

Situational Pressures that Influence Firefighters' Decision Making about Personal Protective Equipment: A Qualitative Analysis

Michael A. Maglio, MPH; Cliff Scott, PhD; Andrea L. Davis, MPH, CPH; Joseph Allen, PhD; Jennifer A. Taylor, PhD, MPH, CPPS

Objectives: Firefighters are exposed to hazardous conditions as a result of their occupation and often understand the dangers of these toxic exposures; yet, it remains unclear why some refrain from wearing personal protective equipment (PPE) in dangerous situations. We were intrigued by the gap between demonstrated safety knowledge and lack of connection to observed or self-reported safety behaviors, an issue about which there is limited consensus among scholars. **Methods:** In a national study of fire service safety climate, 123 firefighters across 12 fire departments participated in 62 interviews and 10 focus groups. **Results:** Firefighter identity, goal seduction, and situation aversion were the

strongest factors of PPE non-compliance, whereas PPE empowerment and individual will promoted PPE use within a fire department. **Conclusions:** Understanding situations where PPE use is both practiced and neglected is imperative to improving fire service safety culture. Peer-pressure and leading by example at the peer and organizational levels appear to be essential considerations firefighters undertake when choosing whether or not to engage in safety behavior.

Key words: firefighter; personal protective equipment (PPE); situational pressures; decision making; identity; safety climate

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Research examining the use of personal protective equipment (PPE) typically has examined the construct as a proxy for safety compliance or for objective safety performance. This work generally has been grounded in the assumption that compliance is a product of attitudes about safety in general (eg, safety climate) and knowledge regarding specific hazards in particular (eg, hepatitis C in hospital settings).¹ Rarely have these studies focused on explaining PPE compliance specifically in terms of available meanings for and interpretations of PPE within the occupational

setting in which compliance is expected. For example, although research has examined the physical characteristics of PPE and the relationship between these characteristics and compliance (eg, perceived comfort of PPE), PPE research generally has overlooked potential explanations for PPE use related to how employees have come to understand the meaning of the equipment in light of particular occupational or organizational cultures.²

As a usual requirement in hazardous work environments, many employers and unions train their members in appropriate use of PPE, and often pay for and maintain the required equipment. Although user knowledge and espoused managerial support for PPE use are present in many industries, literature lacks consensus as to why PPE compliance is not uniformly high across many industries. Even when workers report a high level of safety knowledge through training, their PPE compliance lags behind. A study of Chinese critical care clinicians showed that 77% had adequate knowledge of self and safe patient handling, but these same workers reported only 55% PPE compliance with patient encounters during the H1N1 epidemic.³ In a

Michael A. Maglio, Drexel University School of Public Health, Department of Environmental and Occupational Health, Philadelphia, PA. Cliff Scott, University of North Carolina at Charlotte, Department of Organizational Science and Communication Studies, Charlotte, NC. Andrea L. Davis, Drexel University School of Public Health, Department of Environmental and Occupational Health, Philadelphia, PA. Joseph Allen, University of Nebraska at Omaha, Industrial and Organizational Psychology, Omaha, NE. Jennifer A. Taylor, Drexel University School of Public Health, Department of Environmental and Occupational Health, Philadelphia, PA.
Correspondence Dr Taylor; jat65@drexel.edu

study of Latino roofers, eye protection was rated as important by 93% of the respondents, but it was worn 47% of the time.⁴

We were intrigued by the gap between demonstrated safety knowledge and observed or self-reported safety behaviors, an issue for which there is limited consensus among scholars. We explore this more deeply within the United States (US) fire service using an adaptation of Christian et al conceptual model describing the safety climate-safety outcome relationship as mediated by safety behavior.⁵

Previous research has illustrated that firefighters are at increased risk of toxic exposures through inhalation of particulate matter and gases.⁶ There are several phases of firefighting suppression where exposures to harmful substances are prevalent such as entry/ventilation, extinguishment, and overhaul.⁷

Compliance with rules about PPE becomes especially challenging during the "overhaul" phase after a fire has been extinguished, but before the remaining structure has been secured and all the smoke has cleared. Research indicates firefighters are exposed to multiple toxic and carcinogenic products of combustion during overhaul, which has resulted in an increased concern of higher cancer risk among firefighters.⁸⁻¹⁰ Even with these current scientific data and widespread attention to cancer risk, it is unclear why it is common practice not to follow PPE policies, such as wearing a self-contained breathing apparatus (SCBA), in spite of national standards (NFPA 1500) against SCBA removal during overhaul and other operations.^{7,11}

In an occupational exposure study of 2 Buffalo, New York firehouses, Brandt-Rauf et al found respiratory protection was used partially or not at all at several fires with large concentrations of hazardous materials of combustion.¹² Furthermore, Austin et al estimated that firefighters only used SCBAs about 50% of the time at structural fires.¹³

Strong Situations

Although this study focuses on firefighters, the nature of specific situations encountered by employees across many industries can influence their decision to wear PPE, and some situations may be more powerful than others. Mischel explains a difference between strong and weak situations and their effect on behavior.¹⁴ Situations are considered strong when:

...they lead everyone to construe the particular events the same way, induce uniform expectancies regarding the most appropriate response pattern, provide adequate incentives for the performance of that response pattern and require skills that everyone has to the same extent.

¹⁴(p 347)

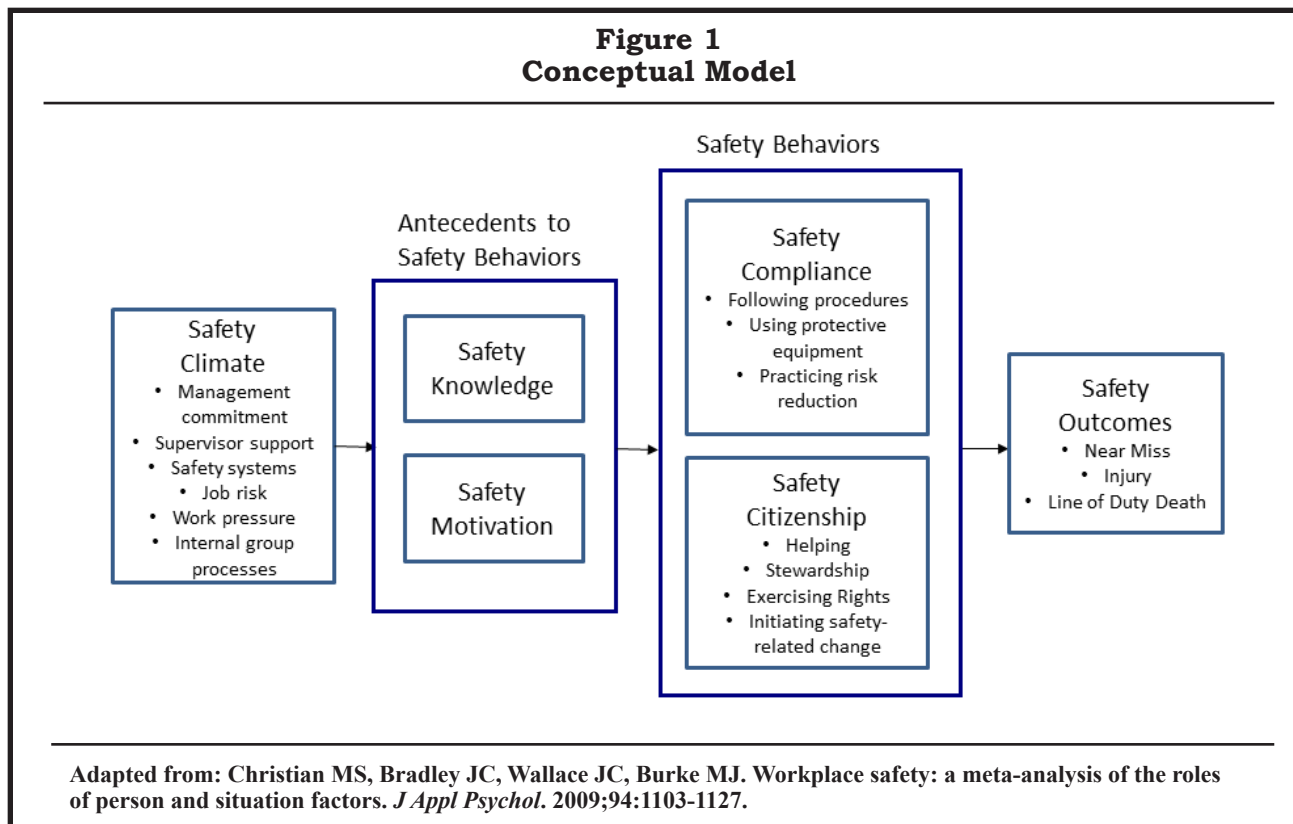
To illustrate a strong situation, Mischel gives the example of how a red light creates an effect on motorists' behavior; they recognize what it means, respond, and react appropriately. Within firefight-

ing, strong situations ideally bring about uniform, coordinated responses consistent with training and standard operating procedures by limiting the range of situational responses firefighters perceive as acceptable. For example, a firefighter may encounter a task he or she knows requires PPE and respond in a compliant manner.

However, as Bearman and Bremner¹⁵ suggest, strong situations also may constrain employees' options such that poor decisions about safety compliance, often motivated by approach and avoidance needs, become the more likely response patterns. Bearman and Bremner¹⁵ built upon Mischel's theory by identifying *goal seduction* and *situation aversion* as pressures that negate uniform behaviors typically practiced in strong situations. Goal seduction is motivation *toward* unsafe behaviors. The individual is seduced to forfeit safety for a productivity goal such as getting somewhere on time or being paid. In the fire service, goal seduction is exemplified in situations where firefighters prioritize the need to rescue others over their own safety.¹⁵ Situation aversion is motivation *away* from safe behavior. The individual may avoid safe choices because they are inconvenient or uncomfortable, or due to a perception that their being safe would make them unpopular with or not accepted in their workgroup. Situation aversion is particularly relevant for firefighters who cannot handle ridicule from peers or have issues with the cumbersomeness of PPE. Overall, goal seduction and situation aversion are theorized to restrict people's perceived options, thereby increasing the likelihood of poor decision making.¹⁶ For example, Bearman and Bremner¹⁵ found that goal seduction often resulted in firefighters taking inappropriate risks with hazards that were believed to conflict with a valued competing goal (eg, violating emergency driving protocols to get to a fire quickly) and that situation aversion resulted in firefighters pressuring commanders to conclude the incident prematurely because the most exciting aspects of an emergency incident have passed.

Although previous research on strong situations has addressed the issue of strategic decision making patterns among incident commanders in the context of emergency response coordination, this framework thus far has not been used to examine the issue of compliance with safety-related orders, rules, and standard operating procedures among supervisees of incident commanders. By examining the behavioral reactions among those expected to comply with the orders and expectations of incident commanders, we hoped to extend the Bearman and Bremner¹⁵ framework. This extension of the framework helps not just to understand how incident commanders make strategic operational decisions in strong situations, but also to explain a range of safety related responses – both compliant and non-compliant. Such an approach would reflect the longstanding assumption better that safety is a product of interactions among leaders who attempt

Figure 1
Conceptual Model



to shape the behavior of their employees and followers who interpret and act upon (compliantly or non-compliantly) commands.¹⁵ Additionally, strong situations rarely have been examined in light of a related concern that emerged in our analysis, social identity, an issue to which we turn next.

Identity Theory

Social identity has been proffered as an explanation for compliance with safety rules and norms in a number of occupational health studies, highlighting the role that efforts to sustain a preferred sense of self at work contributes to decisions about whether to participate in injury prevention fitness programs, the perceived meaning and significance of occupational hazards, and the selection of primary causal factors for industrial accidents.¹⁷⁻²¹ Social identity theory considers, among other things, how behavior constitutes the senses of self that individuals strive for and experience in their work via interaction with other employees, tasks, and clients. By accommodating or resisting various local meanings for what are collectively considered authentic identity characteristics (eg, what it means to work as a “real” smoke-breathing firefighter), individuals sustain or resist identity norms in the course of performing work tasks via formal and informal interaction with others.²⁰ In doing so, employees can align themselves with preferred characteristics and distance themselves from characteristics that threaten preferred sens-

es of self through seemingly mundane behavioral choices, often with safety-related implications.²³

Organizations have an interest in sanctioning safe work practices through reward and punishment and portraying desired compliance in formal communication as expected, rewarded, and supported.²⁴ For example, the US Fire Service has engaged in a major safety campaign called “Everyone Goes Home.” The campaign attempts to persuade firefighters to fight fire more safely by appealing to the espoused identity norm of firefighters, specifically to maintain a genuine brotherhood/sisterhood and to be loyal in protecting one another by maintaining crew safety as a fundamental priority.²⁵ Although there is research examining social identity as a factor in understanding safety compliance, generally identity theory has not been applied to the issue of compliance with specific domains of safety-related behavior, such as the appropriate use of personal protective equipment.^{19,20}

Safety Climate

Strong situations and identity theory inform our understanding of what happens between knowing and doing. Christian et al’s 2009 model provides the overarching framework for how these theories may operate in the space between *antecedents to safety behaviors* and *safety behaviors* – mediators in the large relationship between safety climate and safety outcomes.^{5,26,27} *Safety motivation* is a person’s willingness to make an effort to perform

**Table 1
Participant Demographics**

Characteristic	% (N)
<i>Participants (Interviews and Focus Groups, N = 123)</i>	
Sex	
Male	80% (98)
Female	20% (25)
Age (Mean/SD)	42.86 years +/- 10.55 years
Race/Ethnicity	
Caucasian	83% (102)
African American	10% (12)
Asian	0% (0)
Hispanic	2% (3)
Other	3% (4)
No response	2% (2)
Education	
High school	10% (12)
Some college	19% (23)
Technical school	6% (7)
2-Year college/associate degree	22% (27)
4-Year college	34% (42)
Graduate school or more	10% (12)
Rank/Role	
Frontline firefighter	64% (79)
Supervisor	36% (44)
<i>Fire Department (N = 12)</i>	
Geographic Region	
East	50% (6)
Central	25% (3)
West	25% (3)
Workforce	
Career	67% (8)
Volunteer	17% (2)
Combination	17% (2)

safety behaviors. This is an antecedent to safety citizenship referring to proactive voluntary actions for improving safety above and beyond compliance with rules and procedures. *Safety knowledge* is a person's understanding of how to do the job safely (eg, knowing the hazardous composition of smoke). This knowledge is an antecedent to safety compliance – performing the actual behavior (eg, wear-

ing SCBA during overhaul). Christian et al's meta-analysis of over 200 studies across a multitude of countries and industries (eg, manufacturing, commercial fishing, off-shore drilling, etc), concluded that safety climate offers a robust prediction of safety outcomes (eg, fatalities, injuries, near-misses). Within this framework we are intrigued by the fact that whereas firefighters know how to do their job safely, they do not always engage in safety behaviors. In essence, there is a "black box" between the *antecedents to safety behaviors* and the actual *safety behaviors* themselves. We conducted a qualitative analysis using data from a larger fire service safety climate study to: (1) gain an understanding of SCBA and PPE attitudes and beliefs; and (2) identify factors that either encourage or discourage SCBA and PPE use.

METHODS

We examined qualitative data collected from a diverse national sample of firefighters as part of a larger study to develop a fire service-specific safety climate survey. US firefighting is quasi-military or hierarchical in structure, has industry-specific as well as OSHA standards regarding safety practices, and has a significant onboarding apprenticeship period through a required training academy. During their time in the training academy, recruits are educated in appropriate job and safety procedures, including assignment of and training with personal protective equipment. As a first responder occupation, workers have short intervals of opportunity to don their protective gear prior to engaging in hazardous work.

Sample Size and Participant Recruitment

From June 2013 to December 2013, 72 transcripts, consisting of individual interviews and focus groups, were obtained from semi-structured interviews with members of the US Fire Service. Participants recruited from 12 fire departments located throughout the Eastern, Central, and Western regions of the US were enrolled in 62 interviews and 10 focus groups. Fire departments were chosen via purposeful sampling to identify individuals with diverse experiences in fire service. Fire departments were identified by: (1) their geographic location (ie, US Census Bureau regions of Northeast, South, Midwest, and West); and (2) their organizational characteristics (ie, career, volunteer, mostly career, and mostly volunteer). Participants had to be at least 18 years of age and actively serving as a career or volunteer firefighter. Focus group participants (N = 61) were all frontline firefighters and, on average, were 38 years old and had worked as firefighters for 11 years. The majority of interview participants (71%) held supervisory roles. They were 48 years old, on average, and had worked as firefighters for a mean of 24 years. Ninety percent of the interview participants and 69% of the focus group participants were men (Table 1).

Qualitative Data Collection

Participants were informed that our research team was developing a survey for future use in assessing fire department safety culture. Researchers explained to participants both the positive and negative aspects to any organizational culture and asked to hear about all aspects of their work. The individual interviews were conducted with both leadership and rank and file firefighters and lasted an average of one hour. Focus groups were conducted with rank and file firefighters and lasted an average of 2 hours. After collecting and reviewing data from 7 focus groups, we reached thematic saturation; however, individual interviews continued to elicit new information. Despite having reached saturation, we proceeded with 3 previously scheduled focus groups. We then revised the data collection strategy for all remaining fire departments, to conduct only individual interviews with both rank and file firefighters and leadership. Individual interviews allowed participants to express their experiences with safety in their fire department more deeply with researchers, without additional pressure from fellow firefighters in a focus group setting. Focus groups conducted with firefighters who had varied years of experience limited divergent opinions. Researchers observed rookie firefighters being less likely to vocalize their opinion in a focus group setting if a senior man was present. For this reason, and because data saturation in focus groups was achieved, individual interviews were the primary mode of data collection for the rest of the project. JAT and AD conducted all focus groups and interviews and found the depth and breadth of participant responses to cover a range of safety attitudes and beliefs. A semi-structured interview guide covering topics such as perceptions of job risk, safety outcomes, fire departments prioritization of safety, and institutional attitudes and beliefs around safety messages was used for both focus groups and interviews. Focus group and interview audio recordings were transcribed by a professional transcription agency and then quality checked and de-identified before being entered into QSR NVivo 10 for analysis.

Development of the Coding Rubric

Data from the safety climate survey development study, originally collected for developing a safety climate instrument, were examined using a 2-level analytic scheme that was responsive to relevant concepts in the extant safety literature, but that also enabled researchers to identify emergent concepts and ideas in the data inductively that were not mentioned in previous research.²⁸ In keeping with other qualitative studies that seek to extend or revise, rather than test extant theory, the interview and focus group data were analyzed through a constant comparative process of open coding, reduction, axial coding, and verification.^{29-30,31} Data analysis began with open coding in which research team members separately reviewed each tran-

script, identifying passages that brought to mind a concept or theme. Some of these codes were responsive to the Christian et al⁵ framework. Others were developed in more *emic* fashion when an idea or issue appeared to constitute a theme that did not appear to fit this extant model. From this original data analysis, research team members, including JAT and AD, coded 49 themes. Two trained research assistants coded 25% of the transcripts to assess inter-rater agreement, which exceeded 90% between both. The remaining transcripts were coded by a single team member, given the high level of agreement.

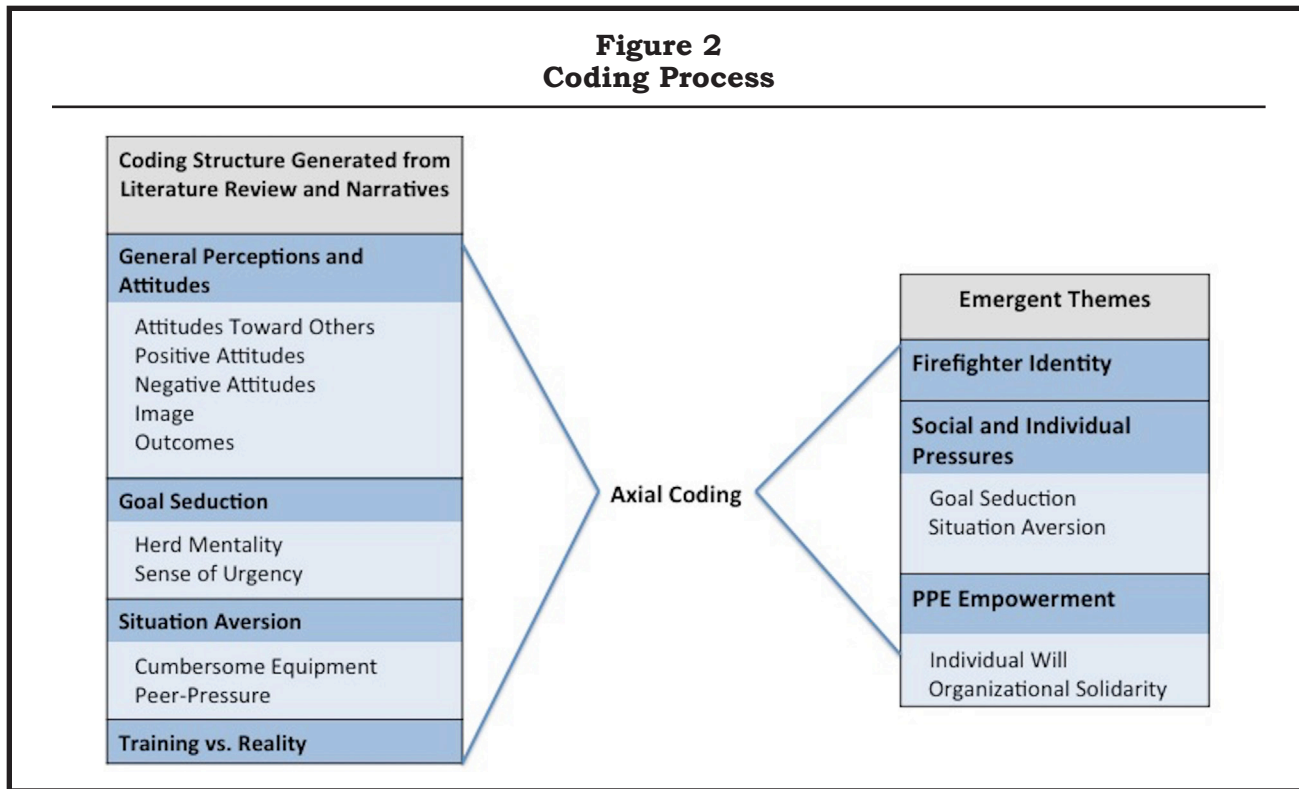
In the reduction phase, the database was streamlined to match the scope of the research question. Of these 49 themes, 6 were determined to be of utility to our research questions regarding SCBA and PPE use. JAT, AD, and MM reviewed all 49 themes and concluded that the following 6 themes were most useful: Gear/PPE and Apparatus, Policies Procedures Practices, Peer Influence, Safety Knowledge, Safety Citizenship, and Job Risk.

We extracted these 6 node reports and used the references within them as the data to be coded for this analysis regarding SCBA and PPE use. Additionally, we conducted a literature search on firefighter exposures, adverse health effects, and SCBA use using the PubMed database to ensure all aspects of SCBA and PPE use were addressed in our data analysis. The search was conducted utilizing 11 key terms (self-contained breathing apparatus (SCBA), air pack, compressed air breathing apparatus, overhaul, chemicals, firefighter, fire, incident commander, first responder, safety, and risk behavior). Each search included a single or combination of key terms. Articles were chosen by title and topic with publication dates between 1980 and 2014. From 72 abstracts, 20 articles were reviewed. Additional information was obtained using social media resources. Fire Engineering University and the "Secret List," a newsletter from firefightersclosecalls.com, were used to identify current issues involving firefighter injuries and death.^{32,33}

JAT, AD, and MM reviewed the literature search and read the 6 node reports from the larger safety climate study. From this review, JAT, AD, and MM created a coding rubric that reflect themes from the literature and our existing qualitative data.³¹ A total of 13 themes were created for this analysis (Figure 2).

Transcript coding in NVivo 10 took approximately 20 hours. Each node was used to collect references pertaining to a particular dimension of SCBA use. We then used axial coding, a process used to relate content within nodes or categories to each other, and arranged these into broader themes most salient to SCBA and PPE use.³¹ To protect the anonymity of participants and uphold the confidentiality of their perspectives, all identifiable information was removed from the transcripts. Participants quoted within this manuscript have been assigned pseudonyms and their rank within the

**Figure 2
Coding Process**



fire service and length of experience has been categorized to protect their identities further.

RESULTS

The transcripts were rich with data describing attitudes and beliefs regarding SCBA use. Initial objectives sought to analyze themes specific to SCBA; however, the narratives revealed similar attitudes and beliefs between SCBA and other PPE. The qualitative analysis revealed that certain cultural expectations, social and individual pressures impacted a firefighter's decision to use PPE. The axial coding grouped 13 nodes into 3 broader themes most salient to SCBA and PPE: Firefighter Image, Social and Individual Pressures, and PPE Empowerment (Figure 2).

Firefighter Identity

The transcripts described a firefighter's preferred image or identity as how firefighters see themselves, and how they are seen and want to be seen by society. Dirty gear, a tough attitude, and a macho persona were some of the examples firefighters used. The fire service contains a culture deep in tradition and image. The uniform is one of the most obvious reflections of that image. One firefighter explained how this image was instilled in him:

They're certainly something you aspired to be, so you want to be like that. And like that was burning coat, melted helmet, all black...and this is kind of weird to me – we have a huge push

right now not to get filthy.

John, Officer, 57 year old, 30+ years as a firefighter

Another firefighter described how the image of clean gear represents inexperience:

... when I first started working with the fire department,... I put my new turn-outs on, and they were like, we've gotta get you into a fire and get your turn-outs all dirty, because you look brand new.

Sheryl, Officer, 46 years old, 20+ years as a firefighter

In this example, the interaction between established firefighters and a newcomer is interesting not just because it portrays well-worn PPE as somehow more culturally optimal than new PPE but also because it suggests an identity that firefighters characterize as authentic. Sheryl was encouraged to consider and evaluate her PPE not for its safety functionality but for its ability to demonstrate the newcomer's belongingness to the culture.

The narratives also revealed authenticity as shaped not just by internal expectations related to the organization's internal culture but also society's perceived image of firefighters as risk takers:

Our society still has a romanticized notion of what firefighters do, which is kill themselves.

And we do everything we can in the fire service to reinforce that... They really believe – my bosses believe that we signed on to die. They actually believe that.

Anthony, Officer, 40 years old, 20+ years as a firefighter

A male speaker from a focus group added:

I mean, we're firemen, we don't like to be known as being overly safe, I guess.

Chris, Officer, 39 years old, 10+ years as a firefighter

Comments such as these both reflect and sustain the notion that authentic job performance involves not just an internal audience but also external stakeholders who associate excellent job performance with work behaviors considered dangerous. These stereotypical views could support an increase in risk-taking behavior.

In addition to describing how the occupational identity of firefighting reflects a value for risk-taking, participants also characterized decisions about PPE use specifically as a related behavioral outcome. One firefighter describes an instance where he felt a fellow firefighter prioritized image over safety:

He goes up one set of steps, he's on the second floor, finds the woman...he removes his SCBA while he's in the smoky environment and then proceeds to give her air. Which on TV looks like this sensationally heroic act, when really it's pure foolishness. Even when you're in an aircraft they tell you, get yourself oxygen before you help someone else. But because it would look good in the press, he takes his SCBA off, gives her air, takes her out. Now they, the both of them have been exposed exceedingly long compared to how quickly they would have been out.

Mike, Officer, 59 years old, 30+ years as a firefighter

In this example, a firefighter violates a well-known standard operating procedure about when the SCBA should be removed. Doing so provided him the opportunity to enact the idealized image of the courageous firefighter who endures greater hazards in order to rescue victims. The firefighter's own supervising officer cannot identify a substantive safety or procedural explanation for why the task of rescuing the victim was carried out in this way, concluding instead that the task was carried out more hazardously for purposes of identity work alone.

Based on the narratives, "firefighter image" is not only embedded within firefighter culture, but resulted in several situations where safe practices were unheeded. Although some firefighters note that a change in identity is slowly occurring, so-

ciety's perceptions coupled with strong traditions suggest a challenge in achieving widespread safety culture change.

Social and Individual Pressures

Pressures from goal seduction and situation aversion influence firefighter's decision making when working in the context of strong situations.¹⁵

Goal seduction. On several occasions firefighters viewed PPE as a barrier to accomplishing their goals. These situations arose when firefighters felt a sense of urgency to meet particular goals such as performing tasks at fast speeds, competing with other companies, rescuing others, or fitting in with fellow firefighters. One firefighter described how certain PPE could impede his ability to carry out specific tasks on scene:

...it's easier for me to pull my helmet off, and take a look, if I need to look up or whatever, or put my face piece on – it's just a lot easier not to use a chin strap, which can slow you down in certain things.

Xavier, Firefighter, 43 years old, 20+ years as a firefighter

In addition to convenience and ease of movement, participants also reported that PPE may not be worn because of pressure resulting from competition about being the first firefighting crew on scene. The "first in" crew to arrive takes at least temporary if not total control over the incident and is virtually guaranteed the coveted opportunity to encounter identity-enhancing tasks clearly associated with the public image of firefighters.²⁰

... you've got 2 fire companies going to the same run, and they both want to get there first...If you have to take time out to put your PPE on, and then get in the rig and then belt yourself in, there's time lost....all it is, is an excuse. So the proper procedure is to really get dressed, get in the seat, and buckle up. So what's happening in reality is people are getting dressed on the way. Consequently, it's difficult to do so if you're belted. So it's that competitive drive that we don't want to take away, but we want to control it. But that's what's killing us... .

Mateo, Officer, 54 years old, 30+ years as a firefighter

In this exemplar, the participant describes a common PPE related practice in his department that often results from the strong situation that is created when multiple companies are dispatched to the same fire. As Officer Mateo suggests, the importance of competing successfully with other crews to arrive first is elevated above the competing need to arrive at the fire safely and without significantly endangering themselves (ie, not wearing seatbelts and donning PPE properly) or the citizens they intend to serve (ie, other drivers who share

the roads) in the process. For obvious reasons, victims and property owners related to the emergency scene benefit when firefighters compete to arrive on emergency calls sooner rather than later. Nevertheless, the goal seduction results in misaligned priorities that arguably endanger both incident victims and the general public.

In addition to influencing behavior regarding PPE use, the desire to respond to incidents quickly affected compliance with other safety policies. This notion was represented by both volunteer and career firefighters:

When it comes to responding to the scene, I try to go as fast as I can, I want to obey the law, but the name of the game is if you've got a full arrest and someone is dead on the floor, the sooner you can get there, the better you are. So yeah, I mean, there's pressure to get there quick. And whether it's blue lights, I try to use whatever I can to get there as fast as I can, and I'd be lying if I said I didn't break the speed limit on occasion...

Bill, Firefighter, 32 years old, less than 10 years as a firefighter

Examples of goal seduction were also apparent when firefighters felt the need to fit in with their peers. Fitting in resulted in imitating others' unsafe behaviors. In one interview, a firefighter recalled his early days in the service and his attempt to fit in:

And I remember when I first got on the job it was a time where the people before me didn't wear packs, right. So I wanted to be like them...

Paul, Firefighter, 47 years old, 20+ years as a firefighter

Situation Aversion

In addition to goal seduction, the transcripts also revealed instances where firefighters were *motivated away* from safe behavior due to perceived aversive situations. Avoiding ridicule and harassment from peers led some firefighters to forgo PPE use. One firefighter recalled conflicting messages between training and real world use of SCBA because of peer-pressure:

When I started as a firefighter – I mean my experience was that you got frowned on for wearing your breathing apparatus. Come on, don't be a sissy, you don't need that. Get in here and fight that fire, you know, and it contradicted for me my training. In my rookie training they emphasized wear your breathing apparatus, and then I get in the station and I'm working with an officer whose been in the fire service a long time where that culture was different – very different than what I was trained on. We got frowned on somewhat. I mean I felt some peer pressure that was like, aw man, he wears his breathing

apparatus.

Jake, Officer, 52 years old, 30+ years as a firefighter

Another firefighter added:

I think part of the problem too is...if we're doing long overhaul in a big warehouse area, it's hot and it just sucks and it's [the mask] right on your face and it's all sweaty and nasty, so you just want to pull that off too. So I think part of it's just a lack of good equipment that's not so cumbersome, you know, because if you had something that was lightweight, fresh air, easy to use, hey, yeah, I'll throw that on versus nothing or versus leaving this big old nasty thing on while there's no visible threat.

Alex, Firefighter/Paramedic, 30 years old, 10+ years as a firefighter

The firefighter's description of overhaul as containing "no visible threat" expresses ignorance of the products of combustion and their known risks to human health.

Given that firefighters need to wear PPE to protect themselves from the hazardous conditions, *situation aversion* and *goal seduction* seem particularly salient in the fire service. It is important to understand the context in which firefighters experience social and individual pressures and the impact these pressures have on their decision making.

PPE Empowerment

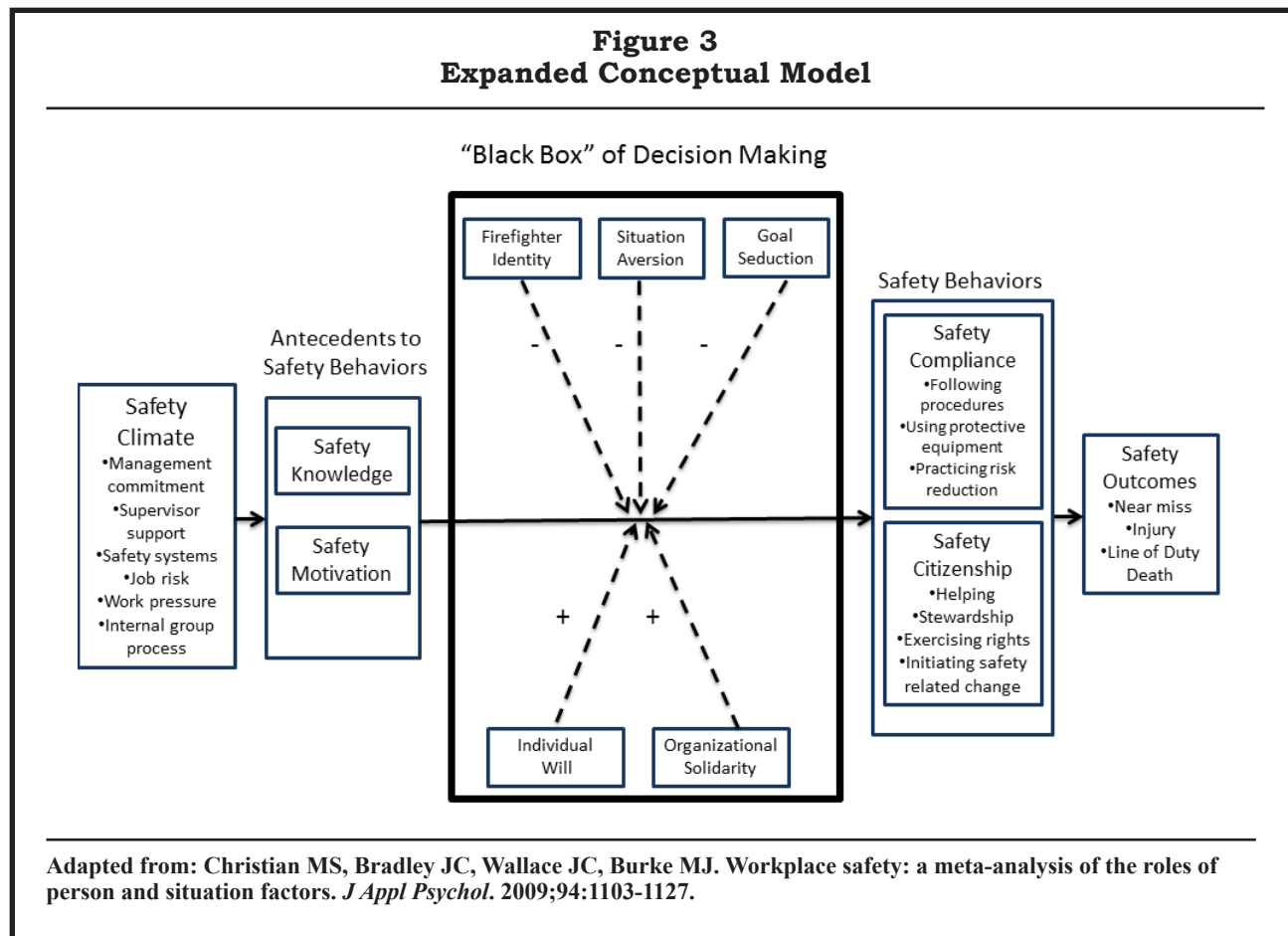
The transcripts revealed situations where firefighters' overcame pressures from goal seduction, situation aversion, and firefighter image in ways that *empowered* PPE use. Such empowerment emanated from 2 factors – individual will and organizational solidarity.

Individual will. Some participants talked about how their knowledge of risks was the driving force that led them to comply with PPE use. These unique participants discussed how knowing the risks of their job, and how to prevent them drove them to comply, even when the rest of their peers were non-compliant or even ridiculing their choice to use PPE. Their training, and concerns for respiratory disease or cancer, empowered them to rise above goal seduction and situation aversion to make conscious decisions to wear their PPE:

Something that's stuck with me that was told to us in the academy was, if you feel like you... still need to wear your mask and breathe air, even though somebody on your crew may not be, then do that, because that saves you. So don't worry about if this person's going to make fun of you because you're still breathing air...I mean, if you're going to make fun of me, you're going to make fun of me, but I'm not going to use an inhaler later on in my life.

Kate, Firefighter, 33 years old, less than 10

Figure 3
Expanded Conceptual Model



years as a firefighter

Another participant vividly described his justification for continuing to wear his air pack, even when others on his crew were encouraging him to take it off on a particular fire run:

I carried it. It's still smoky, and I'm not taking it off until it's empty...And I'm looking around, and everybody's hacking horribly from the poison. Everybody's got snot's running down their nose....[They told me] 'oh, no, you're all right. Come off the pack.' I'm looking around like nope, I'm not doing it, and I caught hell for it. But you know what?...I did what I had to do and left the pack on.

Frank, Firefighter, 40 years old, 10+ years as a firefighter

Our participants used training as a basis for decision making to reduce exposures out in the field:

Pretty much everybody except really old lieutenants have no problem putting on their pack and wearing air, because we have been educated of the negative.

Frank, Firefighter, 40 years old, 10+ years as a firefighter

Whereas this participant does not explicitly say 'cancer' or other respiratory diseases, he is discussing his knowledge of the known poisons and carcinogens within his work environment. As referenced by the initial quote, training at the fire academy is an important educational opportunity for firefighters to learn best practices, while also empowering them with the knowledge to overcome peer pressures by using facts to advocate for their personal health and well-being. This combination could be powerful to steer firefighters towards PPE compliance.

Organizational solidarity. Firefighters were more inclined to wear PPE when support from their leaders and peers was present. Certain practices and actions from leadership were identified as promoting safe behavior amongst rank and file firefighters. When asked about expectations in regards to enforcing safety policies within a firehouse, one fire chief described how his staff leads by example:

I mean, we have Chief Officers that don't neces-

sarily go into a building. They know that coming to the fire, but I always instill in their heads that it's important that they do wear PPE just to set the example, set the tone. If firefighters see you walking around without proper PPE, then they tend to want to do that, too.

Mateo, Officer, 54 years old, 30+ years as a firefighter

Additionally, PPE use could be more ubiquitous when monitored and practiced as a team. Some firefighters reported how looking out for one another is one way they make sure PPE is used properly. As one firefighter stated in a focus group:

We go on the scene, look at a scene with what your brother or your sister's wearing, and make sure you following suit with that. I mean especially going on the fire scene, we want to make sure we have our PPE on, if we got to look at our buddy here or our brother, make sure that he's properly donned, got all his stuff on because any exposure could mean his life... .

Dan, Firefighter, 32 years old, less than 10 years as a firefighter

DISCUSSION

This study provides an understanding of firefighters' attitudes and beliefs regarding PPE use. Based on a larger safety climate survey development study and an arguably more representative sample, our findings affirm the work of Bearman and Bremner¹⁵ in that goal seduction and situation aversion constrain how firefighters comply with organizational directives about proper use of PPE. More importantly, our findings extend this model in ways that may enhance its explanatory value. Our analysis introduces the concept of social identity as a factor that may explain non-compliant responses to strong situations. As visualized in Figure 3, firefighter identity, situation aversion, and goal seduction apply pressure against safety knowledge and safety motivation, generating a negative effect on behaviors. Individual will and organizational solidarity are opposing forces, promoting safety compliance. We proffer these factors as potential explanatory constructs in the "black box" of firefighter decision making and as potential mediators in the pathway between antecedents to safety behavior and safety behaviors.

Theoretical Implications

Our findings not only affirm and add conceptual detail to the work of Bearman and Bremner,¹⁵ but also find that firefighters have difficulty in accomplishing certain goals while wearing PPE (ie, goal seduction) and suggest that peers think less of them if they use PPE during previously defined tasks (ie, situation aversion). These findings add additional constructs and new conceptual details to the Bearman and Bremner¹⁵ model that may not only improve the explanatory value, but also pro-

vide insight into best practices for improving safety compliance in organizations.

In addition to learning that goal seduction and situation aversion inhibit adoption of desired behavior, we found that these 2 barriers to compliance may occur simultaneously. Specifically, we found that those who indicated that PPE inhibited goal accomplishment, thereby forcing them to neglect their PPE, also felt as though their peers would ridicule them for being "soft" or not a true firefighter if they used PPE in certain situations (ie, situation aversion). The simultaneity of goal seduction and situation aversion may create a compounding effect, making it more likely for individuals to neglect their PPE, and therefore, be less safe while working.

Our analysis also identified the socially recognized meaning of safety-related tasks, and the implications for preferred identity to assess the likelihood that tasks will be interpreted in ways that encourage goal seduction and situation aversion. For example, the dictum that firefighters follow proper emergency driving procedures when going from the fire station to emergency incidents may seem quite rational and reasonable to organizational leaders with responsibility for insuring safety. However, to firefighters, this seemingly logical expectation may conflict with the strong desire to rescue others.²⁰ Indeed, we learned that it is not uncommon for firefighters to consider such expectations a threat to their preferred identities as heroes, who consider rescuing citizens more valuable than the need to maintain safety procedures and avoid traffic accidents *en route* to emergency incidents. Organizations seeking to encourage and reinforce compliance with safety-related procedures may need to examine the degree to which members perceive the desired behavior is at odds with their personal notions of occupational authenticity.

Additionally, when the socially recognized task meanings and collective pressure from the group are acknowledged, this has implications for the mitigation strategies leaders may enact when attempting to minimize the impact of these group processes. For instance, when group supervisors lead by example, this increases the probability that strong situations will not be derailed by pressures from goal seduction. Furthermore, leaders may choose to resist these pressures from within the group by acknowledging them and cultivating a more progressive safety climate that highlights how compliance will be expected, rewarded, and supported by characterizing compliance as consistent with the group's identity needs rather than in conflict. Another implication suggested by this analysis is that individuals may fail to respond compliantly to strong situations as a result of pressures emanating from the group. Scholars who have examined responses to strong situations appear to begin with the assumption that responses to strong situations are shaped mainly by individual perceptions. To the contrary, our findings

indicate that the pressures resulting in situation aversion and goal seduction also may emanate from group level phenomena, such as the extent to which group members consider safety directives as threats to the maintenance of identity. Indeed, it may be useful for scholars to conceptualize individual responses to strong situations as potentially reflecting not just the attitudes and beliefs of individuals and bureaucratic structures like standard operating procedures, but also partial consequences of unobtrusive control processes in groups.^{22,34}

Within such a framework, safety compliance stems from individual beliefs and attitudes and the related actions of supervisors, in addition to the “peer pressure” around relevant behavioral norms that individuals perceive they should follow to maintain preferred identity, what scholars have called concertive control.^{29,35} In other words, rational control processes are only part of the puzzle. Organizations may have well-considered rules in place that are clearly communicated and provide rational sanctions and rewards and resources to support compliance. Nevertheless, employees still may fail to comply for reasons that are much more related to personal identity needs than bureaucratic concerns. Many projects that examine problems with safety compliance in general assume that workers will use PPE properly or not depending on more formal, rational control processes, such as training and the enforcement of formal rules. These data indicate that even when organizations train employees on proper procedures and provide employees with the resources (eg, equipment, training, time) necessary to play by the rules, PPE compliance may still be constrained by identity related barriers that emerge in strong situations. Such a conclusion points to the potential utility of measurement that assesses the extent to which safety norms at the group level are consistent with organizational expectations. Currently we assess group norms in term of how positive and negative they are and the degree to which they are shared in the group.³⁶ These are valuable measures, but it would also be useful to know about the degree of overlap between what is normative in the group versus the organization.

Although pressures from goal seduction and situation aversion could deter compliant PPE use, our findings suggest solutions do exist. Our analysis revealed that prioritization of safety by leadership and peers promotes PPE solidarity by encouraging use. This top-down approach is a necessary strategy in mitigating negative influence from social and individual pressures, especially in an industry where leaders and veteran firefighters exhibit a strong influence on rank and file. We distinguish such organizational solidarity from the strongest first order principle of safety climate – management commitment to safety.³⁷ Organizational solidarity is different in that it is *both* management and peer influence on the uptake of safe behaviors by the employees. We posit that its impact is on

“real time” decision making by the employee, as opposed to the pre-existing management commitment to safety reflected in policies, procedures, and practices prior to the adoption of safety behaviors. For this reason organizational solidarity is placed downstream from management commitment in our conceptual model (Figure 3). If the goal to fit in results in new recruits mimicking non-compliant behavior, then situations where supervisors and other veteran firefighters demonstrate compliant PPE use should encourage new recruits to wear PPE appropriately. Our results suggest that leading by example may counteract pressures from goal seduction. As Bearman and Bremner¹⁵ found, the desire to achieve a goal and avoid an aversive situation can occur simultaneously.

Although heard less frequently, our analysis identified that firefighters can summon individual will to overcome pressures from goal seduction and situation aversion. As referenced by firefighter Kate, understanding that they will encounter social pressures that discourage PPE use, and acknowledging the health dangers of PPE non-compliance as a risk factor for future disease and illness, supports the decision to act against the prevailing practice of operating without gear. Overcoming negative social pressures should be taught as an essential competency at fire academies nationwide. Our findings are complimentary to previous research that showed a firefighter’s intention to engage in safe behavior is strongly related to personal and fellow firefighters’ safety beliefs and behaviors.³⁸

Conclusions

Understanding situations where PPE use is both practiced and neglected is imperative in improving fire service safety culture and safety outcomes. This research illustrates the importance of utilizing qualitative data to understand perceptions and social norms about PPE use within the fire service. Peer-pressure and leading by example at the peer and organizational levels appear to be essential considerations firefighters undertake when choosing whether or not to engage in safety behavior. Future research should include incorporation of these considerations into intervention, implementation, and evaluation of safety practices at all levels of the fire service.

Human Subjects Statement

Informed consent was obtained from all participants prior to the interviews and focus groups. All procedures were approved by the University’s Institutional Review Board and by the Department of Homeland Security’s Regulatory Compliance Office.

Conflict of Interest Statement

None of the authors have competing financial interests.

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