (Haddock, et. al, 2012). The study

not surprisingly, found that those firefighters who binge drank were at higher risk of negative health outcomes compared to firefighters that did not binge drink.

However, the Weir and colleagues study appears to contradict these findings. Weir, et al., (2012) examined the relationship between mental health variables and binge drinking in protective service occupations (PSO's). The results indicated no significant relationship between protective service employment and binge drinking though some predictors including some mental health variables were identified. The authors did qualify that the study participants may have under-reported mental health problems or alcohol abuse.

The authors indicate another plausible explanation for their findings is that extensive back ground checks are often conducted on police officers including criminal and driving history, general background and psychological testing. A history of alcohol abuse or mental illness will generally make these applicants unemployable as police officers. Comparatively background checks are often not conducted on firefighters particularly volunteer firefighters. The results of the study may also have been skewed as to police officers by the inclusion of "correctional officers, criminal investigators, and an array of other positions related to the fields of justice and safety" (Weir, et al., (2012, p. 72). Another possible explanation is being the Weir et.al, study mentions no inclusion of firefighters and the Haddock et al., study involved only firefighters the difference in findings may suggest episodic binge drinking is more prevalent in firefighters compared to police officers and requires further study.

Education level has also been found to correlate with alcohol consumption by police officers and firefighters. As found in other research, lower educational attainment is a significant predictor of at-risk alcohol use in male officers (Ballenger, et al., 2011). The correlation between

education level and alcohol consumption is consistent with earlier research this author conducted on the effects of higher education on public safety workers (Walterhouse, 2018).

Contributing Factors

Stress interferes with the proper functioning of bodily processes and has been linked to high blood pressure, cardiovascular disease, insomnia, ulcers, rashes and more. Stress is a response to an event which may result in either positive or negative feelings. Negative stress which results from small events throughout the day, major life changing events or critical traumatic incidents can result in “wear and tear” on the body.

Specifically, in police officers, Gershon et al., (2009) found that stress can result from critical incidents, workplace discrimination, lack of cooperation among coworkers, and job dissatisfaction. Padella (2016) found that the source of stress can differ depending on rank and seniority of police officers. Supervisors and officers with 10 or more years of seniority reported that organizational stressors were more profound, while line officers with 9 or less years of seniority reported that operational stressors were more profound (Padella, 2016). Using a “best evidence synthesis” approach, Chae and Boyle found by examining the “most empirically sound available research” that five prominent aspects of police work to be associated with suicidal ideation. These include “organizational stress, critical incident trauma, shift work, relationship problems, and alcohol use and abuse” (Chae & Boyle, 2012, p. 91).

And, Stępką and Basińska (2014) found that in the group of police officers they studied that high chronic fatigue results in occupational stress and found that the most commonly used coping strategies for dealing with occupational stress were direct action and positive thinking and the least used strategies were the use of alcohol and stimulants.

Ma et al., (2015) in a survey study of 365 police officers found that shift work may be a source of stress for police officers. The study found that officers working afternoon and midnight shifts reported more stressful events compared to day shift officers. Though the study did not include firefighters, a reasonable inference can be made that these findings may apply to firefighters as well because they also respond to some of the same nighttime incidents. Research also suggests that people in general who suffer psychological distress and rely on alcohol to relieve stress symptoms are more likely to develop alcohol abuse and dependence. Also, individuals who are alcohol dependent are more likely than alcohol abusers to suffer from mental disorders (Health Risks, 2000). And, in a study of psychological stress and alcohol use among firefighters conducted by Boxer & Wild (1993) consisting of 145 male firefighters found that 33% of the firefighters in the study exhibited symptoms suggestive of mild depression and 41% of the firefighters exhibiting high distress. And, while 29% of the firefighters in the study had Michigan Alcohol Screening Test (MAST) scores indicating probable problems with alcohol use no relationship was found between psychological distress and alcohol use (Boxer & Wild, 1993).

Another study by Ballenger et al., (2011) found no correlation between duty-related Post Traumatic Stress Disorder (PTSD) symptoms and alcohol consumption but alcohol problems prior to police service, for example in high school or college, may constitute a risk factor for later PTSD symptoms during police service. Also, workplace stress is not a predictor of alcohol consumption levels however the study did find that female officers are significantly less likely to drink under greater work related stressors.

Ballenger's findings regarding PTSD and alcohol consumption are contradicted by other studies. Violanti (2011) found psychologically traumatic work related experiences by police officers increases the risk of post-traumatic stress disorder (PTSD), which increases the risk of

alcohol abuse. These findings are supported by another study. Chopko et al. (2014) also found an association between PTSD and alcohol consumption. Lee et al., (2014) in a study of 525 Korean firefighters found that the manifestation of PTSD symptoms from traumatic stress was moderated by individual resilience. The researchers suggest that clinical interventions may be effective for firefighters with low resilience who have experienced a number of traumatic events.

Myer et al., (2012) conducted a study of 142 experienced professional firefighters from one department with an average of 14.4 years of service with the primary goal of evaluating post-traumatic stress disorder (PTSD) and a secondary goal of evaluating depression, anxiety and alcohol abuse. Study participants were 99% male consistent with the population of the department studied. All of the study participants had been exposed to trauma during their careers. Findings based on a gold standard diagnostic interview revealed that 4.2% of participants exhibited PTSD symptoms. Comparatively 6.4% exhibited PTSD symptoms based on a self-reporting measure (Myer et al., 2012).

Though some studies of firefighters and PTSD have revealed higher percentages many of these studies were based on self-reporting and included volunteer and rural firefighters. Based on their research findings Myers et al. conclude that when more rigorous diagnostic procedures are used the rate of PTSD among professional urban firefighters is about 4-13% lower than expected indicating the firefighters “may represent a resilient group in terms of lower-than-expected rates of PTSD relative to unselected community samples with lower rates of trauma exposure” (Myer et al., 2012, p. 10). The study also found low rates of clinically significant levels of depression and anxiety, again suggesting high resilience. Myers et al. opine that a possible reason for the low rates of clinically significant symptoms is the high level of cohesion within most fire departments. In this study many firefighters had served their entire career in the

same department. Another possible factor is that firefighters may perceive high levels of social support from the community in general. Finally, because many career firefighters are prescreened for psychological health at the time of hire may result in a more resilient and adaptive group.

An additional finding of the study is instructive. Study participants that perceived low social support and high self-blame had the highest levels of clinically significant symptoms of PTSD, depression and anxiety (Myer et al., 2012). The authors conclude that this may indicate a need for resilience training in the fire service. The Myer et al. (2012) finding that 6.4% of firefighters in their study experienced PTSD symptoms is supported by research conducted by Harvey et al. (2016).

In this study 488 current and 265 retired firefighters from New South Wales (Australia) Fire and Rescue completed a cross-sectional survey. Volunteer firefighters were excluded from this study. The Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) was used to assess alcohol consumption in the study participants. Of the current firefighters 8% were found to possess PTSD symptoms while 5% suffered from symptoms of depression. Also of the current firefighters 4% reported consuming more than 42 alcoholic drinks per week. This study is unique in that retired firefighters were also included in the study population.

Significantly higher symptomology was reported by the retired firefighters with 18% suffering PTSD symptoms, 18% experiencing symptoms of depression and 7% reporting heavy drinking. A possible explanation could be the loss of support and cohesion after retirement that was previously provided by colleagues in the fire station. The authors also found “rates of post-traumatic stress disorder, depression and heavy drinking continuing to rise in a linear manner

with each additional trauma exposure” (Harvey et al., 2016, p. 649). This indicates that cumulative trauma exposure may be a risk factor for mental disorders among firefighters.

In another study of firefighters, researchers found that sleep disturbances, common with most firefighters, were associated with psychological distress and psychosomatic disturbances (de Barros, et al., 2012). The researchers found that suicidal ideation, unhealthy alcohol use and time served as a firefighter were “associated with sleep disturbances....at a borderline level of significance” (de Barros, et al., 2012, p. 350). Culture may also be a factor.

A culture of alcohol consumption has been associated with police officers and firefighters for as long as these professions have existed (Flynn, 2012). Abusive alcohol consumption by police officers and firefighters both on and off duty has presented problems for many police and fire departments (Ashton, 2018; Flynn 2012; Lansdowne 2012). Alcohol use is also influenced by culture evidenced by “business lunches” and special occasions which in the workplace may include holidays, promotions, transfers and retirements. Special occasions or simply socializing outside of the workplace also are often centered on alcohol. The most commonly reported psychosocial benefits from alcohol are mood elevation, increased sociability, and relaxation (Health Risks, 2000).

Ed Flynn, Chief of the Milwaukee Police Department, indicates that police officer’s problems with alcohol have been around for as long as law enforcement has existed. Chief Flynn opines, and rightly so, that there are several reasons why police officers have problems with alcohol. Two reasons cited are to de-stress and the other is culture. In support of the later Chief Flynn cites that alcohol is a big part of the Wisconsin culture with the strongest lobbying group in the state being the alcohol industry. However, this may not be representative of other geographic areas. Chief Flynn indicates a need for specialized training in recognizing and

dealing with alcohol abuse and police officers, starting in the academy (Flynn, 2012). This recommendation has merit considering that for the second time in three years Cal Fire has experienced alcohol related problems in their academy most recently disciplining 14 fire fighters ranging from warning letters to termination (Ashton, 2018).

When the San Diego Police Department surveyed their entire department asking what the number one stressor for officers was the reply was a bit surprising. It wasn't finances, family problems, or even policing, it was the administration of the department. Chief Bill Lansdowne indicates the stress arises in part when officers know they have a problem with alcohol abuse, prescription drug abuse or other problems and they are afraid to inform the administration because they believe the issues will negatively affect their career path (Lansdowne, 2012). To address this San Diego created a Wellness Unit staffed by a Captain and four officers. Department members can anonymously seek assistance through the unit. The unit does not provide the Chief any information unless it is criminal in nature or presents a danger to the department. About a third of the department had taken advantage of the program during the first year of existence.

In a study of the Australian State Police Service, researchers found that three quarters of participants reported that alcohol is available at work during special occasions and is regularly available at the staff club. Being this study is 17 years old it is possible that this culture has changed during the intervening years. Also addressing culture, the study found that a significant proportion of participants viewed non-drinkers negatively, suspiciously or as antisocial (Davey, et al., 2001). Participants of the study were asked to rate the importance of items developed by focus groups and the literature as reasons for alcohol consumption. The highest rated times were "to celebrate special occasions", "to send off colleagues" and "drinking is enjoyable". And,

about a quarter of the participants indicated “to be part of the team” as an important reason for consuming alcohol. However, participants also indicated stress reduction as a reason for consuming alcohol. Though the authors found that stress presents a higher risk factor, officers feel they are drinking for mostly social reasons. The authors conclude from these findings that intervention strategies based solely on targeting stress will be less than optimally effective and must also address the social and cultural factors of police officers (Davey, et al., 2001).

Cultural factors were found to exist for firefighters as well. Jahnke and colleagues (2014) using focus groups and interviews studied the perceptions of 423 firefighters on alcohol use by firefighters. The study participants included 295 career firefighters, 48 volunteer firefighters and 80 combination firefighters. Study participants reported a number of reasons for alcohol use by firefighters including in no particular order shift work, stress, social bonding and fire service tradition. While some career firefighters reported social activities with peers centered around alcohol on their days off, others reported using alcohol to “unwind” from the stress of emergency calls.

George Oster, speaking more to liability concerns, nonetheless provides some insight into the culture of some volunteer fire departments. Oster indicates that volunteer fire departments are often the focal point for many community civic, social and fraternal functions. Recognizing that volunteer fire departments are often fraternal and social organizations as well as emergency response organizations, Oster recommends that the civic, social and fraternal aspects of volunteer fire departments be separated functionally, legally and financially from the emergency response functions (Oster, n.d.).

Consequences of Hazardous Consumption of Alcohol

According to the *Dietary Guidelines for Americans* issued jointly by the United States Department of Agriculture and the United States Department of Health and Human Services, excessive alcohol intake can raise triglyceride levels leading to high blood pressure and heart attack or stroke, and a host of other adverse medical conditions including alcoholism, obesity, breast cancer, suicide, vehicle accidents and other accident related injuries. Other health concerns related to heavy alcohol consumption as reported by the *Journal of the American Medical Association* (JAMA) include: increased risk of liver cirrhosis, pancreatitis, and cancer of the liver, mouth, throat, larynx and esophagus. Other long-term health concerns associated with heavy drinking include: loss of appetite and vitamin deficiencies, stomach ailments and digestive problems, skin problems, impotence, obesity (a factor for heart disease), heart damage, memory loss and psychological problems (Hwang, 1999).

This should be of significant concern to police officers, firefighters and their employers as heart disease is a leading killer of police officers and firefighters; and the incidence of certain types of cancer in firefighters far exceeds that of the general population. Approximately 50% of firefighter line-of-duty deaths result from heart attack or stroke. There are also approximately 17-25 non-fatal duty related cardiovascular disease events for every death (Smith et al., 2015). Heart attack is also consistently in the top two or three categories of police officer line-of-duty deaths and the average age of police officers who have suffered a heart attack is 49 years of age compared to 67 years of age for the general population (Sheinberg, n.d., p. 1). It is for these reasons that many states have heart and lung presumption laws for police officers and firefighters that presume heart disease in these professions is job related and subject to coverage by worker's compensation.

Many states have also enacted similar cancer presumption laws for firefighters. A study of approximately 30,000 firefighters employed between 1950 and 2009 found, consistent with other studies, that firefighters have an increased risk of certain cancers particularly respiratory, digestive and urinary (Daniels, Kubale & Yiin, 2013). Though research suggests increased risk of these cancers are related to various by-products of combustion and other toxins encountered by firefighters, these risks may be exacerbated by heavy consumption of alcohol which has been linked to increased risk of some of the same types of cancer particularly those of the oral and digestive tracts.

Alcohol can also have an adverse effect on worker productivity, absenteeism and family relationships (Health Risks, 2000). There have been instances of off-duty police officers being arrested for driving under the influence, sexual assault and domestic violence all related to alcohol abuse (Lansdowne, 2012). Stress is also a concern.

Stress can result in maladaptive coping mechanisms including alcohol abuse. Gershon et al., (2009) report that stress in police officers can result in “negative behavioral outcomes” including spousal abuse, aggression, and increased alcohol consumption. Though no significant correlation between occupational stress and smoking relapse has been identified, a correlation has been found between smoking and alcohol consumption. Unresolved stress may also lead to suicide in some instances.

Tomaka and colleagues studied post-traumatic stress symptoms (PTSS) and their relationship to alcohol-related outcomes in a population of 740 municipal firefighters. Their findings, which the authors indicate are consistent with previous studies, revealed that 32.7% of firefighters in the study reported significant levels of PTSS. This was determined using the post-traumatic stress disorder checklist (PCL).

The PCL is a 17-item self-report measure reflecting symptoms of PTSD. This is consistent with the National Volunteer Fire Council research where 32% of respondents reported feeling stressed most days of the week (USFA, 2008). The Tomaka study also found that about one third of firefighters in the study reported drinking alcohol at levels that require some form of intervention. This segment had “at risk” AUDIT scores ranging from 8-15. Interestingly the study found that these “at risk” levels of alcohol consumption were similar to patterns found in college students in the same geographic area.

The difference being, according to the authors, is that college students generally mature out of these patterns of heavy drinking. The authors indicate that “overall, the data supported both stress and coping theory (Lazarus & Folkman, 1984) and the self-medication hypothesis (Khantzian, 1985) as explanations of associations between PTSS and alcohol use and misuse” (Tomaka, et al. 2017, p. 423). This led the authors to conclude that firefighters with PTSS saw alcohol as a potentially effective means to relieve PTSS symptoms.

Based on the findings of their research and other studies the authors suggest the need for periodic screening for PTSS and at-risk drinking among firefighters. Another suggestion is that processes for identifying those in greatest distress and need of additional services, including referral to treatment providers where appropriate be implemented. The authors also suggest that fire departments educate the entire department on PTS symptoms, at-risk drinking, and how maladaptive coping behaviors such as drinking alcohol to cope can lead to negative outcomes (Tomaka, et al. 2017).

Violanti (2011) found a correlation between psychologically traumatic experiences by police officers, PTSD, alcohol and suicide ideation. Psychologically traumatic work related experiences by police officers increases the risk of post-traumatic stress disorder (PTSD), which

increases the risk of alcohol abuse, which in turn increases the risk of suicide intentions.

Violanti found that “the combined impact of PTSD and increased alcohol use led to a ten-fold increase in suicide ideation” (2004, p. 1). These findings are supported by another study. Chopko et al. (2014) found that suicidal ideation is “positively significantly associated with depression, PTSD symptoms and alcohol use, subjective traumatic stress, work stress, and personal relationship stress” (p. 5).

Garrison (2012) found a statistically significant correlation between having alcohol abuse prevention training and suicidal behavior. Based on study participants, officers who received alcohol abuse prevention training in the academy scored lower on a suicide assessment scale. Garrison also found, not surprisingly, that officers who received suicide prevention training in the academy were less likely to exhibit suicidal behavior (Garrison, 2012). Dr. Kevin Jablonski, Chief Psychologist with the Los Angeles Police Department agrees. Dr. Jablonski indicates that police officers must be trained in the consequences of alcohol abuse and on recognizing the signs of alcohol abuse in others. He states that officers must have the courage to come forth and offer assistance to fellow officers in need as almost all police officers who committed suicide were under the influence of alcohol at the time or had a history of alcoholism (Jablonski, 2012).

In a study of 2883 male firefighters researchers discovered similar findings (Martin et al., 2017). The study participants completed a self-report survey related to alcohol use, PTSD, symptoms of depression, and suicidal tendencies. The researchers found that “alcohol dependence was significantly associated with suicide risk, consistent with results found in populations of police officers and military personnel” (Martin et al., 2017, p. 48).

Studies of both cadet firefighters and first year police officers have found a correlation between smoking and alcohol consumption. In a study of cadet firefighters a correlation between alcohol consumption and relapse of cigarette smoking was found which should be of considerable concern as research indicates high rates of occupational cancer in firefighters. The research believed to be the first to study the relationship between alcohol and smoking relapse consisted of 177 firefighter cadets from seven cities. The study found that 15% of the firefighter cadets reported smoking at the end of the first year. This is significant considering these cadets reported they were tobacco-free upon entering the fire service. When compared to their non-smoking peers this group had higher rates of weekly alcohol consumption during the first year of service and greater increases in alcohol consumption from pre-academy to post-academy (Vander Veen, et al., 2015).

In a similar study, the alcohol consumption measures of 100 Australian police officers were obtained when they first entered training (time 1) and again after completion of 12 months of operational duties (time 2). The researchers found that smoking increased significantly across the time periods and was associated with alcohol risk dependency (Rallings, Martin & Davey, 2002). A correlation between alcohol consumption and smokeless tobacco use has also been found. A study found a positive relationship between binge drinking and smokeless tobacco use in volunteer firefighters with drinkers having higher smokeless tobacco use. One limitation of the study was that it included only male participants. The study was also limited to one fire service region, the Missouri Valley Region, and the cause of heavy drinking in firefighters was not studied (Haddock, et. al, 2012).

But, does the consumption of alcohol effect performance on the job? In a study of police officers by Davey, et al., (2001) about 23% of participants reported being affected by a co-worker drinking with many reporting that co-workers drink before or during shift. Forty-four percent of respondents indicated that co-workers drank before shift, 20% stating co-workers drank while on duty, and 36% said co-workers drank after shift. Only 2% of participants stated their own drinking sometimes impacted on their performance while 22% stated that their own drinking during work did not impact on their performance, 68% stated they did not drink at work and 8% indicated they do not drink. Fourteen percent of respondents indicated that drinking outside of work had impacted their performance in the last year.

An alarming finding of the study Haddock, et al., (2012) was that 9% of career and 10% of volunteer firefighters self-reported driving while intoxicated within the thirty days prior to their research survey. This finding is consistent with research conducted by National Volunteer Fire Council (NVFC). Using a questionnaire the NVFC surveyed 364 firefighters, 149 of which were career firefighters, 165 were volunteer and 50 indicating they were both career and volunteer, which is not unusual as many career firefighters also serve their local communities as volunteers. The NVFC research found that 8% of respondents reported driving under the influence of alcohol or riding with a driver who was under the influence of alcohol (USFA, 2008).

Haddock et al., also looked at the caloric intake from the excessive drinking by firefighters in their study. The findings led the researchers to conclude that “given the high prevalence of excessive and episodic heavy drinking and the impact of alcohol on energy intake in this population, national surveillance programs and targeted prevention interventions for problem drinking in the U.S. fire service are critically needed” (Haddock, 2015, p. 360, 364).

The researchers also concluded that regular consumption of “excessive amounts of alcohol constitutes a significant source of extra calories for those who drink and could exacerbate weight gain similar to additional calories found in a fast-food meal” (Haddock, 2015, p. 365). The caloric intake from alcohol by firefighters is not an insignificant finding considering that numerous studies have shown a prevalence of overweight and obese firefighters in the United States. Depending on the study, researchers have found that between 73-88% of firefighters are overweight with 30-40% of firefighters being clinically obese (Haddock, 2011).

Who is at Risk?

The National Institute on Alcohol Abuse and Alcoholism reports that 14 million Americans meet standard criteria for alcohol abuse or alcoholism (USFA, 2008). Martin et al., (2017) in a self-report survey of 2883 firefighters found that firefighters generally “are an at-risk group in regard to excessive alcohol consumption and alcohol use to cope with work-related stress” (p. 49). However Weir, et al., (2012) found that police officers “experience significantly lower levels of adverse mental health outcomes when compared to the general population” (p. 76).

In a similar study, the alcohol consumption measures of 100 Australian police officers were obtained when they first entered training (time 1) and again after completion of 12 months of operational duties (time 2). The researchers found an increase in harmful drinking between the time periods for female officers but not male officers (Rallings, Martin & Davey, 2002). A total of 18% of female officers reported consuming 6 or more drinks per occasion once or more a month at time 1 and 36% at time 2. Consistent with the findings of other studies this behavior is indicative of binge drinking (Rallings, Martin & Davey, 2002). Though harmful drinking behavior did not increase for male officers between the time periods about 15% of the male

officers had Alcohol Use Disorders Identification Test (AUDIT) scores indicating harmful drinking behavior and substantial risk of dependency upon entering the academy (Rallings, Martin & Davey, 2002). Similarly, Ballenger (2011) found a slight increase in risk for females over males with about 11% of males and 16% of females engaged in at-risk levels of alcohol consumption during the prior week with over a third of males and females reporting an episode of binge drinking during the past month. Binge drinking is also a problem among firefighters with 58% of career firefighters and 40% of volunteer fire fighters reported to have participated in binge drinking on an average of 10 days per month (Haddock, 2012).

In their study Weir, et al., (2012) found that being white and male increased the odds of binge drinking by 146.9% and belonging to the 26-34 age groups increased the odds of binge drinking 180.5%. Also being associated with any ethnicity other than white, religion and military service also decreased the odds of binge drinking (Weir, et al., 2012). In a separate study, Garrison also found a statistically significant relationship between age and alcohol abuse with younger officer's more likely to abuse alcohol and also found a statistically significant relationship between gender (male) and alcohol abuse (Garrison, 2012).

In other research, Violanti, et al., (2011), randomly selected a cross-section of 115 officers from a mid-sized urban police department of 934 officers. An important difference in this study from some others is that women officers were included and were over sampled to increase representation. Officers volunteered and agreed to participate and alcohol use was measured using AUDIT. The results of the study suggest in general that "males were more at risk for higher mean levels of hazardous alcohol use"...."younger female officers were at higher risk for hazardous drinking than older female officers".... stress factors related to police work "were not significantly associated with drinking behavior among officers" and external life

events such as divorce or separation “were associated with hazardous drinking behavior in male officers” (Violanti, et al., 2011, p. 354)

Policies

The International Association of Fire Chiefs issued a policy statement in 2003 recommending zero tolerance of alcohol consumption within eight hours of emergency operations and training (IAFC, 2003). The policy statement provides that any member of a fire and emergency service organization, who within the previous eight hours has consumed alcohol, or who is still visibly impaired, voluntarily remove themselves from all functions of the organization including emergency response and training. Also contained in the policy statement is that no alcohol shall be permitted on the premises of any operational portion of a building including but not limited to apparatus, apparatus bays and living quarters. Organizations that operate social halls connected to their station must provide a distinct separation between the hall and zero tolerance areas of the building. A final recommendation is that all fire and emergency service organizations develop written policies to support the *IAFC Zero Tolerance Alcohol Policy* and to include provisions for blood alcohol testing of members involved in accidents that cause measurable property damage, injuries or death (IAFC, 2003).

And, the Firefighter Code of Ethics developed by the National Society of Executive Fire Officers (NSEFO) reads with regard to alcohol that firefighters “Never engage in activities involving alcohol or other substance use or abuse that can impair my mental state or the performance of my duties and compromise safety” (NSEFO, n.d.).

Discussion

One concern of hazardous alcohol consumption is the adverse impact it has on the health of police officers and firefighters who are already at a higher risk for cardiovascular disease and

cancer compared to the general population (Haddock, 2011; Hwang, 1999; Smith, 2015). The leading cause of line-of-duty deaths for firefighters is cardiovascular related events which are also one of the leading causes of line-of-duty deaths for police officers (Sheinberg, n.d.). Both groups tend to experience these events at earlier ages than the general population. Research also indicates that firefighters have higher incidences of cancer compared to the general population particularly those of the oral and digestive tracts.

Hazardous alcohol consumption has also been linked to similar types of cancer, heart disease and heart disease risk factors such as obesity. Haddock and colleagues (2011) report the caloric intake from alcohol by firefighters is significant considering other researchers have found that between 73-88% of firefighters are overweight with 30-40% of firefighters clinically obese with both conditions elevating risk factors for heart disease and cancer.

This data stresses the importance of recognizing and treating alcohol abuse by public safety employees and administrators. Not only could line-of-duty deaths be reduced, but undesirable behavior such as driving under the influence, domestic violence and assaultive behavior including sexual assault be minimized. Improved performance, reduction of sick time usage and reduced worker's compensation costs could also be realized. Of equal interest studies by Vander Veen, et al. (2012) and Rallings, et al. (2002), found a correlation between alcohol consumption and cigarette smoking which only increases the already high risk of heart disease and cancer. But, do police officers and firefighters consume alcohol in excess of national health recommendations?

Though there is some conflicting research, several studies suggest that they do. According to Haddock and colleagues (2015) current research indicates that the prevalence of episodic heavy drinking found among firefighters is double the prevalence found in adult males

in the general U.S. population. A number of studies found a prevalence of binge drinking or risk of hazardous alcohol consumption among police officers and firefighters (Rallings et al. 2012; Ballenger, et al., 2011; Haddock, et al., 2015; Davey et al., 2001). Though Weir et al. found no correlation between binge drinking and police officers they did find that being white, male and between the ages of 26-34 increased the odds of binge drinking while religion and military service decreased the odds. This is supported by the work of Garrison (2012) who also found a relationship between male gender, young age and alcohol abuse.

Haddock (2012) reports that 58% of career firefighters and 40% of volunteer fire fighters reported binge drinking averaging 10 days per month. Of significant concern is the finding of Haddock (2012) that 9% of career firefighters and 10% of volunteer firefighters reported driving while intoxicated. This finding is supported by a National Volunteer Fire Council survey where 8% of career and volunteer firefighters reported either driving intoxicated or riding with someone who was intoxicated. Jahnke and colleagues (2014) report similar findings in their study of firefighters. This is especially concerning as most firefighters have experienced firsthand, while doing their jobs, the adverse impact of driving while intoxicated.

Various studies indicate excessive consumption of alcohol by police officers and firefighters but the underlying cause is not as clearly defined. However a number of studies report a correlation between PTSS and alcohol consumption (Chopko, et al., 2014; Martin, et al., 2017; Tomaka, et al., 2017; Violanti, et al., 2004). Boxer and Wild (1993) discovered that between 33-41% of firefighters in their study exhibited symptoms suggestive of mild depression and high distress and 29% exhibited abusive alcohol behavior but found no relationship between the psychological distress and alcohol consumption. Tomaka (2017) found that 33% of firefighters studied had significant post-traumatic stress symptoms. This is consistent with the

finding of the NVFC who reports 32% of firefighters studied feel stressed most days. Tomaka also found that about one-third of the firefighters studied had “at risk” AUDIT scores and levels of alcohol consumption that were similar to patterns found in college students in the same geographic area. Tomaka found an association between post-traumatic stress symptoms and alcohol use/abuse. The author believes this association can be explained using coping theory and self-medication hypothesis leading to the conclusion that firefighters view alcohol as a means of relieving symptoms of stress. This is supported by Martin et al., (2017) who found that firefighters generally are at-risk for consuming alcohol to cope with work-related stress. And, failure to recognize and reduce stress may result in maladaptive coping mechanisms including excessive alcohol consumption (Padella, 2016).

The research of Myer et al. (2012), however contradicts these findings. Myer found that only 4.2% of firefighters exhibited post-traumatic stress symptoms. Harvey et al. (2016) had similar findings based on their research with 6.4% of firefighters displaying post-traumatic stress symptoms, 5% suffering from depression and 4% with abusive drinking behavior. Also, the research of Violanti et al. (2011), Ballenger (2011) and Weir (2012) found no significant association between the stress of police work and alcohol consumption though Violanti (2011) did find an association of external life stressors such as divorce and alcohol consumption in male officers.

Acknowledging that other studies found considerably higher percentages, Myer (2012) believes this can be explained by self-reporting of symptoms and when more rigorous diagnostic methods are used the actual percentage of post-traumatic stress symptoms in firefighters is between 4-13%. Myer also found lower levels of depression and anxiety indicating firefighters as a group may be more resilient. However, alcohol abuse was higher compared to community

samples though no explanation for this finding was provided. Myer suggests that cohesiveness of firefighters, social support including community support and pre-hire psychological evaluations may account for the low levels of stress symptoms. Harvey (2016) found higher rates of stress symptoms and alcohol consumption among retired firefighters suggesting cumulative trauma exposure is a risk factor.

Firefighters report several reasons for consuming alcohol including shift work, social bonding, to “unwind” from the stress of emergency calls and fire service tradition. Social gatherings are often centered on alcohol and alcohol is often present at celebrations of retirements, transfers or promotions across police and fire organizations. This is consistent with the findings of Davey et al., (2001). In a study of police officers one third exhibited at risk alcohol consumption with officers who do not drink being viewed negatively, suspiciously or as anti-social. When officers were asked why they drink they indicated to celebrate, to send colleagues off, to be part of the team, drinking is enjoyable and stress. Though the authors found stress to be a risk factor most officers felt they were drinking for social reasons. Jahnke, et al., 2014 had similar findings with firefighters reporting shift work, stress, social bonding and fire service tradition as reasons for drinking. Tradition, social bonding, be part of the team and celebrations all suggest drinking is part of the social culture of police and fire departments (Davey, et al., 2001; Jahnke, et al., 2014; Lansdowne, 2012; Flynn 2012).

Research suggests that job-related stress may result from several factors. One such factor is shift work particularly night shifts where more stressful events are reported to occur (Ma, et al., 2015). The general administrative and organizational functions of a department may be a stressor for some, particularly supervisors and more senior officers (Lansdowne, 2012; Padella, 2016). Operational stressors are more predominant for lower seniority officers (Padella, 2016).

Stress can also result from critical incidents, workplace discrimination, lack of cooperation among coworkers, and job dissatisfaction and can result in “negative behavioral outcomes” including spousal abuse, aggression, and increased alcohol use (Gershon et al., 2009). Disrupted sleep is also associated with stress and alcohol consumption (de Barros, et al., 2012). Sleep disturbances have long been associated with shift work of public safety personnel. However, stress may be moderated by the resilience of the individual (Lee, et al., 2014; Myer, et al., 2012).

Regarding critical incidents, a number of studies have found a correlation between depression, PTSD, alcohol consumption and suicidal risk (Chae & Boyle, 2012; Chopko et al., 2014; de Barros, et al., 2012; Violanti, 2011). And, alcohol dependence is significantly associated with suicide risk (Martin, 2017). Research also suggests that in general those who suffer psychological distress and rely on alcohol to cope are more likely to develop alcohol dependence and alcohol dependent individuals are more likely to suffer from mental disorders (Health Risks, 2000).

Regarding gender Violanti et al., (2011) found that male officers were more at risk for higher mean levels of hazardous alcohol use compared to female officers and younger female officers were at higher risk for hazardous alcohol consumption than older female officers. However, Ballenger (2011) found that 11% of male officers studied and 16% of female officers engaged in at risk consumption of alcohol with female officers 2-3 times more likely to binge drink compared to male officers. Rallings, et al., (2002) also found a higher incidence of alcohol abuse among female public safety employees.

Limitations

This research is limited to a synthesis of the literature from a qualitative standpoint and benefit could be derived from a quantitative analysis. Second, no studies included both police

officers and firefighters requiring a synthesis of separate studies to arrive at some inferences general to both professions. A recommendation for future study is research that includes both police officers and firefighters and possibly other emergency services personnel to determine if alcohol consumption patterns are similar or different among the various public safety disciplines. A third limitation is that only one study included retired police officers and future research of the alcohol consumption habits of both retired police officers and firefighters is needed included the potential impact of cumulative stress. A fourth limitation of the studies in general is a likely under representation of female police officers and firefighters. Fifth, there is conflicting data regarding the maladaptive use of alcohol by police officers and firefighters as a coping mechanism for general work-related stress and future research is needed to resolve these conflicts. Sixth, a number of studies involved small samples from small departments, or sampled a limited geographic area resulting in data that may not be generally applicable. More wide scale studies are needed. Seventh, many of the studies relied on self-reporting surveys and future studies employing more rigorous diagnostic may produce different results (Rallings, et al., 2002). Eighth, more research is needed on the association of PTS symptoms, alcohol as a coping mechanism and suicidal ideation.

Recommendations

Because alcohol abuse or a pre-disposition to hazardous alcohol consumption may already exist in applicants for police officer and firefighter positions, screening of applicants is necessary. This may be accomplished through background checks, pre-employment psychological screenings, pre-employment medical evaluations and interviews.

Once hired and starting with the academy, police officer and firefighter recruits should receive specialized training on recognizing the signs of hazardous alcohol consumption in

themselves and their colleagues. This is critical as studies have shown that alcohol consumption increases from pre-academy to post-academy for some recruits (Vander Veen et al., 2015; Rallings et al., 2002). This should include training on the responsible consumption of alcohol, how maladaptive coping behaviors such as consuming alcohol to cope can lead to negative outcomes, the general negative consequences of harmful alcohol consumption, and where department members can seek assistance. This training should also be required of all department members including supervisors and administrators and continue to be offered as periodic in-service training.

Because younger, approximately 26-34, white males appear to be most at risk for hazardous alcohol consumption special effort should be taken by supervisors to monitor these department members for the signs of abusive alcohol consumption. Younger females are also more at risk for binge drinking as are younger males and should be more closely monitored. One option could be for departments to assign a more senior officer or firefighter to younger department members as a mentor.

Because a number of studies (Chae & Boyle, 2012; Chopko et al., 2014; de Barros, et al., 2012; Violanti, 2011) have shown a correlation between suicide and alcohol abuse, suicide awareness and prevention training should be offered in the academy. Like alcohol awareness training, suicide awareness training should also be mandatory for all department members and be continued as periodic in-service training. This training must include identifying the signs of suicide or emotional distress, and where department members can seek assistance themselves or refer colleagues who are in need of assistance.

The same studies have also found a correlation between critical incidents, PTSD, alcohol use and suicidal risk. Accordingly, departments should also integrate into training programs

information on identifying post-traumatic stress symptoms. The training should also include where and how to seek assistance. Departments should also be alert for those types of incidents that may result in post-traumatic stress and offer critical incident stress management programs administered by licensed mental health professionals.

Because resilience can mitigate the effects of work-related and critical stress, resilience training should be offered to all police officers and firefighters. Those Police officers and fire fighters with low resilience, particularly those that have responded to a number of critical incidents, should be identified and provide with necessary support up to and including clinical intervention.

Assistance for members of police and fire departments can be provided by employee assistance programs (EAP). Every police and fire department should offer or have access to an EAP. While EAP's may be custom designed, most are focused on positively affecting the mental and emotional wellbeing of an organization's members. EAP's are confidential, voluntary and generally provide counseling and support for alcohol and other substance abuse, stress, grief, family problems, and psychological disorders. Another option is department wellness units such as the one created by the San Diego Police Department to help their employees address issues of work-related stress, critical incident stress, and alcohol and other substance abuse issues. Whether EAP, wellness unit or other approach, success is contingent on commitment from the department administration to encourage department members with problems to come forward maintaining a supportive environment to help those in need.

Periodic screening for post-traumatic stress symptoms, at-risk drinking, and suicidal ideation among firefighters and police officers should also be considered. This could be accomplished by providing annual medical evaluations that include a mental health component.

Because there is a correlation between alcohol and tobacco use, smoking cessation programs should also be offered to employees and this may be accomplished through the EAP or stand-alone program.

Finally, all police and fire departments must have comprehensive zero-tolerance substance abuse policies detailing the scope, coverage, prohibited conduct, testing and consequences.

Conclusion

Though there is some conflict, research generally suggests that abusive alcohol consumption, particularly binge drinking among police officers and firefighters does exist. Research also suggests that younger police officers and firefighters, particularly males but also females, are at the greatest risk for abusive alcohol consumption, including binge drinking. The cause behind abusive alcohol consumption by police officers and firefighters is not clearly identified and the effect of work-related stress on alcohol consumption is inconclusive. There is evidence that social culture plays a role in alcohol consumption, but what effect social culture has compared to stress or other causal factors has not been identified. However, a number of studies suggest a correlation exists between critical incidents, post-traumatic stress, depression, abusive alcohol consumption and suicidal risk. Based on current research there is sufficient data to suggest that risky alcohol consumption exists among police officers and firefighters and departments need to be proactive in addressing potential abusive alcohol consumption that may lead to a number of negative consequences.

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