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Journal of Safety Research

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## Q1 Safety climate and firefighting: Focus group results☆☆☆

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### 7 A R T I C L E I N F O

#### 8 Article history:

9 Received 24 February 2016

10 Received in revised form 12 April 2017

11 Accepted 14 June 2017

12 Available online xxxx

#### 13

#### 33 Keywords:

34 Firefighters

35 Safety climate

36 Occupational safety

37 Injury prevention

38 Qualitative research

### A B S T R A C T

*Background:* Firefighting is a hazardous occupation and there have been numerous calls for fundamental changes in how fire service organizations approach safety and balance safety with other operational priorities. These calls, however, have yielded little systematic research. *Methods:* As part of a larger project to develop and test a model of safety climate for the fire service, focus groups were used to identify potentially important dimensions of safety climate pertinent to firefighting. *Results:* Analyses revealed nine overarching themes. Competency/professionalism, physical/psychological readiness, and that positive traits sometimes produce negative consequences were themes at the individual level; cohesion and supervisor leadership/support at the workgroup level; and politics/bureaucracy, resources, leadership, and hiring/promotion at the organizational level. A multi-level perspective seems appropriate for examining safety climate in firefighting. *Conclusions:* Safety climate in firefighting appears to be multi-dimensional and some dimensions prominent in the general safety climate literature also seem relevant to firefighting. These results also suggest that the fire service may be undergoing transitions encompassing mission, personnel, and its fundamental approach to safety and risk. *Practical applications:* These results help point the way to the development of safety climate measures specific to firefighting and to interventions for improving safety performance.

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### 43 1. Introduction

44 Firefighting is a hazardous occupation. Firefighters are injured, suffer  
45 work-related illnesses, are hospitalized, are forced into early retirement,  
46 or die at higher rates than most other workers in the United States (Lee,  
47 Fleming, Gomez-Marin, & Leblanc, 2004; U.S. Department of Labor,  
48 2006). From 2010 to 2012, about 70,000 firefighters were injured in  
49 the line-of-duty (LOD) each year (U.S. Fire Administration, 2014). The  
50 large majority of these injuries (87%) occurred in structural fires.  
51 Approximately 100 firefighters die in the line-of-duty each year (Fahy,  
52 LeBlanc, & Molis, 2015), and this number has not improved substantially  
53 during the past 25 years despite advances in technology, personal pro-  
54 tective equipment, engineering controls, environmental management,  
55 medical care, and safety legislation.

#### 56 1.1. Rethinking safety in the fire service

57 This lack of progress has prompted a number of firefighter organiza-  
58 tions and advocacy groups to call for fundamental changes in how fire

service organizations approach safety and balance safety with other op- 59  
erational priorities. In 1999, the Fire Service Needs Workshop (Walton, 60  
Bryner, Madrzykowski, Lawson, & Jason, 2000) recognized the need for 61  
a culture of safety instead of a culture that rewards and glamorizes un- 62  
safe behaviors. The 2005 National Fire Service Research Agenda Symposi- 63  
um (NFPA, 2005) also identified culture change as a high priority 64  
research area and one of the key factors in reducing firefighter injuries 65  
and fatalities. Firefighter Life Safety Summits were conducted in 2004, 66  
2007, and 2014 (National Fallen Fighters Foundation, 2004, 2007, 67  
2014). The most fundamental issue agreed upon was the need for 68  
the American fire service to change its acceptance of LOD fatalities as 69  
normal and to advocate changes within the fire service related to safety, 70  
leadership, management, supervision, and accountability. Studies of 71  
firefighter fatalities have also called for changes or improvement in 72  
the organizational aspects of fire service organizations (Hodous, 73  
Pizatella, Braddee, & Castillo, 2004; Kunadharaju, Smith, & DeJoy, 74  
2011; Morbidity and Mortality Weekly Report, 2006). In 2015, the U.S. 75  
Fire Administration (USFA, 2015) reinforced the call for culture change 76  
in their report: National Safety Culture Change Initiative. 77

Despite these calls for action, there has been a dearth of empirical 78  
research on the organizational and cultural aspects of fire service organi- 79  
zations and firefighting operations. Conclusions and recommendations 80  
offered to date have been based largely on professional experience and 81  
judgment and the examination of firefighter incident and fatality data. 82  
Linkages between organizational factors and firefighter LOD injuries 83

\* Contract grant sponsor: U.S. Department of Homeland Security/Federal Emergency Management Agency (EMW-2011-FP-00582).

\*\* The authors report no conflicts of interest.

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and death have not been extensively explored or empirically verified through systematic research. This is surprising, because in terms of the overall occupational safety literature, research on organizational factors has expanded exponentially during the past three decades. The impetus for much of this work can be traced to the investigations of a number of high profile events, including the Chernobyl nuclear disaster (Pidgeon & O'Leary, 2000), the 2003 Columbia space shuttle disaster (Vaughan, 1996) and the 2005 BP Texas City explosion (Baker et al., 2007). These investigations all highlight the critical role of organizational factors and the fact that investments in more sophisticated and expensive engineering solutions often yield diminishing returns in terms of safety. There is now broad recognition that system safety depends on social/organizational structures as well as engineering and technological controls (e.g., DeJoy, 2005; Mearns, Whitaker, & Flin, 2003; Reason, 1997; Rochlin, 1999).

### 1.2. Safety culture and climate

Much of the research on organizational factors has focused on safety culture and safety climate. The distinction between safety culture and safety climate remains a source of some debate within the safety field (Flin, Mearns, O'Connor, & Bryden, 2000; Guldenmund, 2000; Wiegmann, Zhang, von Thaden, Sharma, & Gibbons, 2004). Definitions of safety culture (Wiegmann et al., 2004) generally highlight the shared norms, values, and assumptions that impact safety-related attitudes and behaviors, while safety climate focuses more on employee perceptions related to safety policies and practices within their workgroup or organization (Zohar & Luria, 2005). Arguably, safety climate represents the observable or surface manifestations of safety culture (Schneider, 1975; Zohar, 1980). The majority of empirical research specific to workplace safety falls more within the purview of safety climate, in that, the main focus has been assessing employee perceptions through the use of questionnaires and quantitative methodologies (DeJoy, Schaffer, Wilson, Vandenberg, & Butts, 2004; Flin et al., 2000; Neal & Griffin, 2004).

The body of evidence linking safety climate to safety performance has grown considerably and now covers a wide array of different occupations and work settings and a variety of different safety-related outcomes (Clarke, 2006; Neal & Griffin, 2004). Results from several recent meta-analyses covering up to 200 published studies (Beus, Payne, Bergman, & Arthur, 2010; Christian, Bradley, Wallace, & Burke, 2009; Clarke, 2010; Nahrgang, Morgeson, & Hofmann, 2011) indicate that safety climate is among the strongest predictors of workplace safety behaviors and injuries. Much of the interest in safety climate can be traced to the fact that safety climate functions as a leading indicator of safety performance (i.e., predicts future injuries and other adverse outcomes), whereas most traditional measures of safety performance (such as lost time injuries) are, by definition, lagging indicators (i.e., after-the-fact). However, studies focusing on firefighters are mostly absent in this literature.

### 1.3. Current study

The current study was conducted as part of a larger project to develop and test a model of safety climate pertinent to the fire service. This study employed focus groups to identify important dimensions of safety climate and pertinent safety-related practices and behaviors. In addition, we were interested in determining the extent to which prominent safety climate constructs from the general industry literature also apply to firefighting. Focus groups were thought to be a good method for obtaining a more thorough understanding of the organizational and operational dynamics of the fire service. Focus groups as a qualitative methodology are often used for taking a detailed look inside various aspects of peoples' lives, including their work and occupational roles (Schonfeld & Farrell, 2010). Qualitative methods are increasingly being used in occupational safety and health research, either as independent

methodologies or in conjunction with various quantitative methodologies (Black, 1994; Dobson et al., 2013; Gordon et al., 2005; Huang et al., 2013; Schonfeld & Farrell, 2010).

## 2. Method

Two large metropolitan fire departments, one located in the eastern U.S. and one located in the western portion of the country, participated in this research. The selection of Eastern and Western departments was partially to improve the generalizability of results. The two participating departments were chosen for their overall comparability and their willingness to participate. Both departments serve metropolitan areas with populations exceeding one million residents. Each department employs upwards of 1000 personnel and operates approximately 30 stations with specialties including search and rescue, EMS, aircraft rescue and firefighting, and hazardous materials. A stakeholder advisory group (SAG) with representatives from the two departments was established at the beginning of the project, the purposes of which were to advise and assist the research team and to liaison with department senior leadership and employee organizations. This research, including the focus group portion, was reviewed and approved by Institutional Review Boards at the University of Georgia and Embry-Riddle Aeronautical University. Informed consent policies were followed.

### 2.1. Focus group participants

Focus group participants were recruited by the research team using posters and email messages delivered to personnel at the various stations operated by the departments. The SAG facilitated the recruitment in terms of making sure that the recruitment materials were widely distributed and answering any questions about the focus groups or the overall project. The SAG also provided input into the development and structuring of the focus group protocol. They did not, however, participate in or attend the actual focus group sessions. They also had no access to the focus group recordings or transcripts, and did not participate in organizing or analyzing the results. A total of 10 focus groups were conducted; five with each department. We anticipated that conducting five groups with each department would help in reaching saturation; that is when no new information is forthcoming. In each department, four groups were conducted with station or company level firefighters. Two groups were conducted with frontline personnel (Level I); two with station/company level officers (Level II); and one with senior department leadership (Level III). The numbers of senior personnel were limited making multiple groups difficult. This structure or segmentation was employed to help maximize free and open discussion and to obtain viewpoints from different operational levels. It was thought that the hierarchical or quasi-military structure of fire departments might potentially make some participants reluctant to disclose their personal views and opinions in the presence of others holding substantially different ranks and responsibilities within the organization (Dobson et al., 2013; Krueger & Casey, 2015; Morgan, 1993).

### 2.2. Focus group protocol

Each focus group began with a brief welcome message and expression of appreciation for taking the time to participate in this portion of the project. The moderator introduced herself or himself and his or her assistant for the session. A senior member of the research team moderated each focus group and each group followed the same script. Informed consent forms were completed and an opportunity provided for questions. The consent form mentioned that the group discussions would be digitally recorded (audio) and that notes would be taken during the session. These particular aspects were also communicated verbally to the groups while they were reviewing the consent forms. Participants were also reminded that no names would be included in any written transcripts or notes. Participants were then asked to

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