

**Can We Identify Human Factors in Firefighter Occupational Fatalities on The Fire
Ground?**

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Executive Summary

Firefighter occupational fatalities have been studied at a national level for over two decades. Significant advances in personal protective equipment, training, and performance standards have helped reduce firefighter occupational injury and death. Despite these efforts, the morbidity and mortality of firefighters remain unacceptable. More and more, the underlying Fire service culture is emerging as a significant factor in these tragedies (Clark, B. A. 2024). As the airline industry and military continue to invest in understanding the human factors in accident investigation, the fire service must also commit to identifying and correcting human variables to support the safety and lives of firefighters. To date, no such human factors analysis has been applied to firefighter traumatic fire ground fatalities.

Background

Accident investigations have taken many forms over the years. In the aviation industry, much of the initial focus was tied to mechanical failures thus many of the investigation techniques were related to engineering topics. This exploration was based on data-driven research of highly sophisticated methods and procedures as well as objective and quantifiable information which ultimately was effective at determining why a mechanical failure occurred. This information was stored in accident databases with structured categories, well-defined variables, and causal relationships. Thereafter, the data was analyzed to identify trends and common mechanical and engineering safety issues. As these processes became more streamlined and demonstrated value in reducing accidents, the focus shifted to human factor aspects of an investigation since human error was ultimately responsible for the majority of airline accidents. The challenge, however, became identifying direct evidence and causes of human error because the processes were qualitatively different, at times elusive, and less defined. At that time, the

focus was on what caused the accident rather than why it occurred. The airline industry has subsequently invested in new approaches to properly investigate accidents, store relevant data, and analyze it to make appropriate recommendations. Today, human factors analysis is conducted whenever there is an airline accident (Bridger, R. S.,2021). Similarly, the fire service has investigated mechanical and engineering components of firefighter injuries and fatalities without exploring human factors. The fire service must begin to engage in human factors analysis and classification.

The National Institute for Occupational Safety and Health (1998) began investigating occupational fatalities on a national level when Congress provided funding to The National Institute for Occupational Safety and Health (NIOSH) to conduct research and make appropriate recommendations to prevent work-related injuries and deaths in the fire service. This effort was identified as The Fire Fighter Fatality Investigation and Prevention Program (FFFIPP). The function was to provide recommendations and not serve to enforce compliance with state or federal job safety and health standards nor determine fault or place blame on individual firefighters or fire departments. The focus of these recommendations is on the mechanical and engineering components of the firefighting profession.

The National Fallen Firefighter Foundation (2004) held a summit in 2004 that created sixteen Firefighter Life Safety Initiatives which were meant to bring awareness to variables that impact firefighter safety. Thereafter, nationwide, the firefighter's personal protective ensemble, apparatus, and equipment technology, available training and safety resources, and safety standards are at the highest, safest levels ever experienced in fire service history. However, United States Fire Administration statistics reveal a ten-year plateau of more than one hundred firefighter line-of-duty deaths and approximately ten thousand serious line-of-duty injuries each

year. To worsen matters, firefighters are being injured and killed in incidents at rates close to those of twenty years ago. Case analyses show that most of these line-of-duty deaths and injuries are preventable. The first life safety initiative is as follows, “Life Safety Initiative 1: Define and advocate the need for cultural change within the fire service related to safety, incorporating leadership, management, supervision, accountability, and personal responsibility.” The task of culture change has been established without any clear path on how to accomplish the goal.

Brunacini (2008) illustrated the cultural challenge facing every fire chief, “When the fire kills us, our department typically conducts a huge ritualistic funeral ceremony, engraves our name on the honor wall, and makes us an eternal hero. Every Line of Duty Death (LODD) gets the same terminal ritual regardless if the firefighter was taking an appropriate risk to protect a savable life or was recreationally freelancing in a defensive place. A Fire Chief would commit instant occupational suicide by saying that the reason everyone is here today in their dress blues is because the dearly departed failed to follow the department safety plan. Genuine bravery and terminal stupidity both get the same eulogy. Our young firefighters are motivated and inspired to attack even harder by the ceremonialization of our battleground deaths.” This reflection from the late chief provided insight into underlying psychological processes related to individual and organizational relationships with death. With a cultural analysis within a human factors investigation, there is an opportunity to explore unseen variables and systemic characteristics that may impact firefighter injury and death (Brunacini, A. V., 2008).

Kunadharaju, et al; (2011) from the College of Public Health at the University of Georgia published a paper titled “Line of Duty Deaths (LODDs) among U.S. Firefighters: An Analysis of Fatality Investigations.” This piece reflected the cultural challenges both the fire service and society at large face concerning firefighter occupational injury and fatalities. The research team

studied 189 NIOSH reports that included 213 LODDs from 2004 to 2009. The NIOSH reports made a total of 1,167 recommendations to reduce firefighter injury and death. The researchers categorized the recommendations into 5 factors: Incident Command; Personnel; Equipment; Operations/Tactics; and External. The researchers applied root cause analysis techniques to the data set to determine the basic or higher-order causes that they classified as: under-resourcing; inadequate preparation for/ anticipation of adverse events; incomplete adoption of incident command procedures; and sub-optimal personnel readiness. An important point they make is that these higher-order causes “...do not provide any definitive insights as to their origin,” but “... may actually be tapping the basic culture of firefighting.” The researchers go on to make the following comment about the core culture of firefighting, “operating with too few resources, compromising certain roles and functions, skipping, or short- changing operational steps and safeguards and relying on extreme individual efforts and heroics may reflect the cultural paradigm of firefighting. This should not be construed to be a culture of negligence or incompetence, but rather a culture of longstanding acceptance and tradition. Within many fire service organizations, these operational tenets may be accepted as “the way we do things.” Moreover, this tolerance of risk may be reinforced both externally and internally through the positive public image of firefighters and firefighting and internally through the fire service’s traditions and member socialization. With that said the larger social culture may have a direct impact on the health and safety of firefighters.

NIOSH (2022) Fire Fighter Fatality Investigation and Prevention Program (FFFIPP) held a Fire Service Community Meeting on June 27, 2022, to explore recommendations. There were forty suggestions and responses, one was about culture, human factors, and the current NIOSH process. The twenty-first suggestion read, “Organizational culture and human factors need to be

addressed in the investigation. Comment [or Issue]: Several comments reflected concern that the FFFIPP reports failed to address the cultural and leadership/management factors that might have played a role in events leading up to a fatality.” The NIOSH response stated, “The FFFIPP understands the added value of assessing fire department cultures and leadership/management factors during an investigation. Acknowledging deficiencies, safety culture, and leadership/management is difficult to describe in reports without finding fault or placing blame on fire departments or individual firefighters. One measure of the safety culture of a fire department is the development, use, and enforcement of standard operating policies and procedures. Currently, investigators routinely collect this information as part of their investigation. The FFFIPP will remain alert to possibilities to add insight in this area when we are able to do so without finding fault or placing blame on fire departments or individual firefighters. Not placing blame or finding fault is a key concept of the program. The most important aspect of an investigation is to identify recommendations to prevent similar incidents from happening.” While there is a motivation to avoid content that may be perceived as blame, a human factors analysis explores variables that occur within the context of a larger system or culture to provide insight into the mechanisms that create specific behavioral outcomes. To improve firefighter health and safety, a human factors analysis would provide an investigation into the contextual variables that created the environment for unsafe behavior to occur. With awareness, safety initiatives can begin to address these variables with specificity and intentionality.

Conclusion

Firefighter occupational injury and death remains at an unacceptable level. Human factors play an important role in accident investigations across industries. As the military and

aviation industry have explored the role of these factors, so too should the fire service begin to invest in a human factors analysis and classification system. Since individuals operate within the context of a culture, this exploration will provide insight into the systemic variables that may have a direct impact on firefighter morbidity and mortality (Bridger, R. S., 2021).

Recommendation

The American Psychological Association should work collaboratively with fire service stakeholders to identify and address human factors within firefighter occupational fireground injuries and fatalities. Initial funding for the project should be established and ongoing investment should be made into this important process. Furthermore, doctoral students who intend to work within the fire service should be provided opportunities to develop the relevant knowledge, skills, and abilities to work within the specific function and context of the fire service.

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