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Bailee Pelham
Scripps College

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Saving Our Heroes:
A Longitudinal Study of Mental Disorders Within the Fire Service

by

Bailee B. Pelham

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PROFESSOR GROSCUP
PROFESSOR WOOD

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Abstract

Previous research on the mental health of firefighters has shown that they are at a greater risk than the majority of the population to develop various mental disorders, such as depression, anxiety, alcohol abuse, suicidal ideation, and post-traumatic stress disorder. However, very little research has been done on the repetitive cumulative exposure to trauma that is associated with their career, which may lead to elevated levels of mental disorders that may not be detected in one testing. In this study, a series of assessments will be given to a sample of urban firefighters every year for the entirety of their career. The data collected in this study will be analyzed at each testing date using simple regressions, and then the data will be analyzed using time series analysis. The results of this study predict that as a career in the fire service progresses, as age increases, as the average hours of sleep decrease, as their rank within the department rises, as the number of critical incidents attended, and as the number of critical incident stress debriefings attended increase, all of the mental disorders measures will increase. Not only do the simple regressions show evidence of an increased aptitude for mental illness, but also the time series analysis will show that the mental illnesses continue to amplify throughout a career in the fire service. The results of this study could have massive implications for the fire service's treatment of mental health stigmatization.

Keywords: firefighter, mental health, trauma, longitudinal study, fire service

Dedicated to the firefighters of the Monrovia Fire Department

and in memory of Dave Dennis.

You are forever in our hearts.

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Thank you to my friends at the Monrovia Fire Department, you all know exactly who you are. Thank you for not only helping raise me and treating me like part of the family, but also thank you for letting me bounce ideas off of you and explaining your stories to me. You have all been so accommodating and selfless. To everyone at the station who has looked out for me, supported me, and taken an interest in this project, you will always be my second family.

For some background on this project, I would like to explain exactly what motivated me to begin the journey that has become my thesis. During the summer of 2015, I attended yet another funeral. While this may not seem like an extraordinary event to most, it was shocking for

my father, a firefighter of 26 years, and for my family as a whole. Just days earlier, we received a phone call from the Rancho Cucamonga Fire Department alerting us to the suicide of our good friend, Dave Dennis. Dave was a retired firefighter of the Monrovia Fire Department and a mentor, as well as friend, to my father. At only 54 years old, having enjoyed a mere 4 years of retirement, Dave decided to end his life. Because of this unexpected and eye-opening event, my father and I spoke at long length about the mental load that he and many of the other firefighters at the Monrovia Fire Department had to endure. It was because of these numerous discussions that I decided on the basis of this study.

Firefighters everywhere are known to be the heroes who bravely face insurmountable odds to aid the people of their city. However, firefighters may be the people whom need the most help. What if, because of their career, firefighters are more at-risk for not only physical ailments but also severe mental illness?

Firefighters are under tremendous stress and, not surprisingly, are at a high risk to develop mental distress after particularly debilitating events (Fullerton, McCarroll, Ursano, & Wright, 1992). Studies have shown that as many as 23% of firefighters show symptoms of post-traumatic stress disorder (Armstrong, Shakespeare-Finch, & Shochet, 2014). Some studies have even shown that at one point in time, 10% of firefighters have depression, 9% exhibit symptoms of anxiety, 29% report significant stress outside of work, and 44% report psychological distress (Vargas de Barros, Martins, Saitz, Bastos, & Ronzani, 2013). As Antonellis and Thompson (2012) said in an article aimed at educating firefighters in this serious matter, the fire service in general has not admitted that there is indeed a problem. This project will explore mental illnesses, such as depression, anxiety, alcohol abuse, suicidal ideation, and post-traumatic stress disorder (PTSD), as a result of a career in the fire service.

Stress and Mental Health Models

There are numerous theories about how one may incur mental health disorders. Among these, the diathesis-stress model and the biological model are the most prevalent. Although both of these may be a part of the problem for firefighters, previous research in this field suggests that another theory, the conservation of resources stress theory, may be equally important to the susceptibility of firefighters to mental illness. The diathesis-stress model assumes that there is already a predisposition for mental health vulnerabilities, which when compounded with the stressors that are ever-present in the fire service can cause a mental illness (Harris, Baloglu, &

Stacks, 2002). It has been determined that, frequently, delayed onset PTSD can be very common in this population. It becomes even more likely when firefighters manage to contain their stress initially but suffer another stressor or further natural progression of the neurobiology that was created with their initial stressor (McFarlane, 2012). Additionally, all mental disorders characterized by a diathesis-stress model rely on the discussion of allostatic load. Firemen, due to their career, often have what appears to be a greater capacity of their allostatic load. However, they may not actually have that capacity that we perceive. Thus, with the numerous stressors that society demands firefighters solve, their allostatic load could easily be overwhelmed, thus causing mental disorders in the individual (McFarlane, 2012).

On the other hand, the conservation of resources (COR) stress theory provides an alternative reason that firefighters may succumb to mental illness. The conservation of resources theory explains that all individuals have or desire to have four types of resources: personal characteristics resources, condition resources, energy resources, and object resources. It is when these resources become threatened that the individual stresses and becomes more susceptible to mental illness (Sattler, Boyd, & Kirsch, 2014). Sattler et al. (2014) discussed the possible diminishing resources in a firefighter's response to a crisis, listing personal characteristic, condition, and energy as the most likely to be lowered. Due to the nature of their career, a firefighter is more likely to see themselves as inadequate (a personal characteristic resource depletion), fear a demotion or lack of social support (condition resource depletion), or be physically injured (an energy resource depletion) as a result of their response to an emergency and the crisis's outcome. Both of these theories on the relationship between stressors and mental disorder could be relevant to the firefighter population. Both provide a potential theoretical framework for why this population may be exceptionally vulnerable to mental illness.

Stress Factors in the Fire Service

There are many studies that describe the factors that make a career in the fire service particularly debilitating, such as occupational stress, specific factors during critical incidents, rank within the fire department, and individual personality characteristics (Armstrong et al., 2014; Fullerton et al., 1992; Bulala, 2013). In recent research, there has been a trend of investigating demographic information, such as age, years in the fire service, number of life-threatening experiences, and rank within the department, and its relation to mental health. Del Ben, Scotti, Chen, & Fortson (2006) found that the age of a firefighter could predict PTSD symptoms, with those who started younger being more likely to develop these symptoms. Meanwhile, it was also found that years as a firefighter and the number of life-threatening experiences they had been a part of were significantly related to post-traumatic distress (Sattler, Boyd, & Kirsch, 2014; Kehl et al., 2015). The demographic that seems to be most predictive of mental distress in the fire service is rank within the department. Although Bulala (2013) suggested that there was a difference between firefighters, paramedics, and Emergency Medical Technicians (EMTs) when compared to the other ranks in the department, Armstrong et al. (2014) suggested that there might even be a difference in mental health between paramedics and firefighters. In a different study, Marmar et al. (2006) found that paramedics report a greater level of peritraumatic dissociation, or dissociation during a traumatic event than the average firefighter. Overall, rank is clearly important, but it is a question that needs more research.

Research has shown that general occupational stress may be even more toxic to a firefighter's mental health than participation in a critical incident (Haslam & Mallon, 2003; Marmar et al., 2006). In a study by Kehl, Knuth, Hulse and Schmidt (2015), they asked firefighters to report their most stressful event in relation to their work. The researchers found

that the majority of firefighters reported house fires and transportation accidents as the most stressful. Following those two categories, they included natural disasters, a building collapse, or other miscellaneous calls. Thus, this work suggests that the average day at a fire department may end up being one of the most stressful. In a different study, Kehl, Knuth, Holubova, Hulse, and Schmidt (2014) found that by a similar token, the events that distressed firefighters the most were ones that evoked horror, fear, anger, guilt, helplessness, or other negatively perceived emotions. Any of these emotions can be experienced on a day-to-day basis within the fire service, once again suggesting that it does not have to be a critical incident for the experience to cause psychological damage. In a study done by Beaton, Murphy, Johnson, Pike, and Cornell (1998), the researchers found that even something as routine as cardiopulmonary resuscitation (CPR) could be stressful to some degree for the first responder whom was performing the procedure. Although such simple procedures may not wreak mental havoc on a firefighter, the repeated exposure to these minor stressful incidents can have a vastly negative effect, which could result in a more permanent change (McFarlane, 2012).

Although recurring stressors that are associated with the occupational stress of the job can be the most detrimental, the impact of critical incidents cannot be completely discounted. Much of the research dealing with the fire service has focused on the type of emergency situation and its impact on a firefighter's mental health. However, many of these studies do not have generalizable findings because they often focus on case studies of massively publicized tragedies. Despite this limitation, through both case studies and surveys, researchers have found some common themes evident in what firefighters describe as making the emergency more distressing. As Meyer et al. (2012) noted, the most potentially traumatic events in the fire service were injuries to the individual, injuries to coworkers, the chance of working on particularly vulnerable

victims, and overall exposure to death. Other researchers have found that firefighters are particularly vulnerable to emergencies that deal with people they know (Kehl et al., 2015), emergencies that deal with infants and children, with whom they frequently associate their own children, (Beaton et al., 1998; Fullerton et al., 1992), feelings of helplessness when victims plead to return to life before the incident (Fullerton et al., 1992), particularly gruesome accidents, and unpredictably dangerous situations (Beaton et al., 1998). Another very important factor in the probability of a firefighter to incur mental health consequences during a critical incident is the firefighter's response to the actual incident. As discussed by Marmar et al. (2006), a fear-related activation during the incident, which is then sustained for a long period of time, can have direct implications on the development of PTSD. In agreement with that idea, Ehlers & Clark (2000) created a cognitive model that suggested dissociation and desensitization during a traumatizing event can lead to PTSD of a greater severity. As most paramedics can attest, there is a large portion of their population whom completely disengage emotionally from a traumatic event, thus putting them at more risk for the development of PTSD.

One of the final topics of interest in current research is the role that personality plays in the development of PTSD in firefighters. Typically, firefighters need to make quick and practical decisions while still sympathizing with a patient's diagnosis to be good at their job. However, seeing this sort of quick diagnosis on their patients, firefighters are often hesitant to admit their own mental health concerns. They sympathize with their patients, but may balk at belonging to that sort of group (Bulala, 2013). Similarly, their ability to make quick decisions with the information they have allows them to prevent injuries in the field. However, it prevents them from taking on other perspectives in non-crisis situations (Bulala, 2013). Another depiction of how trauma changes a personality is through the use of "gallows humor." Frequently, firefighters

can be seen engaging in humor that does not seem appropriate to those outside the fire service. They often joke about emergencies or what they saw on a particular call (Fullerton et al., 1992). This sort of humor separates them from their family and friends, a support group, which can be crucial to the treatment of mental disorders. Other characteristics of firefighters that seem to have an effect on a firefighter's probability of developing a disorder are high levels of self-blame (Meyer et al., 2012). This theory makes logical sense, as the rumination of what one could have done better is not healthy for either one's stress level or overall mental health. In one case study by Marmar et al. (2006), researchers found that higher levels of hostility and lower levels of self-efficacy at a baseline level predicted greater probability of the development of PTSD. In this study, they measured firefighters before entering the fire service and then incrementally over a two-year period. This type of study suggests that the type of personality one enters the fire service with could predispose an individual to mental health problems later in their career.

Mental Illness and Substance Abuse

A career in the fire service has always been associated with anxiety, depression, and alcohol abuse, even if the individuals possessing these disorders did not have them clinically diagnosed. With the amount of tragedy they see and the number of life-threatening situations they put themselves in, it is undeniable that their career is one of the most stressful. There have been numerous research experiments that corroborate this hypothesis. Both Harris et al. (2002) and McFarlane (2012) noted that depression and anxiety are among the top disorders associated with trauma. McFarlane (2012) also expressed the need for research on the etiology of both major depressive disorder and PTSD due to their frequent co-morbidity. There has also been significant research done on the co-morbidity of substance abuse and depression (Haslam & Mallon, 2003; Harris et al., 2002). Meanwhile, Duckworth (1986) did some of the most

extensive research on anxiety in the fire service through his case study of the Bradford Fire Disaster of 1985. Duckworth gave several of the first responders a survey to measure somatic stress symptoms, anxiety and major depressive disorder. When analyzing the results, Duckworth found that scores on anxiety as well as somatic symptoms related to anxiety were elevated for this particular population. However, because of the dated aspects of this study, such as assessment tools and criteria for diagnosis, this study may not be as applicable today as it was in 1986. The intersectional nature of these three disorders serves as a testament to the theories that fire service personnel had already deemed accurate without a clinical diagnosis.

Although substance abuse is co-morbid with anxiety and depression, it is also separately affected by the trauma associated with the fire service. Flannery (2015) mentions that not only is substance abuse a risk factor as a medical problem, but also it can become a form of self-medication in firefighters' attempts to cope. Ehlers and Clark (2000) found that substance abuse was one of the maladaptive strategies to control the anxiety associated with PTSD. They also noted in their model that the use of this method could make PTSD symptoms persist. In a study by Vargas de Barros et al. (2013), the researchers found a significant relationship between alcohol abuse and sleep deprivation with the mental health problems such as suicidal ideation. Using the Alcohol Use Disorders Identification Test, the Beck Scale for Suicidal Ideation, and the General Health Questionnaire, the researchers found that there was a borderline significance in suicidal ideation and alcohol usage's association with lack of sleep in a sample of 303 participants. This association, when complemented with other findings that indicate a short duration of sleep and alcohol abuse increases suicidal ideation, suggests a highly dangerous mental health risk associated with the fire service.

Although the combination of alcohol abuse and sleep deprivation is especially dangerous, lack of a decent amount of sleep can be equally detrimental to a firefighter's mental wellbeing. One of the most commonly reported symptoms that firefighters report after traumatic events is insomnia (Haslam & Mallon, 2003; Duckworth, 1986). In Haslam and Mallon (2003)'s experiment, the researchers asked firefighters to fill out a survey, dealing with various qualitative questions about stressful incidents at work. When asked about insomnia, a third of the subjects reported problems sleeping. Many noted that they had experienced severe nightmares. Although nightmares are an important part of the problem, emergency workers also suffer from a lack of sleep because they run calls at all hours of the night and because of the exposure to imminent danger on nearly every call, making them much more likely to develop sleep disorders during their lifetime (Vargas de Barros et al., 2013). When Vargas de Barros et al. (2013) used the General Health Questionnaire (GHQ) to analyze sleep disturbances in a Brazilian Firefighter Battalion, they found that psychological distress was related to the sleep disturbances and that 51% of their sample reported these disturbances. Because that rate is much higher than the general population, they concluded that the fire service and the traumas witnessed were associated with these disturbances. However, their sample was so specific that it is not externally valid.

The most prevalent research discussion in recent years is the relationship between PTSD and the fire service. In a study done by Fullerton et al. (1992), firefighters were qualitatively assessed on their reactions to a major event in their area that was highly publicized. The subjects complained of intrusive visuals and smells after the incident. Many had trouble sleeping because they had nightmares. These sorts of symptoms are very common in the fire service, thus leading to the belief that there is some relationship between this career and PTSD symptoms like the

ones Fullerton et al. (1992) documented. Later, Kehl et al. (2014) created a study where firefighters were asked to complete a survey. Using this survey, the researchers found that close to 10% of the subjects met the criteria for a possible PTSD diagnosis. Armstrong et al. (2014) corroborated the findings of Kehl et al. (2014)'s study with a study of their own. In their study, the participants completed a battery of questionnaires dealing with their mental health as well as their most traumatizing experience. These researchers found that 23% of their sample appeared to reach the criteria for a clinical diagnosis of PTSD. Because of these high percentages, researchers began to study what symptoms of PTSD were most prevalent in the population.

Post-traumatic stress disorder is defined as a disorder in which patients suffer repeated and unwanted re-experiences of the traumatic incident, avoidance of stimuli that may be related to the trauma, hyper-arousal, and emotional numbing (Del Ben et al., 2006; Ehlers & Clark, 1999; Flannery, 2015; Haslam & Mallon, 2003). In order to obtain a clinical diagnosis for this disorder, an individual needs to have seen or been a part of a traumatizing event which involved threat of injury, death, or physical integrity to the individual or others (Criterion 1). This traumatic incident must have also cause the individual to have feelings of fear, hopelessness, or horror (Criterion 2; American Psychiatric Association, 2000).

According to Ehlers and Clark (2000)'s cognitive model on PTSD, because the disorder is classified as an anxiety disorder, persistent PTSD only occurs when the way the individual processes the trauma provides a sense of threat in the present. Thus, many of the people who have PTSD see their trauma as lasting forever and having an impact on every aspect of their future. The first symptom of PTSD, re-experiencing the trauma, is reported at a high frequency by patients (Ehlers & Clark, 2000). In Haslam and Mallon (2003)'s study, 25% of firefighters reported on their surveys that they had experienced flashbacks to specific traumas, often due to

visual and olfactory triggers. Many PTSD patients experience these intrusive memories in a very vivid and highly emotional way, whether that means that they perceive the physiological sensations without the memory of the trauma or, more commonly, experience sensory impressions as if they were happening at the time of the flashback rather than in the past (Ehlers & Clark, 2000). Patients also use maladaptive coping through the process of rumination. Rumination is the preoccupation with how a traumatic event could have been changed or how to ensure justice is served, which may serve to continually remind the patient of the traumatic event (Armstrong et al., 2014; Ehlers & Clark, 2000).

In the Haslam and Mallon (2003) study, researchers once again used a qualitative survey to analyze firefighters' psychological responses. They revealed that 65% of the participants admitted to rumination over the trauma. Most notably, they were preoccupied with the trauma they had witnessed happening to either themselves or their family. Another symptom that Haslam and Mallon (2003) reported was that one third of the firefighters avoided thinking about specific traumas and believed that if they thought about the incident they would be unable to perform well on the job. This avoidance was explained by Ehlers and Clark (2000), along with the idea of thought suppression in regards to the unwanted memories. Individuals will partake in these maladaptive coping strategies in an effort to avoid the stimuli that may trigger a flashback. However, Ehlers and Clark (2003) suggest that such thought suppression and other avoidance attempts may have the opposite impact, increasing the frequency of intrusive memories.

In the study of firefighters, there has been a range of different percentages diagnosed with clinical PTSD. To explain this variation, McFarlane (2012) introduced the idea of subsyndromal PTSD, the idea that patients can show some PTSD symptoms but not enough to meet the criteria of the DSM-IV. McFarlane (2012) also suggests that there is an important relationship between

somatic symptoms, like back pain, and the stress put upon firefighters at their workplace. PTSD has serious repercussions for the healthy individual. With the development of PTSD, a patient can compromise mastery of their environment, attachments to others, and their purpose in life to work towards some goal (Flannery, 2015).

Although most PTSD research on the fire service has focused on the DSM-IV criteria, there has been little research dealing with the relatively new criteria from the DSM-V. The DSM-V says that triggers for PTSD must be exposure to actual or threatened death, serious injury, or sexual violation (APA, 2013). They must experience the trauma, witness the trauma, learn that the trauma occurred to a family member or close friend, or experience first-hand repeated or extreme exposure to aversive details of the trauma (APA, 2013). In the DSM-V, they chose to eliminate the stipulation that an individual respond with horror, helplessness, or fear. It also adds another diagnostic cluster to re-experiencing, avoidance, and arousal (APA, 2013). They added negative cognitions and mood, which can mean persistent and distorted ideas of blame, whether the blame be on themselves or others, lack of ability to remember the trauma, a lack of interest in activities, and separation and estrangement from others (APA, 2013). Thus, there is a need for research that takes into account these changes to diagnostic criteria in the DSM-V.

Help Given to Firefighters

Despite the devastating effects of regular traumatic incidents on firefighters, there are some safeguards to help solve disturbances and promote mental well being within the department. The most commonly used method is Critical Incident Stress Debriefing (CISD). A critical incident, as defined by the fire service, is an emergency that exposes a firefighter to injury, traumatizing stimuli, human mistake, or failure to complete their duty. It can also be defined as

the exposure to many traumatizing events over a short period of time, especially traumatizing injuries to children, or excessive media coverage of an event. All of these potential situations could lead to a firefighter's inability to cope with the situation effectively (Harris et al., 2002; Kehl et al., 2014). In response to the psychological trauma of critical incidents, researchers created the CISD process. By definition, CISD is a psychological debriefing led by one mental health professional and a panel of peer professionals designed to protect against work-related trauma and prevent PTSD (Everly & Mitchell, 1996; Harris et al., 2002). According to the creators of the CISD process, the main goal of CISD, other than the protection against adverse reactions to traumatic events, is to accelerate normal recovery processes in individuals who have experienced unusual events (Everly & Mitchell, 1996). During CISD, participants undergo group meetings with one trained mental health professional. The entire session is a seven-stage intervention that allows fire personnel to engage in rational and structured catharsis after a particularly debilitating trauma. In this intervention, they are first introduced to the debriefing process, they are asked to discuss basic facts about the incident, and then they are asked about their thoughts upon arriving on the scene. The fourth step is to talk about their particular reactions to the trauma, which is followed by a discussion of their symptoms since the incident. The final two steps are teaching, where mental health professionals instruct them in coping skills and other necessary information that relates to the specific trauma, and re-entry into the workplace (Everly & Mitchell, 1996). Everly and Mitchell (1996) also describe a shorter process called defusing that only has three steps and requires fewer team members to organize before a session. During this intervention, the incident is introduced and explored in depth. Then, the firefighters are instructed on coping skills and the effects of trauma (Everly & Mitchell, 1996). Both methods are used to help discuss mental health in the fire service. However, there appears

to be great dissention in the research over whether CISD and defusing truly work to eliminate post-traumatic distress.

Many people argue that CISD's use is only beneficial, and not harmful, to first responders and should thus be used extensively in this population. Everly and Mitchell (1996) take this position, stating that it allows trauma victims to support each other through the mechanism of group discussion. They also conclude that CISD may serve as a way to identify subjects who need a more in-depth psychological therapy, which would enable them to reach a quicker and more efficient recovery.

However, other researchers have found serious problems with the institution of CISD. Some studies have found that CISD has the opposite of the intended effect. According to Harris et al. (2002), subjects who had gone through debriefing had higher levels of PTSD symptoms, higher levels of depression, higher levels of agoraphobia, and a greater problem with both anger and anxiety. Although there still needs to be research done to corroborate this finding, there have been theories that the personality associated with a career in the fire service could be one of the biggest barriers to mental health attention and CISD. Firefighters have always been seen as "action-oriented, self-contained, deferential men and women where 'complaining' is not acceptable behavior" (Flannery, 2015), and they firmly believe in "the popular role stereotype of the 'helper' as being resourceful, strong and in control, which is so different from that of the 'victim', who is seen as resourceless, weak and helpless" (Duckworth, 1986). Haslam and Mallon (2003) confirmed this personality type among firefighters in their qualitative assessment of firefighter mental health. In this study, they found that firefighters were less likely to seek help through the department because of the manly image associated with firefighting and even fears that admission of that 'weakness' would result in them being fired. Kehl et al. (2014) also stated

that, because they work as part of a crew, because they have a number of co-workers whom rely on them, and because they are often labeled as heroes within their community and through media during especially glorified emergencies, they may be less likely to admit their feelings about the traumas they encounter for fear of looking weak. Bulala (2013) expounded on this theory of mental stigmatization in the fire service by running a study specific to the resistance of firefighters to seek mental health treatment. She hypothesized that the resistance to mental help-seeking behaviors was due to lack of education of the benefits of mental health observance, stigma within the fire department, or society's traditional view of male gender roles. She defines the mental health stigma as having two sources. Her first definition of the stigma is that "mental health is associated with being perceived as different, dangerous, or unacceptable." Bulala (2013) continues to describe the idea of a more specialized stigma, known as self-stigma. She defines this as "an internal form of stigma where the individual perceives the act of seeking professional help for distress as a threat to their self-worth." She explained that even the idea of exposing their distress to their co-workers, those whom they trust with their life, is frightening because they feel it implies that they are weak and unable to adequately do their job. They fear that their co-workers will ridicule and alienate them if they are deemed the type to "fold under pressure." She ran a study using four surveys to determine the barriers to mental health-seeking behaviors. Bulala (2013) found that mental health stigma is the biggest inhibitor to professional help for firefighters, even among variables like desire for privacy in their medical records, a problem with taking orders, lack of understanding that there is a problem, financial inability, and lack of assumed control. Although Bulala (2013)'s study had a small sample size of 89 participants, her results show that there is much more to be explored about why firefighters refuse to seek mental health help.

The present research does not measure beyond a firefighter's reaction to one traumatic incident. Most of the studies determine PTSD symptoms or CISM efficiency after an individual's most traumatic work experience. The lack of longtime information on more than one event strengthens the argument that longitudinal research needs to be done to test the mental health effects of trauma incidents throughout a career. In this study, a series of mental health batteries and demographic surveys that are based on DSM-V diagnostic updates will be conducted to measure rank changes, age, years of service, gender, an estimate of critical incidents responded to, how many times they attended a CISM, and an approximate number of hours they slept per night. These surveys will be given out yearly, as the typical firefighter's career is thirty years of service.

As a career in the fire service progresses, it is predicted that more and more firefighters will be more likely to develop depression, anxiety, PTSD, some form of alcohol abuse, or engage in suicidal ideation. It is also predicted that the rank of paramedic, compared to the equivalent department positions, will result in elevated levels of PTSD. However, it is hypothesized that for all other scales, the scores will increase as the rank in the department increases. It is predicted that more years of service will result in higher levels of depression, anxiety, PTSD, alcohol abuse, and suicidal ideation. Also, subjects on the younger end of the age spectrum (18-24 years old) and the ones closest to retirement age (40-55 years old) will have higher levels of depression, anxiety, PTSD, alcohol abuse, and suicidal ideation, while those in the middle of their career (25-39 years old) will have lower levels of depression, anxiety, PTSD, alcohol abuse, and suicidal ideation. It is also predicted that as the number of critical incidents attended increases, so will levels of depression, anxiety, PTSD, alcohol abuse, and suicidal ideation. It has been hypothesized that the number of CISM they participate in will result in higher levels of

depression, anxiety, and PTSD. However, it should not affect alcohol abuse and suicidal ideation.

Finally, it is hypothesized that fewer hours of sleep per night in the past year will show an increase in the levels of depression, anxiety, PTSD, alcohol abuse, and suicidal ideation.

However, it is predicted that fewer hours of sleep will have the most significant impact on suicidal ideation.

Proposed Method

Participants

The ideal population for this study, according to a power analysis predicting a small effect and wanting a power of .80, would be 2,500 participants from across the United States. This accounts for the approximate dropout rate of 10% due to career anomalies such as injury, career termination, and other unexpected events. All of these participants will be active-duty firefighters in large, urban fire departments. The participants will be recruited during their training within the city's fire academy program, also known as their "tower." Because urban city departments with their own fire academies have the highest retention rate for trainees actually becoming firefighters, the study will be limited to only urban departments with their own training towers. The Fire Fighters' Association will be asked to back this research rather than specifically asking each department, thus preventing the trainees from feeling pressured by their employer. Because the union is promoting the study, participation will be voluntary while still encouraging the trainees about the legitimacy of the study. While recruiting, the demographics should be reflective of the overall percentages evident in the firefighter population. The sample will be mostly male, with a small percentage of females (approximately 5%). Additionally, there will be a majority of Caucasians, with a good percentage of other minority groups, as is representative of overall percentages in the fire service. Throughout the study, survey participation will include firefighters of all ages. There will also be several different positions within the department, especially the trainees get further into their careers. These positions will include firefighter, paramedic, engineer, captain, battalion chief, division chief, deputy chief, and chief. All of the participants will be paid firefighters, rather than volunteers. To compensate these participants for their time, they will be offered their hourly wage for the time taken to

complete the surveys. Additionally, they will be offered the opportunity to receive their results after each testing date, allowing for earlier detection of possible mental disorders. Along with these results, they will be given a list of references for mental health professionals and offered treatment at a discounted rate upon the possible discovery of symptoms of mental illness.

Another form of compensation will be the fact that they are contributing to a greater base of knowledge and helping those who will follow in their footsteps.

Materials

Depression. To measure depression in this population, The Beck Depression Inventory II (BDI-II; Beck, Steer, & Brown, 1996) will be utilized. The Beck Depression Inventory II is a 21-item, self-report questionnaire. It assesses depressive symptoms in an individual. This questionnaire has a high internal consistency ($\alpha = .91-.94$; Beck et al., 1996).

Anxiety. To measure anxiety symptoms, The Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988) will be utilized. This questionnaire is a 21-item, self-report measure for both physiological and cognitive symptoms. It exhibits good internal consistency ($\alpha = .92$, Beck et al., 1988).

Post-Traumatic Stress Disorder. The PTSD Checklist (PCL-5; Weathers, Litz, Keane, Palmieri, Marx, & Schnurr, 2013) is a 20-item, self-report measure that assesses the 20 DSM-V symptoms of PTSD. To further gain information about these individuals, the extended PTSD Checklist that has the Life Events Checklist for DSM-5 and the extended Criterion A Assessment (Weathers, Blake, Schnurr, Kaloupek, Marx, & Keane, 2013) will be included in the survey. Although there are no formal psychometric evaluations of these measures yet, Weathers et al. (2013) suggests that their internal consistency is equivalent to that of the PTSD Checklist-Civilian Version (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1993). The PCL-C exhibits

a high internal consistency in trauma-subjected individuals ($\alpha = .97$). It also demonstrates a diagnostic sensitivity of .94, a specificity of .86, and an overall efficiency of 90%, according to a study done by Blanchard, Jones-Alexander, Buckley, and Forneris (1996).

Alcohol Abuse. To measure the amount of alcohol abuse in this population, The Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 2001) will be utilized. This measure is a 10-item, self-report questionnaire to measure alcohol dependency or abuse. It has a good internal consistency ($\alpha = .85$), according to Daeppen et al. (2000), and is commonly used in alcohol abuse research.

Suicidal Ideation. The Beck Scale for Suicidal Ideation (BSI; Beck & Steer, 1991) will be used to measure suicidal ideation in the population. This scale is a 21-item, self-report survey that detects and assesses an individual's behaviors, attitudes, and plans to commit suicide. This scale has a high internal reliability ($\alpha = .97$).

Procedure

After fire department trainees are recruited through their department's training programs, they will be asked to volunteer for this study. All of the tests will be administered at the department. Upon their agreement to the study, they will be given an informed consent form (Appendix A). Upon completion of this step, they will be given a packet with all five of the scales included. The order of the scales within the packet will be randomized for every testing date. There will also be a brief demographic survey at the end of the packet (Appendix B). During each test date, the participants will be asked to stay in their training room, or equivalent room at each department, for the duration of the assessment. The assessment should take approximately a half an hour, and no more than an hour. However, the subjects will be given all the time they need to complete the measures. All of the participants from each department will

be asked to complete the assessments at the same time in this classroom-like environment. After completing the scales, they will be debriefed and compensated.

Every year for 30 years, the typical length of a firefighter's career, data will be collected in the same way. The data will then be analyzed as a whole over the course of an entire career. There will be both informed consent forms and debriefings given at each testing date to remind each of the participants of their rights.

Ethics

This study is an ethical undertaking with participants being subjected to tasks of minimal risk to their well being. As this study will analyze firefighters in urban areas, it does not deal with any protected populations. All of the firefighters taking the surveys required to participate in this study will be completely informed about the nature of the study, as deception will not be utilized. After providing informed consent, the firefighters will be allowed to end participation in the study at any time. During consent, they will be informed that the researcher will have the ethical responsibility to release information under certain conditions, such as scoring above a certain point on the suicidal ideation scale.

The surveys may ask questions that could be deemed sensitive or triggering to the participant. As is relevant when studying mental illness, there will be questions on their reactions to traumatic events or patterns of suicidal ideation. To account for the potentially triggering material, resources for local psychologists and psychiatrists will be provided to the participants. Additionally, they have the option of ending their participation in the study at any time.

In the surveys, symptoms of a certain mental disorder present in any one individual will be analyzed. The study of the symptoms rather than the diagnoses of mental disorders will allow

for a larger sample of participants. It will also allow completion of the research without intervention from The Health Insurance Portability and Accounting Act (HIPAA).

One of the biggest ethical decisions involved in this study is the decision to use a confidential data collection rather than an anonymous data collection. Because of the longitudinal nature of this study, it is necessary to keep track of which participants are which. Their current results need to be compared to their previous results. Thus, the study cannot be anonymous. However, confidentiality will be used to protect the participants. Every participant will be given an identification number for the duration of the study. With every survey completed, they will use this number rather than their name. Only the participant and the researcher will know what identification numbers match which participant. All of the data will be kept on a secure server. Only the researcher will have access to this server for data analysis purposes.

Overall, this study's benefits will outweigh any risk to the participants. The results of this study can have a serious impact on the fire service and the way the fire service deals with mental illness and stigma. By studying this area, firefighting associations and organizations will be provided with the information necessary to plan mental health programs in fire departments all over the nation. Additionally, all of the participants will have the option of receiving their results at every survey. By providing this option, the subjects will be given a chance at earlier detection of possible mental disorders. They can be made aware of their symptoms and the resources available to them, thus benefiting them as well. The lack of knowledge in this field has had a detrimental effect on the population being studied, and the research, although potentially triggering, may provide many connections between mental illness and the fire service. Hence, the

benefits this study hopes to uncover greatly outweigh the potential risks to the participants of this study.

Proposed Results

For this study, statistical tests will need to be run throughout the 30 years of testing and again after all testing has been completed. After every testing date, the data collected will be analyzed using simple regressions. This study will also need to employ anchoring due to the unreliability of self-report data.

It is expected that if an individual starts the fire service at a younger the age, their PCL-5 scores will be higher, which would replicate the study done by Del Ben et al. (2006). Research done previously by Sattler et al. (2014) suggests that as more time is spent in the fire service, their PCL-5 scores will be higher. The results of the same study would indicate that as the number of critical incidents attended increases, PCL-5 scores will increase significantly. It is also expected that the rank of paramedic, based on the results of the study done by Marmar et al. (2006) will have higher scores on the PCL-5 than other ranks within the department. It is also predicted that participation in a greater number of Critical Incident Stress Debriefings will result in higher PCL-5 scores, demonstrated in the study done by Harris et al. (2002). As the average number of hours a firefighter sleeps increases, the PCL-5 scores will decrease, as suggested in a study done by Barros et al. (2012).

It is expected in each data collection that as time in the fire service increases, so will the Beck Anxiety Inventory scores. Similarly, older firefighters will have higher scores on the BAI than the younger firefighters. These results would replicate studies done by Haslam and Mallon (2003) and Marmar et al. (2006) in regards to the theory that everyday tasks at the station may have the most detrimental effects on firefighters. These studies also may account for an increase in BAI scores as firefighters reach higher ranks within the department. As McFarlane (2012) suggested, it is expected that as the number of critical incidents attended increases, the BAI

scores of the individual will increase as well. Similar to the results in the PCL-5, BAI scores will increase as the number of CISDs attended increase, much like the results found in Harris et al. (2002). It is expected that BAI scores will go down as the number of hours a firefighter sleeps increases, as suggested in the study by Barros et al. (2012).

In the study of depression, it is expected that scores on the Beck Depression Inventory will increase as a firefighter reaches higher ranks in the department and as the time spent in the service increases. It is also predicted that both young ages (18-24 years old) and older ages (40-55 years old) will experience higher scores on the BDI, for similar reasons to those found in previous anxiety and PTSD studies because of the well-documented associations between anxiety, depression, and PTSD despite the lack of evidence in the specific population of firefighters. Based on the article by McFarlane (2012), it is predicted that as the number of critical incidents attended increases, so will their scores on the BDI. Also, according to Harris et al. (2002), as the number of CISDs attended increases, the scores on the BDI should also significantly increase, despite the logical assumption of the opposite. Finally, higher average hours of sleep should show lower BDI scores, following the results of Barros et al. (2012).

Under the well-documented assumption that depression, anxiety, and substance abuse are related in the general population, as time in the service and rank in the department increase, scores on the Alcohol Use Disorders Identification Test (AUDIT) should increase as well. However, with age, it is predicted that both young ages (18-24 years old) and older ages (40-55 years old) will have higher scores on the AUDIT. This is expected because of the high anxiety and depression associated with older ages as noted in the other assessments and the high probability of social drinking in the younger ages. Based on the Flannery (2015) study, it is predicted that a larger number of critical incidents attended will relate to higher scores on the

AUDIT. It is also likely that lower average hours of sleep reported will have higher AUDIT scores, as demonstrated in the Barros et al. (2012) study.

As with the other mental disorders being tested, suicidal ideation is well documented as being associated with depression and anxiety. Thus, it is expected that as rank, time in the service, and number of critical incidents attended increase, there will be an increase in scores on the Beck Scale for Suicidal Ideation (BSI). Following information given in the Antonellis and Thompson (2012) article, it is predicted that scores on the BSI will increase during the younger ages (18-24 years old) and older ages (40-55 years old). It is also predicted that as the average hours of sleep reported decreases, scores on the BSI will increase, as shown by the Barros et al. study (2015).

Although it is predicted that all of the simple regressions listed above will occur at each testing date, to measure the effect of each of these variables on the mental health variables over the course of a career, a time-series analysis will be done. Using each of the regression results from each testing date, the scores will be plotted over a period of 30 years. After the first few years, when enough data has been accumulated, the data will be analyzed using a univariate time series. To model this times series, an autoregressive model will be utilized, essentially setting up a linear regression that compares the current value at the date of analysis with prior measured values in the series. Although there is no current research using longitudinal data, it is predicted that the regressions towards the end of a career will be significantly different from the regressions measured in the beginning of a career. It is expected that the time series analysis will be able to detect insignificant differences in the regressions that accumulate over a career to make the overall difference between the beginning of a career and the end significant.

Discussion

The results of this study have important implications for the fire service and their treatment of mental health. Previous studies have discussed the mental health detriments of major disasters. However, there has been little research on the impact of repetitive exposure to traumatic incidents specifically in the context of the fire service. Because this study demonstrates that there is significant detriment to the mental health of an individual in the fire service, it suggests that there is a need for greater attention to mental health services and interventions within the fire service.

Currently, there are very few preventative measures that the fire service provides, and there is an even greater issue with firefighters agreeing to participate in preventative or intervening measures. By encouraging the pursuance of such mental health issues, the fire service could prevent many of the mental illnesses discussed in this study. Not only do these illnesses and disorders feed into each other, but they have also been the cause of divorce, suicide, and other familial disturbances. By engaging current firefighters and enlightening them to the severity of mental health issues and possible repercussions, the fire service could not only save their lives, but it could also solve many of the problems within their marriages and relationships with their children.

Although this study recognized a significant gap in the literature, it is not without its limitations. For example, it does not take into account the interactions between the variables. By ignoring this well-known interaction, results could be skewed. Another limitation of this study is that the batteries will only be administered once a year and that the individuals could forget about events that were traumatizing for a period of time, but no longer traumatizing at the time of the assessment. There also could be a problem with any major catastrophes occurring during the

testing period. To accommodate for this possibility, we would need to run an interrupted time analysis rather than a simple time analysis.

For future studies, research should examine the interactions between the predictor variables and the dependent variables presented in this study, rather than focusing only on the relationships that our study examined. Another avenue that may be beneficial to explore would be other possible mental disorders. There are many other anxiety and substance abuse disorders that can be found within the population of firefighters. A different direction that the study of mental health in the fire department could examine would be the exploration of how knowledge about the mental health detriments associated with their career could influence them to attend CISDs and seek other resources for a healthy mental well being. Finally, our research uncovered a lot of firefighters who claimed to distance themselves from their patients. Other research could explore how this is either beneficial or detrimental to their mental health.

This study has vast implications for firefighters, but the results are not limited to that population alone. The results of this study can be applied to police officers, military personnel, and other first responders. All of these populations experience traumatic incidents on a daily basis. The repetition of such events has been shown by this study to have long-lasting effects that may continue to build throughout their career. By advocating for this study, the fire service could also introduce the effects that the mental health of firefighters can have on their family life.

The current atmosphere and opinion of firefighters in the community is particularly contentious. While many citizens view firefighters as heroes, there is also much discussion on the benefits they receive and how they conduct day-to-day activities within their respective fire stations. By publicizing the knowledge this study brings to light, civilians may garner greater

respect for this selfless career and recognize that firefighters deserve the benefits they receive upon retirement.

Although this field of study seems relatively narrow when compared to all of humankind, it begs the question, “If we don’t take the time now to save our heroes, who will continue to save us into the future?”

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Appendix A

Informed Consent Form

The Department of Psychology at Scripps College supports the practice of protection of human participants in research. The following will provide you with information about the experiment that will help you in deciding whether or not you wish to participate. If you agree to participate, please be aware that you are free to withdraw at any point throughout the duration of the experiment.

In this study, we will ask you to answer questions related to your current mental health. All information you provide will remain confidential and will not be associated with your name. If for any reason during this study you do not feel comfortable, you may leave the laboratory and receive compensation for the time you participated and your information will be discarded. Your participation in this study will require approximately an hour. When this study is complete you will be provided with the results of the experiment if you request them, and you will be free to ask any questions. If you have any further questions concerning this study please feel free to contact me through phone or email: Bailee Pelham at BPelham3572@scrippscollege.edu (626-261-1547). Please indicate with your signature on the space below that you understand your rights and agree to participate in the experiment.

Your participation is solicited, yet strictly voluntary. All information will be kept confidential, except under conditions dealing with ethical responsibility, and your name will not be associated with any research findings.

Signature of Participant

Bailee Pelham, Investigator

Print Name

Appendix B

Please answer the questions as honestly as possible. This information will be kept confidential. All of your information will be stored in a secure location and will only be accessed by the primary investigator.

ID #: _____

What is the gender you most closely identify with?

Male Female

What is your age?

How many years have you worked in the fire service (beginning with the year you entered the fire academy)?

What rank are you within the department? Please choose the rank closest to yours if your rank is not listed.

Firefighter Paramedic Engineer Captain Battalion Chief
 Division Chief Deputy Chief Fire Chief

In the last month, what is the average number of hours you slept per night you spent at the fire department?

A critical incident is defined as an emergency that exposes a firefighter to injury, traumatizing stimuli, human mistake, or failure to complete their duty. It can also be defined as the exposure to many traumatizing events over a short period of time, especially traumatizing injuries to children, or excessive media coverage of an event.

Approximately how many critical incidents have you attended in the past year?



By definition, a Critical Incident Stress Debriefing is a psychological debriefing led by one mental health professional and a panel of peers trained in this method that is designed to protect against work-related trauma and prevent Post-Traumatic Stress Disorder (PTSD). Many stations offer CISD in response to particularly traumatizing emergency calls.

Approximately how many times have you participated in a Critical Incident Stress Debriefing (CISD)?

Thank you so much for your participation!