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Moving FOCUS – The Fire Service Organizational Culture of Safety survey – From research to practice

Andrea L. Davis [a], Joseph Allen [b], Lauren Shepler [a], Christian Resick [c], Jin Lee [d], Richard Marinucci [e], Jennifer A. Taylor [a,*]

[a] *Dornsife School of Public Health at Drexel University, United States*
[b] *University of Utah, United States*
[c] *Drexel University LeBow College of Business, United States*
[d] *Kansas State University, United States*
[e] *Fire Department Safety Officers Association, United States*

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ABSTRACT

Introduction: FOCUS, the Fire Service Organizational Culture of Safety survey, has evolved from a research to practice enterprise within the United States fire and rescue service. The FOCUS tool was developed through a FEMA Assistance to Firefighters Research & Development grant. Then it moved to practice in the field. To date over 35,000 firefighters have participated. A current FEMA Fire Prevention & Safety grant can support FOCUS assessment in up to 1,000 fire departments, with the potential of nearly 120,000 respondents. With each funding cycle, the goal of the FOCUS program is to grow and measure its research to practice impact. *Methods:* We describe how FOCUS safety culture results are disseminated to fire service stakeholders. By utilizing customized reports and a training curriculum we demonstrate how FOCUS is moving research to practice by: (1) illustrating how survey results can be delivered effectively to practitioners, (2) providing examples of how fire departments are using results, and (3) sharing the reactions of the fire service to the FOCUS instrument, reports, and our flagship data training curriculum – Culture Camp. *Results' Conclusions:* Qualitative and quantitative data are analyzed to demonstrate the impact and acceptance of the FOCUS report and Culture Camps. Stakeholders reflect on the report and the experience of having quantitative safety culture data. Culture Camps are evaluated qualitatively and quantitatively using a matching game exercise, pre/post-test, a fire department teach back, and a Qualtrics evaluation. *Practical Applications:* Traditionally, the fire service has focused on reducing negative safety outcomes. FOCUS is helping shift their attention further upstream in the prevention pathway through the measurement of important organizational outcomes. The research to practice evolution of the FOCUS program may hold utility for other occupational groups when considering how to steadily move occupational health and safety research to practice in the field for measurable impact.

1. Introduction

Safety climate has been an important metric for organizational culture assessment in a multitude of occupations for decades. First discussed by Zohar in 1980, safety climate is employees shared perceptions of their organization's policies, procedures, and practices related to safety, and the types of behavior that are supported and rewarded by leadership in the organization (Zohar, 1980). Strong evidence of the relationship between safety climate and safety outcomes emanates from multiple studies, the most compelling being a meta-analysis of over 200 studies across varied countries and industries (manufacturing, commercial fishing, offshore drilling, etc.), which concluded that safety climate offers robust prediction of fatalities, injuries, and near-misses (Christian, Bradley, Wallace, & Burke, 2009; Beus, Payne, Bergman, & Arthur, 2010; Nahrgang, Morgeson, & Hofmann, 2011). Recent research also finds that improvements to safety climate result in improvements to organizational outcomes - not traditionally thought of as 'safety' outcomes - such as turnover, job satisfaction, employee engagement, and morale (Huang, Lee, & McFadden, 2016; Taylor, 2011). These costly organizational outcomes are very important to safety in any organization, but partic-

* Corresponding author at: Department of Environmental & Occupational Health, Dornsife School of Public Health at Drexel University, Nesbitt Hall, Room 655, 3215 Market Street, Philadelphia, PA 19104, United States.

E-mail address: jat65@drexel.edu (J.A. Taylor).

ularly in the fire service, where improved employee engagement and retention translates into more experienced firefighters and greater team cohesion - both of which are vital for survival in such a high-risk occupation.

1.1. Safety climate in the fire service

The impetus to develop a fire service specific safety climate survey originated from the United States Fire Service. In 2004 the National Fallen Firefighters Foundation held the inaugural National Life Safety Summit where fire service leaders and researchers came together for a two-day meeting to develop a research agenda. Participants identified 16 critical fire service initiatives. National Life Safety Initiative #1 reads: "Define and advocate the need for a cultural change within the fire service relating to safety; incorporating leadership, management, supervision, accountability, and personal responsibility" (National Fallen Firefighters Foundation. Firefighter Life Safety Initiatives). Proceedings from the subsequent Indianapolis Mini-Summit report (April 13, 2005) showed that the fire service is ready to examine their culture and enact change:

> The issue that has been identified most consistently as the key factor in reducing firefighter fatalities and injuries is a change in the prevailing fire service culture with regard to safety [which] glorifies the acceptance of extreme personal risk far ahead of the thoughtful analysis and management of risk factors. Instead of having a commitment to safety incorporated into the fundamental values of the fire service, in too many cases safety is considered as an afterthought and an inconvenience. This cultural orientation allows firefighters to feel justified in violating established safety standards and regulations, if they are perceived as a hindrance to a more important mission (National Fallen Firefighters Foundation. Indianapolis Mini-Summit).

While the terms 'culture' and 'climate' are two empirically and theoretically distinct constructs, we have consciously chosen to use the term 'safety culture' when communicating with the fire service. This term is widely understood and accepted by the occupation, as illustrated above. Given that the fire service did not have a way to measure its safety culture, there was an obvious need for an industry-specific safety climate tool. While a generic safety climate scale could have been employed, previous research showed that industry-specific safety climate tools are more robust predictors of future near misses, injuries, and line of duty deaths (Huang et al., 2016). Through Federal Emergency Management Agency (FEMA) Assistance to Firefighters Grant Research and Development funding, the Fire Service Organizational Culture of Safety (FOCUS) survey was developed and validated (Taylor & Davis, 2019). FOCUS emerged from an exploratory sequential design: qualitative inquiry that developed candidate survey items, followed by psychometric evaluation and validation of data from over 10,000

respondents in a geographically-stratified random sample (757 stations from 132 career and volunteer departments representing all 10 FEMA regions). There are two dimensions to FOCUS: Management Commitment and Supervisor Support, each measured with seven items. In addition to these, other previously validated scales are included on the FOCUS survey (burnout, work engagement, and job satisfaction) so that organizational outcomes can be measured in conjunction with safety outcomes (Maslach & Jackson, 1981; Schaufeli & Salanova, 2002; Sexton & Helmreich, 2006). FOCUS has a negative relationship with injury rates and burnout, and a positive relationship with job satisfaction, work engagement, and safety behaviors (Taylor & Davis, 2019).

Occupational safety and health professionals, like other scientific disciplines, can be slow to translate evidence-based innovations into real-world practical applications (Dugan & Punnett, 2017). Dugan and Punnett explain that the practice of dissemination needs to be a careful consideration when planning how scientific research will be translated for the occupational group to benefit from the research. The context within which the occupational group works and how the findings should be communicated are important points to address when developing a dissemination plan (Dugan & Punnett, 2017). This is a critical step for FOCUS dissemination, or else the fire service will be unaware of the opportunity to assess their safety culture and they will not be involved in the data training opportunities available to their departments. This is complementary to the Research-to-Practice (r2p) initiative advocated by the National Institute for Occupational Safety and Health (NIOSH). NIOSH's r2p framework includes six components, including "transferring findings to the public or private sector," "communicating findings to target audiences," and "evaluating the efficacy of efforts aimed at improving worker health and safety" – all of which are relevant to the research to practice evolution for FOCUS described herein (National Institute for Occupational Safety and Health).

The purpose of this paper is to describe the practice efforts that took place after the research and development of FOCUS, specifically how results are disseminated to fire departments. Through customized reports and a data training curriculum we demonstrate how FOCUS is moving research to practice by: (a) illustrating how science-based survey results can be delivered effectively to practitioners, (b) providing examples of how fire departments are using the results, and (c) sharing the reactions of the fire service to the FOCUS instrument, reports, and our flagship data training curriculum - Culture Camp.

1.2. The path to practice

The FOCUS tool was developed and validated through a FEMA AFG Research & Development grant (Fig. 1, Box 1). Then it moved to practice through a FEMA Fire Prevention & Safety grant (FP&S)
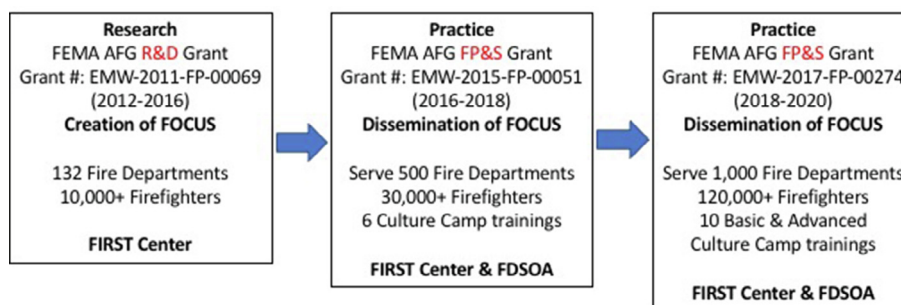

Research	Practice	Practice
FEMA AFG R&D Grant	FEMA AFG FP&S Grant	FEMA AFG FP&S Grant
Grant #: EMW-2011-FP-00069	Grant #: EMW-2015-FP-00051	Grant #: EMW-2017-FP-00274
(2012-2016)	(2016-2018)	(2018-2020)
Creation of FOCUS	**Dissemination of FOCUS**	**Dissemination of FOCUS**
132 Fire Departments	Serve 500 Fire Departments	Serve 1,000 Fire Departments
10,000+ Firefighters	30,000+ Firefighters	120,000+ Firefighters
	6 Culture Camp trainings	10 Basic & Advanced Culture Camp trainings
FIRST Center	**FIRST Center & FDSOA**	**FIRST Center & FDSOA**

Fig. 1. Evolution of the FOCUS program from research to practice.

which concluded with 417 fire departments and 35,256 firefighters participating in the FOCUS assessment, and six FOCUS Culture Camp trainings (Fig. 1, Box 2). FEMA R&D grants create a partnership between science and the fire service with the goal to reduce firefighter deaths and injuries, with fire service partners involved in all phases of research (Federal Emergency Management Agency). FEMA FP&S grants are intended to disseminate work conducted previously under the R&D mechanism (United States Department of Homeland Security). A subsequent FP&S grant (Fig. 1, Box 3) is currently supporting FOCUS assessment in up to 1,000 fire departments, with the potential of nearly 120,000 respondents, and the capability to hold 10 FOCUS Culture Camp training sessions. With each funding cycle, the goal of the FOCUS program is scalability, growing its research to practice impact.

1.3. Industrial-academic partnership

The two FP&S grants were awarded to a partnership between the research team and the Fire Department Safety Officers Association (FDSOA). This partnership was a natural fit, given that many fire departments tasked their designated safety officer with FOCUS assessment. The FDSOA's mission statement is to "champion and influence safety practices and standards for all emergency responders by providing education, certification, and networking for safety officers" (Fire Department Safety Officers Association). The organization has an extensive curriculum for certifying Incident Safety Officers and Health & Safety Officers around the country. Their depth of experience with trainings and their target audience within the fire service made for a rich and valuable partnership between industry and academia.

2. Science to practice delivery methods and processes

2.1. FOCUS report design and interpretation

To return FOCUS results to participating fire departments in a visually compelling and easily digestible format, the FIRST Center partnered with a Tableau data visualization vendor to design the FOCUS report (Tableau, version 10.4, www.tableau.com). The FOCUS report underwent multiple rounds of revisions and is constantly evolving to include additional synthesis and updated research. The current format of the FOCUS report will be described herein, which incorporated suggestions from our fire service partners and design elements from our research team. Care was taken to ensure that our stakeholders were presented with their data in a way that accurately described what is known about their department, illustrated with specific metrics, and showed the relationships that exist between safety climate and important outcomes (Ola & Sedig, 2014; Berner & Moss, 2005; Keough, 2002). The FOCUS report contains the following items:

Orientation to report
- Title page
- FOCUS Terms to Know
  o Component definitions & items
- Relationship between FOCUS & injury/organizational outcomes
- Overall sample statistics
- Report guide with symbol key & FEMA region map

Department Data
- Department demographics
- Department-level data
- Benchmarks
- Station-level data
- Organizational outcomes

o Job Satisfaction, Burnout, Engagement

Based on feedback from the fire service regarding ease of interpretation, results from the FOCUS survey were rescaled from 5-point Likert to a 100-point scales. A full mock FOCUS report is available upon request.

The FOCUS report begins with a title page that incorporates important pieces of information for the fire department reviewer, including the fire department name, the date range of FOCUS assessment, and how many fire departments and respondents participated in FOCUS as of the time their data were analyzed. Because a fire department can be benchmarked to other participating fire departments within this report, these statistics are placed in multiple locations throughout the report.

Included in the front matter of the FOCUS report is a 'Terms to Know' glossary defining key concepts included in the report, including a definition and list of items in each measured construct. This section of the report serves as an important refresher for departmental members when they are reviewing their results, providing diagnostic information when meditating on why a score may be higher or lower.

The next section of the FOCUS report includes a one-page description of the relationship between FOCUS score, injury, and organizational outcomes (Fig. 2). This page of the report serves as the 'why' behind safety climate assessment in the fire service, inspiring a strong interest in safety climate scores among departments, labor-management teams, and members.

By clearly showing that there is a relationship between FOCUS score and multiple outcomes, fire department stakeholders can begin to set goals to envision how their safety and organizational outcomes can be maintained or positively changed through safety climate intervention.

2.2. Overall sample statistics

Next in the report is benchmarking data such as how many departments and respondents participated in FOCUS assessment at the time of report generation. This is important data for the reviewer so that they can better understand the subsequent information that follows. This page contains the sample mean and range for each FOCUS dimension (Management Commitment, Supervisor Support), along with each Organizational Outcome including Job Satisfaction, Burnout, and Engagement.
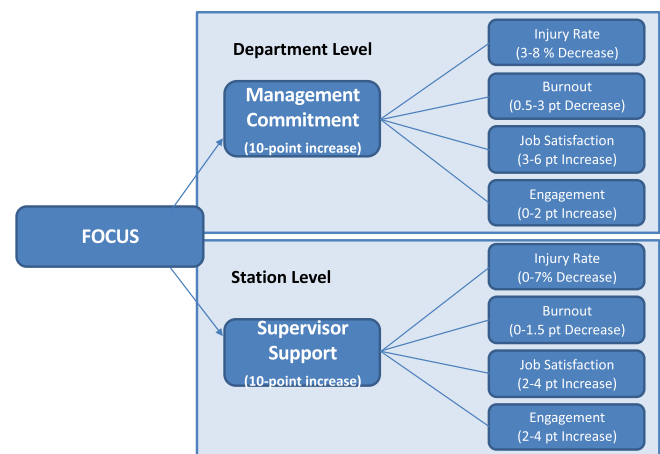

Fig. 2. Relationship between FOCUS score and Safety/Organizational Outcomes (Taylor & Davis, 2019).

The last section of the front matter includes a guide to symbols found throughout the packet, like defining that "A/T" represents "Administration and Training" or that "n" is the total number of respondents or departments. On this page a map of the ten FEMA regions in the United States is included, so reviewers can understand to whom they are being compared in various benchmarks within the report.

2.3. Department demographics

Department-specific information begins with a Demographics page. This displays information provided by the fire department when they enrolled in FOCUS assessment. The responses used to conduct their FOCUS analysis are: FEMA region, population served, call volume, number of stations, total roster size, total number of FOCUS survey respondents, and the overall department response rate. Also visualized on this page is a histogram showing all stations within the department arranged by descending response rate. Stations who achieved the required 60% response rate are color-coded in green, and those stations who did not achieve the 60% response rate are greyed out. To secure sufficient variability in perspectives, a minimum 60% response rate – a standard in safety climate research- was obtained at each fire station in participating departments (Anseel & Lievens, 2010). On this page, report reviewers can see an overview of how successful their department was with FOCUS survey administration—both at the department-level and station-level—informing them of the validity and reliability of the subsequent report sections.

2.4. Department level data

Report reviewers then turn to the 'Department Level Data' page (Fig. 3). Here they find a color-coded department-level response rate. If they met the minimum 60% response rate requirement, the numbers are green. If they did not achieve the required 60% response rate, the numbers are red. They are also reminded of the "n," the total number of respondents that participated in FOCUS assessment. Then they see their overall FOCUS score for the department, displayed on a 100-point scale. Individual scores for both components of FOCUS—Management Commitment and Supervisor Support—are also displayed. A double arrow moving from their FOCUS score to the two components of FOCUS act as a visual cue that their FOCUS score is the average of both component scores. Further down on this page, the department is compared to other participating departments in a few different visual formats. The average and ranges for FOCUS, Management Commitment, and Supervisor Support are displayed next to the department score for each. The same numeric score ranges are then displayed through histograms so that fire departments can see how they sit within the entire sample. FOCUS scores by FEMA region are displayed on this page through scatterplots, as another visual tool for reviewers to use to understand their data.

2.5. Benchmarks

When presenting the developing FOCUS report at national fire service conferences, participants suggested several useful benchmarks. Therefore, the report includes population served, call volume, and roster size, comparing a department to others who participated in FOCUS (Fig. 4). Departments can also review histograms comparing a department's FOCUS, Management Commitment, and Supervisor Support scores.

Within each histogram, the range, average, and department scores are repeated. A yellow horizontal line running through the histogram indicates the average score, the navy bar indicates the specific fire department within the histogram, and the grey bars are other participating fire departments. All of these design elements help fire departments understand their data and how their results compare to other participating fire departments.

2.6. Station level data

On the next page, reviewers see scores for FOCUS, Management Commitment, and Supervisor Support, displayed at individual stations rather than at the department-level (Fig. 5). Within each of the three panels that display a different metric, the department average is shown at the top. Then, based upon the department average, stations are color-coded red (if below the department average), yellow (if they fall at the department average), or green (if they are above the department average). Stations who did not achieve the minimum 60% response rate are greyed-out so that fire department reviewers know that these data are unreliable. Each station is identified by their number, response rate, and total number of respondents.

2.7. Organizational outcomes

The last metrics displayed in the FOCUS report are scores for organizational outcomes, including job satisfaction, engagement, and burnout. These metrics are displayed at the station-level and follow the same layout as just previously described (i.e. color coding, station number, total number of respondents, and response rates). They also include a definition of each organizational outcome to refresh the reviewer on what this metric is measuring. For **job satisfaction**, these items were asked of respondents thinking about their work overall in the fire service. Because our research team knew of the psychologically-demanding differences between EMS and fire suppression aspects of their work, we felt it would be useful for fire departments to see if differences in scores existed between the two domains, so respondents answered **engagement** and **burnout** items twice—once when thinking about their work on an EMS run, and then again thinking about their work on a fire run (Figs. 6 and 7).

Burnout scores are typically higher on the EMS run panel versus the fire run panel. And engagement scores are typically higher on the fire run panel versus the EMS run panel. It is important to note that the burnout scores are the only metric within the report where lower scores are interpreted as more positive (i.e., the higher a station's burnout score, the more burnout those members are experiencing). For most fire departments, these two pages of the FOCUS report are striking, especially when seeing their differences in burnout and engagement scores by color-coding.

3. Report delivery and practical education for fire service stakeholders

With the report in hand, departments then needed an opportunity to further discuss the reports, learn how to more fully interpret the numbers, and understand what it means for them and their department. Although the report provides much of the information needed, to fully benefit from the science-based practical impact of FOCUS, two major processes were deployed. First, **consultation calls** were provided for departments for the purpose of one-on-one interpretation and discussion. Second, **FOCUS Culture Camps**, trainings with both lecture and interactive learning environments, were organized for participating departments to gather and learn about FOCUS data together. We turn our attention to these two practices now to provide a greater understanding of how we helped fire service stakeholders become competent and confident with their safety climate data.
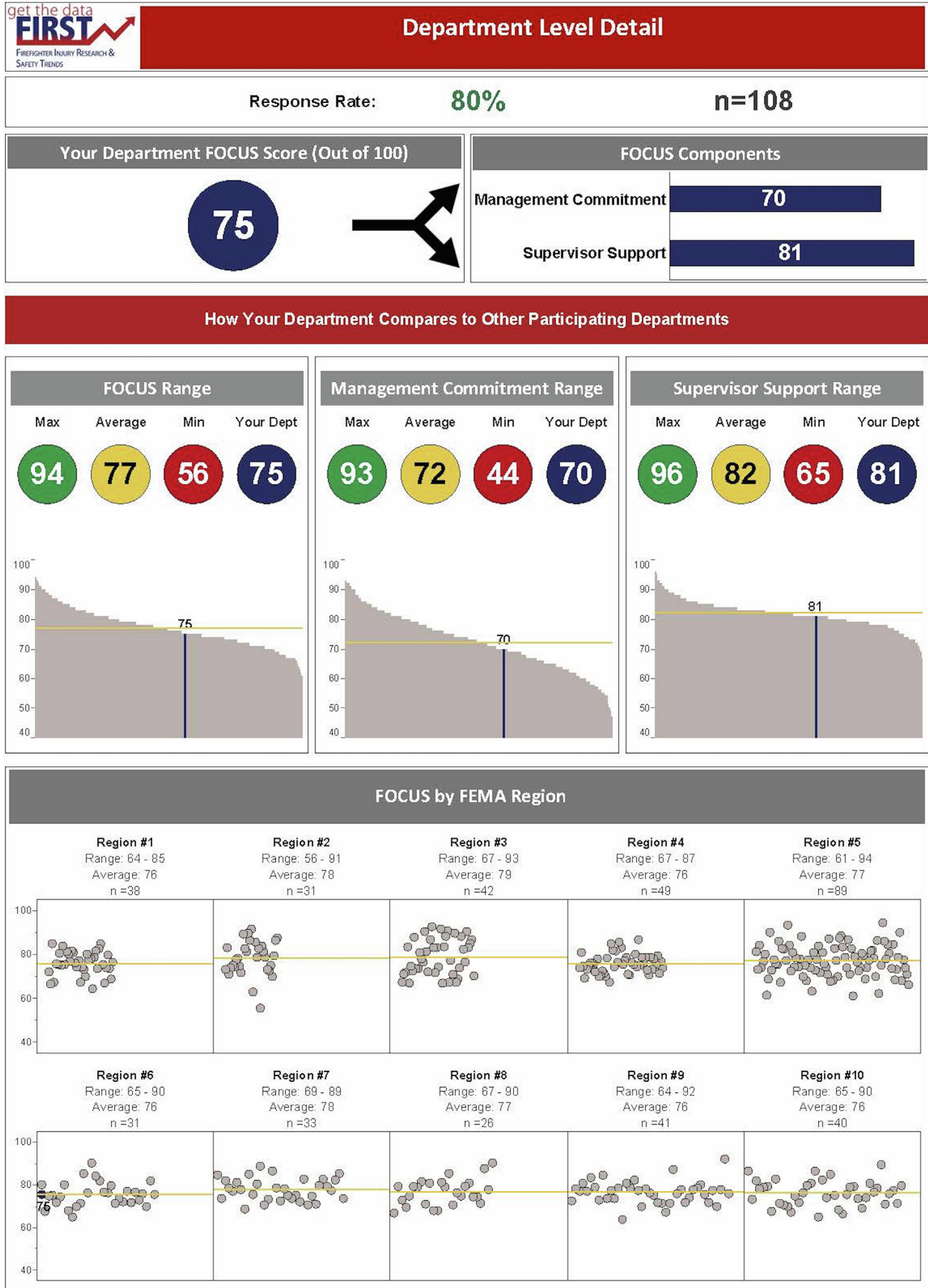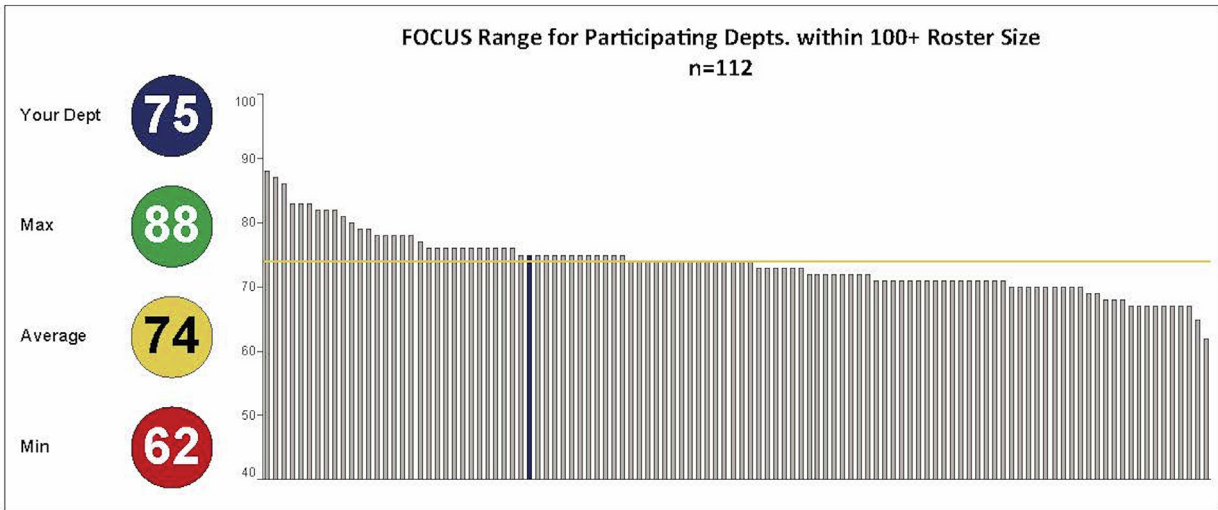
Fig. 3. Department Level Data Page.
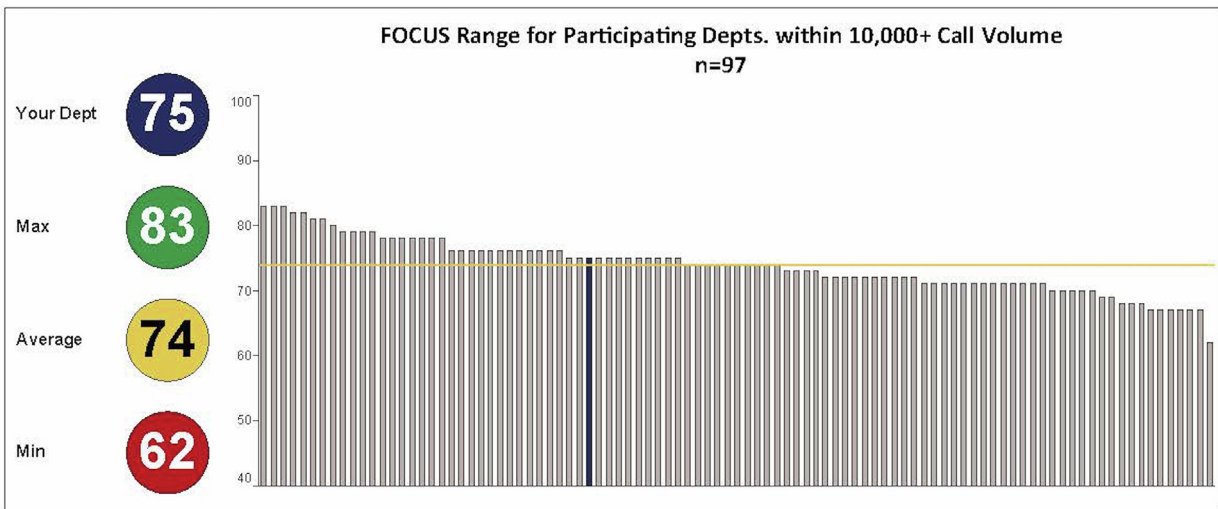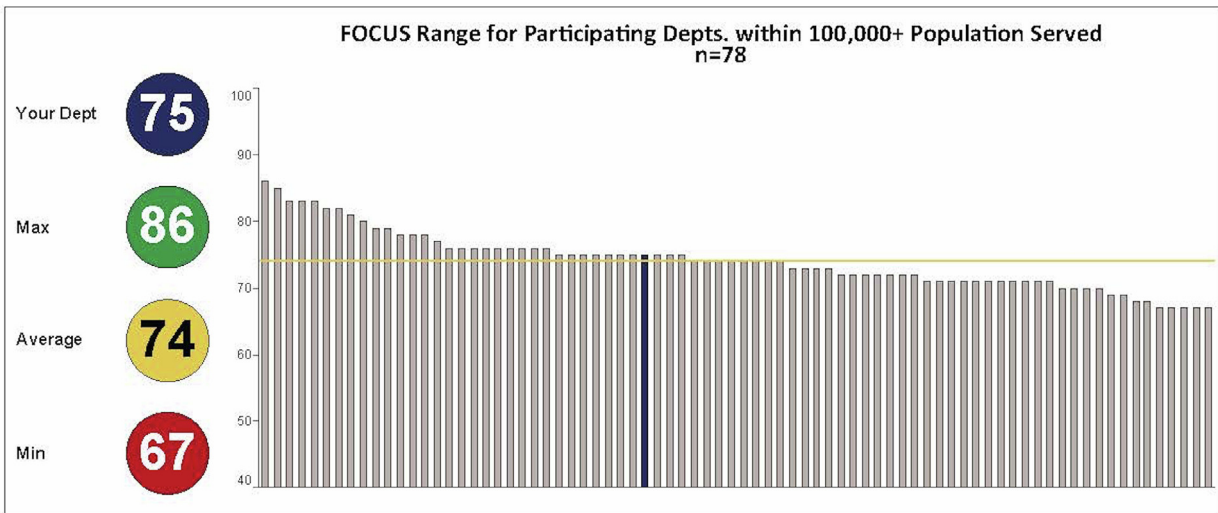
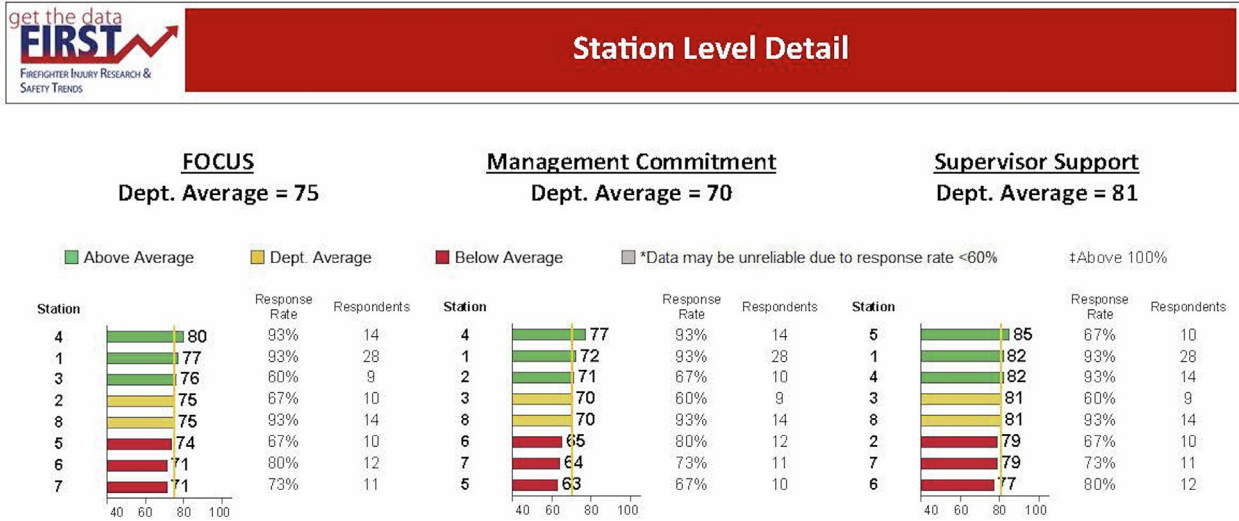**Fig. 4.** Benchmarks by population served, call volume, and roster size.
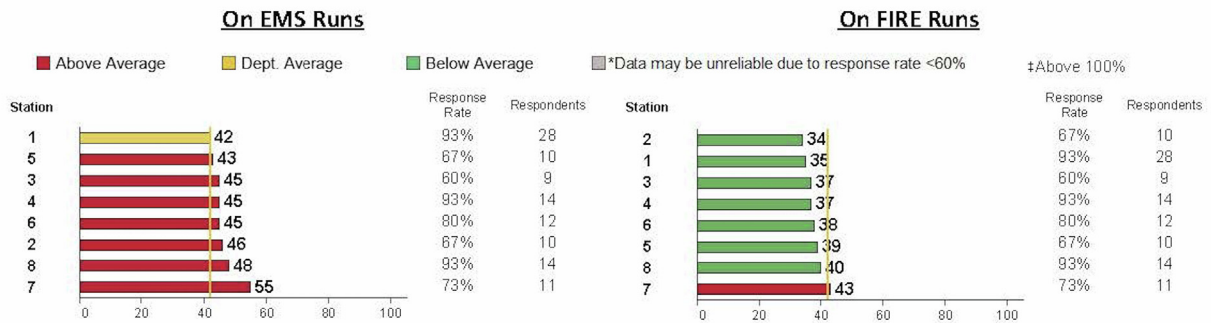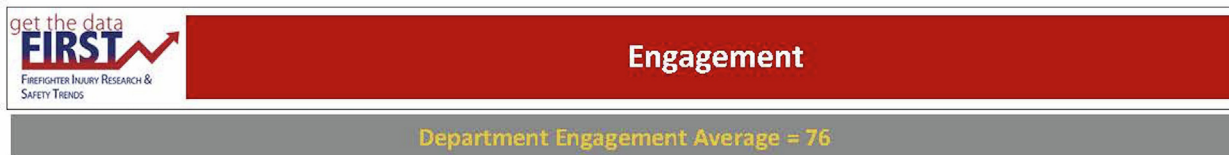
Fig. 5. Station Level Data.

Fig. 6. Burnout data displayed by EMS run or Fire run.

3.1. FOCUS consultations calls

Once FOCUS results were ready to be shared with fire departments, they were invited to participate in a one-hour consultation call with our research team. Each fire department was contacted via email to announce that their FOCUS results had been analyzed and were ready for review. After the initial email to all participating fire departments, reminder emails were sent over a one-month period, approximately 2–3 days apart, for a total of 7 additional reminder emails. 58 fire departments out of the 132 departments (44%) that participated in the beta-test of FOCUS scheduled a consultation call. The online scheduling system, YouCanBook.Me (https://youcanbook.me) was used, allowing each fire department leader to select the best day and time that worked for their schedules. This online scheduling system was incredibly efficient as it

allowed our team to open up specific appointment slots on various days and times, thus ensuring that a fire department selected a time that we were available. This helped to mitigate numerous emails back and forth when trying to organize conference calls with this many fire departments, who may have anywhere from 1-10 participants on each call from each fire department.

The preferred modality for FOCUS consultation calls was Zoom video conferencing, version 4.1 (https://zoom.us). Most fire departments had web camera enabled computers and could join the consultation calls via video. Those who did not have that capability joined the consultation calls via phone. Zoom video conferencing was particularly useful for consultation calls with fire departments who had numerous attendees. Several fire departments invited their executive team, union representation, and city risk managers—which could include upwards of 10 attendees. Video calls
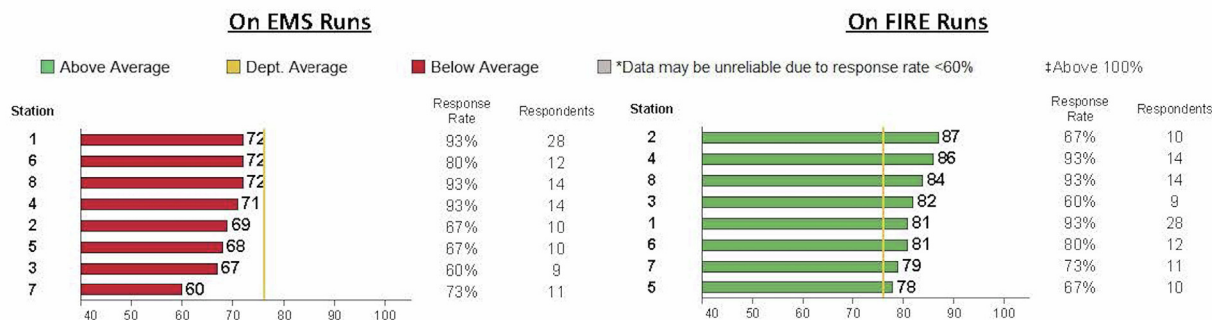
Fig. 7. Engagement data displayed by EMS run or Fire run.

helped to cultivate our relationships with each fire department, particularly if we had not worked with them previously. They were able to meet our research team 'face-to-face' and learn more about our research in the process. This is also an excellent tool to use when trying to conserve grant resources. We did not have funding to travel to each fire department, so this was a cost-efficient way to provide individualized service.

Each department was sent their FOCUS report prior to the call. They were encouraged to review the report before the call and often brought questions that had arose during their review. During each call, a research team member walked the fire department through their FOCUS results, providing detail and explanation for each page. Fire department representatives were able to ask questions at each page and also offer some ideas or hypotheses for why their data looked as it did. Often times during the consultation call a fire department partner leader would hypothesize why the burn-out levels were high at a particular station or why another station was measuring low on engagement. In this way, the consultation calls were very interactive and more of a dialogue with our fire service partners rather than a report out by a research team member. While reviewing each page of the report, a research team member would provide context to aid score interpretation. While there are no evidence-based thresholds for safety climate scores, we classified scores of 80 or higher as reflecting a 'maintenance phase' indicating that firefighters currently shared a highly positive perception of Management Commitment or Supervisor Support for safety and they would want to ensure that it stayed high. Alternatively, scores falling below 80 indicated areas on which to concentrate improvement efforts. We also encouraged fire departments to reflect on the spread between their scores on the Management Commitment and Supervisor Support dimensions. We used a 10-point difference as a rule-of-thumb for score interpretation; a spread of 10 or fewer points indicated high consistency in the shared perceptions of Management Commitment and Supervisor Support for safety, while a spread greater than 10 points indicated divergence between the two. The science of safety climate assessment, the art of interpretation, and next steps were reviewed with fire departments on each consultation call.

After reviewing a department's FOCUS results, our team discussed best practices for using the FOCUS data moving forward. It is important to remember that the fire service had never had access to data such as these, and because of that, their familiarity and dexterity using these data was being developed. On our conference calls, the research team strongly encouraged transparency with the data, sharing results with the entire membership to make sure that they understand that their voices were heard and that data resulted from their participation. We expressed that sharing of the data should include not just the executive team of a department, but also firefighters, ensuring that all ranks are aware of the results. Our research team discussed the importance of labor-management partnership, both at the outset of survey administration and then when sharing the results. We found fire department unions to be strong partners to department leadership when securing buy-in from membership to achieve the minimum 60% response rate, and gaining trust with their members that the data will be used in non-punitive ways. Some fire departments created joint labor-management videos to garner buy-in, while others sent a joint encouragement letter with the survey packet to each fire station. No matter how the joint message is communicated, having a strong partnership between labor and management at the beginning of FOCUS administration ensured that the data would be utilized when planning next steps forward.

The FOCUS consultation calls were also used as an opportunity to gather feedback on the FOCUS report itself. Toward the end of each call we asked fire department representatives to provide feedback on the look and feel of the report. Some of the prompt questions that were used to garner feedback included: *"What is missing from the report that you need or would want to see?"*, *"What other benchmarks would be useful to you?"*, and *"What other improvements in the data display would be helpful to you?"* Their feedback was incorporated into subsequent iterations of the FOCUS report and helped to shape what the current version of the report contains as of this publication.

At the conclusion of the consultation call, stakeholders were asked to reflect on the utility and meaningfulness of the safety culture data they had just received. Prompts included: *"How do these data help your department when thinking about the future?"*, *"What*

do these data mean for you and your department?" and *"Have you ever seen data like these before?*" Given that the fire service has never had quantitative data to assess their safety culture, their reflections on the process were important for our research team to record:

> "The fire service needs to realize that they can take care of everybody else but now it's time to start taking care of ourselves in so many different ways – it's not just safer equipment, it's also safety procedures and the problem is that we have to deal with the stress…You've given us tools that can help us move forward in safety culture in the fire service." – Fall River, MA FD

> "I'm excited about this. I'm going to sit down with our management team and company officers to let them know where we're at. I think this will make a difference and would cause a change in every department."-Odessa, TX FD

> "I believe FOCUS has the potential to have a positive long-term effect within our organization. I believe it will provide the guidance needed to help prevent injuries and improve the work environment." – Fire Chief

> "…In my heart, I believe that we promote a safe culture…, but it was gratifying to see that others in our organization believe this to be true also…I like the fact that I can now put actual numbers to what has previously been a 'gut feeling'." – Fire Chief

> "Change is the hardest thing for people to accept. Trying to implement some change has to be well thought of and with this kind of data, it helps. This is scientific data we could use to try to identify some of those pitfalls and we can fix them." – Salem, OR Fire Department

As these quotes document, stakeholders found the FOCUS data to be innovative and exciting. There was great enthusiasm for having the data and being able to use it to effectuate change in their fire departments. On these consultation calls, all fire departments were offered two opportunities for further involvement in our safety culture research: (1) an opportunity to re-assess with FOCUS to provide them with more current data, and (2) an invitation to a Culture Camp training.

Stakeholders found utility in these data, and were eager to continue to assess their department's safety culture (Fig. 8). Twenty of the 58 fire departments (35%) who participated in a consultation call decided to reassess with FOCUS version 1.0 (v.1.0). Because they had historic data from their participation in the beta-test ver-

sion of the survey, they opted to enroll in a re-assessment with the FOCUS v.1.0 survey to provide them with contemporary safety culture data. These early-adopter fire departments now have longitudinal safety culture assessment, measuring two distinct time points with the FOCUS instrument. For fire departments who did not participate in a consultation call, this could be attributed to the high turnover of high-level fire department administrative roles. Often times, the individual who was the Chief or Safety Officer at the time of FOCUS assessment was no longer holding that position at the time the beta-test results were returned. This could account for the lack of follow-up from some of the partner departments.

3.2. FOCUS Culture Camps

In partnership with FDSOA, the FIRST Center FOCUS Culture Camps were developed and were held throughout the United States. The objectives were three-fold: (1) to provide knowledge to fire service members on the importance of safety climate assessment; (2) to provide knowledge to members regarding how safety culture relates to important safety and organizational outcomes; and (3) to provide experiential activities that facilitate knowledge and skill development to enable members to interpret and use their own department's data. All fire departments who complete FOCUS assessment are given the opportunity to attend a Culture Camp on a first-come, first-served basis. Any United States fire department can participate, whether career or volunteer, large or small, and from any geographic area. Military or federal fire departments and foreign entities are excluded from participation due to FEMA grant restrictions. All expenses related to participation in a Culture Camp (travel, lodging, and meals) are covered by FEMA AFG funding. Departments are notified of Culture Camp opportunities via email and invited to send two representatives from their fire department. They are strongly counseled to send one representative from leadership and one from the labor union, when applicable. By allowing two departmental representatives to participate, a shared knowledge of the curriculum is cultivated and both members can work together when they return to their department to share their results and plan next steps.

Originally, FOCUS Culture Camps were conceptualized as one-day training sessions. Knowing that many fire departments are now tasked with 'doing more, with less,' we were concerned that representatives would not be able to attend any sessions longer than one-day. However, feedback from participants indicated that
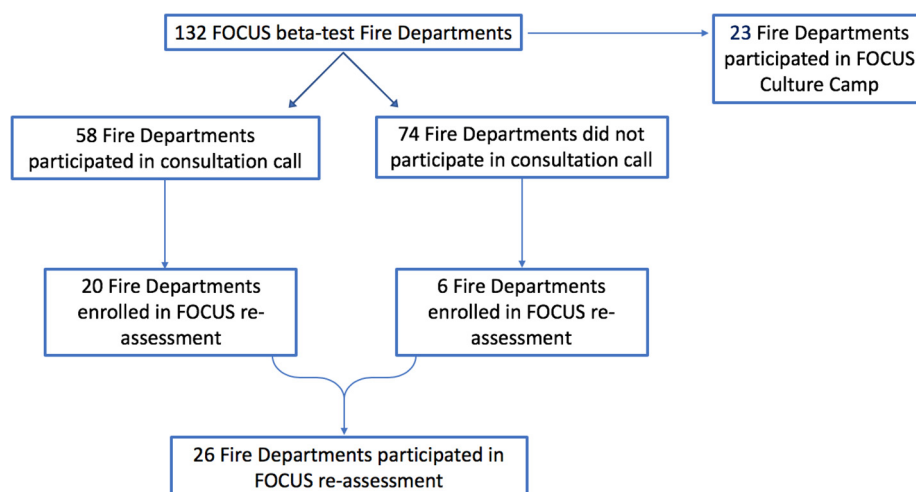

Fig. 8. Continued Participation in FOCUS Re-assessment & Training.

the FOCUS Culture Camps should be longer in duration, given the extensive curriculum format. Therefore, we revised the curriculum to provide a two-day intensive training for all FOCUS Culture Camps. In our first round of FEMA FP&S funding, six one-day FOCUS Culture Camps were held. In our current funding cycle, we are holding 10 FOCUS Culture Camps. To date, we have held 9 FOCUS Culture Camps across both rounds of grant funding. These sessions have been held in geographically diverse locations—including three sessions in Philadelphia, PA; two sessions in Dallas, TX; Scottsdale, AZ; San Diego, CA; Traverse City, MI; and Orlando, FL. By selecting diverse locations for the FOCUS Culture Camps we are able to lessen the travel burden for our participants and ensure that we have more 'local' opportunities for our partners. Each Culture Camp typically includes 10 departments with 20 participants. By keeping each Camp relatively small, our team is able to provide individualized attention to each participating department. As of spring 2019, 160 fire service members have participated in a Culture Camp, representing 83 fire departments.

Each Culture Camp is instructed by multiple individuals, including FIRST Center staff, an FDSOA representative, and organizational psychologists or occupational health psychologists (Fig. 9). At the beginning of Culture Camp, a member of the FDSOA board asks all participants to introduce themselves, sharing their name, rank, department, and expounding on what the safety culture is like within their department. These introductions can take upwards of one-hour, and the time invested is critical to establishing a safe and trusting learning culture. By having each individual share their successes and areas of opportunity for safety culture in their department, participants become comfortable with one another and realize that their department is more similar to others than different.

A **pre-evaluation exercise** is then administered containing six questions (in the one-day Camp format) and five questions (in the two-day Camp format) (Fig. 10). Participants are given approximately 10 min to complete it. The concepts tested are taught in the subsequent curriculum and then these same questions are asked as part of a **post-camp evaluation exercise** to measure knowledge transfer. FOCUS Culture Camp begins with an introduction to safety climate definitions and theory emphasizing the evidenced-based causal pathway through which safety climate

- Pre-evaluation exercise
- Post-evaluation exercise
- Matching game
- Mock data "pair share" exercise
- Departmental team teach backs

Fig. 10. FOCUS Culture Camp Curriculum Assessment Tools Used.

operates. The two components of FOCUS: management commitment and supervisor support are explained in detail, as well as the organizational and safety outcomes that are critical to understand when reviewing their data. All of these components are presented with clear definitions, fire service specific examples, and time is built-in for ample questions and answers. After this lecture, an exercise is completed with the group. Participants are asked to **match different components** of the theoretical framework (i.e. safety climate, safety behavior, safety outcomes, or organizational outcomes) in one column with a particular fire service-scenario in the other column (Appendix I). This exercise is collected and used for evaluation purposes. Then, the group reviews the correct matches together. Eight of the nine FOCUS Culture Camps have been included in the subsequent evaluations below. The first Culture Camp (Oct 2017) was omitted due to its developmental nature and subsequent refinement. Below are the matching game scores, by FOCUS Culture Camp training, comparing eight FOCUS Culture Camps, from Jan 2018 through March 2019. The Table 1 below includes both the average score and the percent correct for this exercise at each Culture Camp. Participants had the lowest score (76%) at the second Culture Camp in January 2018. This is in contrast to the highest score (86%) achieved in the fifth and the most recent Culture Camp. On average, participants scored an 80% on the matching game across all Culture Camps included in this evaluation.

Participants are then taught how the FOCUS survey was developed, the importance of survey validation, and best practices for FOCUS survey administration. We also discuss the difference between validity and reliability – and why the FOCUS tool has been developed to ensure both. The science of climate assessment provides members with important background information to enhance their own knowledge and enable them to answer questions about the FOCUS tool in their departments.

At this point in the Culture Camp, participants have been presented with a thorough overview of safety climate, the relationship between safety climate and safety/organizational outcomes, and how the FOCUS tool measures safety climate in their fire department. Participants are then presented with two **Mock FOCUS reports** – both of which have significant differences between them – and they work with their partner to answer a number of questions provided on a workbook. Teams of two complete their workbooks and then we come back together as a group to discuss the

Introduction to Safety Climate
- Pre-evaluation exercise
- Theoretical Framework
- FOCUS components
  - Management Commitment
  - Supervisor Support
- Organizational & Safety Outcomes
- Exercise #1: Matching Game

Introduction to FOCUS and Data Discussion
- Importance of survey validation
- Best practices for FOCUS administration
- Exercise #2: Mock FOCUS Data
- Post-evaluation exercise

FOCUS Data Display & Next Steps towards Maintaining or Improving your Safety Culture
- Orient to FOCUS report
- Exercise #3: FOCUS report teach back by participants
- How to share FOCUS results
- Additional Resources/Intervention Ideas

Training Evaluation via Qualtrics

Fig. 9. FOCUS Culture Camp Agenda.

Table 1
Matching Game Evaluation including average score & percent correct by FOCUS Culture Camp Site.

FOCUS Culture Camp	Average Score (out of 11)	Percent Correct
Scottsdale January 2018	8.35	76%
Philadelphia May 2018	8.76	80%
Dallas June 2018	8.65	79%
San Diego June 2018	9.47	86%
Traverse City July 2018	8.53	78%
Philadelphia Dec 2018*	8.47	77%
Orlando January 2019*	8.60	78%
Dallas March 2019*	9.47	86%
Total	8.82	80%

*Indicates two-day training sessions.

differences between these two mock reports. By the end of this exercise, participants become well-versed in the importance of the 60% response rate, know how to identify scores that are unstable due to low response rates at the station-level, and begin to sharpen their savviness on when certain scores should be strongly trusted versus disregarded based on response rates. At this point the **post-evaluation exercise** is administered to participants. Three questions included on the pre/post evaluation were administered in both the one-day and two-day Camp formats. After matching answers by name, the following results in knowledge transfer are seen. Data from eight of the nine FOCUS Culture Camps, spanning January 2018 through March 2019 are analyzed below (Table 2).

On average, the pre-evaluation score across all Culture Camp sites is 51.11%. This is in contrast to the 81.55% post-evaluation average across all Culture Camp sites. By measuring changes in pre and post-evaluation scores for each Culture Camp, a transfer of knowledge from the Culture Camp curriculum is seen.

3.3. FOCUS Fire Department Teach Back

One of the last components of Culture Camp is a FOCUS Fire Department Teach Back. The two representatives from each fire department work together to review their department-specific FOCUS report, page-by-page, and answer questions in a workbook. After completing their workbook, they then come to the front of the classroom and perform a teach back of their FOCUS results to the group. The teach backs have evolved from participants using their full FOCUS report on the screen in front of the classroom, to now participants use a summary slide with the safety climate conceptual model, overlaid with their FOCUS scores. This new format helps to re-ground participants in the safety climate casual pathway while explaining how their department scored on various metrics. Participants walk through their scores, discussing them in relation to the casual pathway, to practice how they will present their data. During this teach back, participants get the experience of speaking about their data in front of a group and our faculty provide feedback on their presentation and interject to ensure that information is presented accurately. This teach back exercise is emblematic of the real-world scenario that participants will experience when they return to their fire departments. As champions of the FOCUS survey administration, and having completed a Culture Camp training, they are now the resident experts on safety culture in their departments. It will be their task to teach others in the department about why safety culture assessment is so important, how it relates to their safety and organizational outcomes, and how they can start to use their results for maintenance or positive change in their departments. As each department performs their teach backs, the other departments in the room are able to ask questions, provide feedback, and learn different approaches to presenting on a particular concept or metric. This time also serves as a valuable opportunity for fire departments to collaborate and share knowledge and insights. Departments are able to hear innovative approaches or policies another department is using that could be applicable to them. Some of these innovative approaches or policies may positively influence a FOCUS metric if implemented.

Culture Camp participants are asked to complete an extensive evaluation of the training at the end of their session via a Qualtrics survey. The teach back portion of the curriculum has been highly regarded in these evaluations, as well as the networking opportunities that the Culture Camp provides. We were concerned that the teach backs would be repetitive for participants, given that each fire department had a FOCUS report that was visually similar and there were similar trends amongst reports, but even though this exercise can be rote for a scientist, it proved to be cathartic for the fire service member. This is reflective of the fact that the fire service did not have data such as these for their own department and that they welcomed the experience of hearing how similar

Table 2
Average Percentage Pre and Post Test by Culture Camp Site & Date.

	Pre_Q2	Pre_Q3	Pre_Q4	Pre_Total
Scottsdale, January 2018	42.31%	49.04%	47.12%	46.15%
Philadelphia, May 2018	64.71%	63.24%	50.74%	59.56%
Dallas, June 2018	43.06%	40.28%	52.78%	45.37%
San Diego, June 2018	57.89%	53.95%	44.08%	51.97%
Traverse City, July 2018	44.85%	50.74%	42.65%	46.08%
Philadelphia, December 2018	53.47%	52.78%	68.06%	58.10%
Orlando, January 2019	47.50%	44.38%	59.38%	50.42%
Dallas, March 2019	45.63%	47.50%	60.63%	51.25%
Average	49.93%	50.24%	53.18%	51.11%
	Post_Q2	Post_Q3	Post_Q4	Post_Total
Scottsdale, January 2018	98.08%	85.58%	74.04%	85.90%
Philadelphia, May 2018	82.35%	73.53%	68.38%	74.75%
Dallas, June 2018	92.36%	81.94%	76.39%	83.56%
San Diego, June 2018	84.87%	76.97%	71.05%	77.63%
Traverse City, July 2018	94.85%	81.62%	70.59%	82.35%
Philadelphia, December 2018	87.50%	78.47%	80.56%	82.18%
Orlando, January 2019	81.88%	75.00%	72.50%	76.46%
Dallas, March 2019	90.63%	85.63%	92.50%	89.58%
Average	89.06%	79.84%	75.75%	81.55%

(or different) they are from another department. Included below are some other reflections heard from participants, speaking specifically to the teach back portion of the curriculum:

"I enjoyed reviewing my own department's FOCUS survey and the teach back. First, I enjoyed reading our results because it validated some concerns that I already had. Secondly, presenting those findings to the class allowed for me to get a feel of what I can expect when presenting the information back to our administration."

"[The teach back] was by far the best part of the sessions for myself. Being able to take the information that was relevant to our department, and present it as though you were providing the information to your department was very helpful in preparing a presentation. Also being able to compare our data, with departments of similar size, was a great tool as well."

"Having to present our department FOCUS info. It forced my partner and myself to discuss more and interact in a manner as to practice presenting the info to our management team. The discussion prior to the presentation began the process of digesting the info and how to present and what to present. The presentation created more ideas/angles. The professional feedback from the instructors was invaluable and validated our thought process in regards to the presentation."

"I enjoyed analyzing my own department's data and being given the opportunity to do a soft presentation to a group prior to doing one for my own department. This was extremely valuable so that I could fine tune my words and have multiple sets of eyes see other parts of my data that I may not have focused in on that were important."

"[The teach back] greatly improved my understanding of the subject matter and helped guide my ideas on how I would deliver this information to my own members. Everyone had differing ideas and approaches and allowed me to adjust my delivery by adding and subtracting my ideas."

"I believe the part where we broke down the data for our organization was the most enjoyable. It was fun to work with the Drexel team and have them explain the data and interpret it better. It helped me understand more about my organization and what I must do when I return home to prepare our people for the future of improving our safety culture. **It showed me that the people are the ones that create the safety culture in any organization**." (Emphasis added)

Participants also reflected on the utility of the Culture Camp experience, as a whole, when filling out their Qualtrics evaluation form:

"This training takes you into the world of data and science. Learning to understand data and science allows departments to go deeper into the world of safety. In time, this will allow facts to be the rule in place of opinion or theory."

"This training validated much of what I already believed and couldn't prove, suspected but had no way to verify, or plainly educated me on what I need to know to grow a culture of safety in my organization."

"I believe FOCUS has the potential to have a positive long-term effect within our organization. I believe it will provide the guidance needed to help prevent injuries and improve the work environment."

4. Discussion

The opportunities and possibilities for the future of FOCUS are ample and expanding. With each grant cycle, additional modifications and improvements are made to the FOCUS report. As we con-

tinue to more deeply understand this construct created for the fire service additional edits will be enacted. For example, a safety compliance construct was developed on the FOCUS tool and the score will be included in future FOCUS report generations and the Culture Camp curriculum.

In addition to getting involved via the FOCUS assessment process, the latest round of grant funding allowed for the addition of Advanced Culture Camps led by our research team. This additional training will be available to fire departments who attended a Basic FOCUS Culture Camp and are highly motivated to develop fire service specific safety culture interventions. The Advanced Culture Camps will be two-day intervention design sessions, held around the country, where fire department representatives will work with academics on how best to develop protocols. Advanced Culture Camps will collaboratively modify an existing science-based intervention from another industry, or will develop a new one originating from the fire service. Each intervention will aspire to positively influence scores for either Management Commitment, Supervisor Support, or both (Lee et al., in press; Zohar, 2010).

At the end of each Advanced Culture Camp, the participants will come to consensus on the protocol and it will be ready for testing in fire departments. The intervention protocols and any subsequent testing and analysis will be published in peer reviewed academic and industrial literature. The goal of Advanced Culture Camps is to empower fire department stakeholders with potential next steps forward, and begin to offer the fire service a set of interventions that can be used to address areas of concern identified through the FOCUS assessment. This is important because after consultation calls and FOCUS Culture Camps, firefighters often responded, "What do I do next?"

Advanced Culture Camp is based on a participatory approach such that it entails effort and engagement from various stakeholders such as firefighters, fire department safety officers, and a group of researchers in identifying extant problems in the fire service, designing possible intervention strategies and solutions, and suggesting feasible ways of intervention evaluation (Henning, Warren, Robertson, Faghri, & Cherniack, 2009; Punnett et al., 2013). The participatory approach of Advanced Culture Camp intrinsically motivates fire service workers because their involvement is closely associated with the cultural changes that matter to them. Thus, they are more likely to develop an increased sense of ownership in the cultural change process (Kleiner & Hendrick, 2002) and tend to be more tolerant to unexpected problems and responsible for dealing with them throughout the intervention phases (Henning et al., 2009). By gaining stakeholder buy-in at the design phase of the intervention process, effectiveness and sustainability of the intervention can be substantially enhanced by Advanced Culture Camps.

Without tested interventions that are proven to improve safety culture in the fire service, the answers are few and far between. Unfortunately, a set of strong, evidence-based interventions has not been developed for any industry, let alone the fire service. The after action review is the only intervention shown to increase safety climate within the fire service (Allen, Baran, & Scott, 2010; Dunn, Scott, Allen, & Bonilla, 2016). Available evidence suggests that company level AARs are among the most effective and least expensive solutions for improving firefighter safety (Allen et al., 2010). Additional interventions need to be developed and accessible for our fire service stakeholders who are motivated to enact change.

4.1. The future of FOCUS

FOCUS moved from a research to practice enterprise with significant impact – over 400 fire departments and over 30,000 firefighters have participated. But there are 30,000 fire departments

and over 1.2 million firefighters in the United States (USFA, 2018), so scaling up FOCUS dissemination and training are strong considerations for the future. As more efficiencies are gained through our survey assessment and data visualization processes, we will be able to serve an increasing number of fire departments. The industrial-academic partnership with FDSOA provides core strength to the continued dissemination of FOCUS. But all of these activities are grant funded so an alternative, although one that is less desirable, is the fee-for-service model. The main reason to avoid such an arrangement comes from a question we asked on the Qualtrics evaluation, which read in part: *"In the absence of grant funding, would your department have the resources to conduct a FOCUS assessment without financial support? Why or why not?"* 76% of participants stated that their department would not be able to conduct a FOCUS assessment without grant funding to support the program, signaling that the fee-for-service model will likely be cost-prohibitive for many fire departments who would like to participate.

There are some opportunities for improvement and challenges for this research to practice work. First, the FOCUS report has several areas for improvement, of which we are working closely with our fire service partners and data visualization collaborators to find solutions. For example, the red, yellow, and green color coding that is used on the station-level and organizational outcomes pages can be interpreted incorrectly. Because red color coding signifies any station that fell below the department average for each metric, a station that has a relatively positive score could potentially still be color coded as red, signifying to a reviewer that this station is a poor performer. This is particularly cumbersome when a station falls just one-point below the department average, but is still scoring an 80 or better—a score that we would generally say is positive and in a maintenance zone. Other color coding schemes have been suggested, including an ombre color gradient (i.e., light green to dark green), and will be explored in new iterations of the FOCUS report.

Second, related to the future of FOCUS, a major challenge of the current FOCUS deployment model is the limited human resources necessary to hold as many Culture Camps as requested by the fire service. For both the survey assessment and the Culture Camps, we have waiting lists. Fortunately, subsequent grants have allowed us to honor the patience of our partners. Moreover, the research team and FDSOA greatly value the face-to-face interaction that fosters learning, collaboration, and growth, so keeping class sizes to around 20 firefighters allows the team to accurately evaluate a firefighter's growing data competency. Although this is the premier model based on the science of learning (Mayer, 2011), online education tools and tactics are greatly improving and may be an alternative to be explored in the future. These may be real-time culture camps via online platforms or some pre-recorded offerings. Although the team is hesitant at this stage to move to this format, the limitations on time and resources may eventually require these methods for more universal dissemination of the FOCUS tool and trainings.

When analyzing the Culture Camp evaluation data, we recognized that the matching game would be best administered as a pre and post-test tool to ascertain the degree to which participants
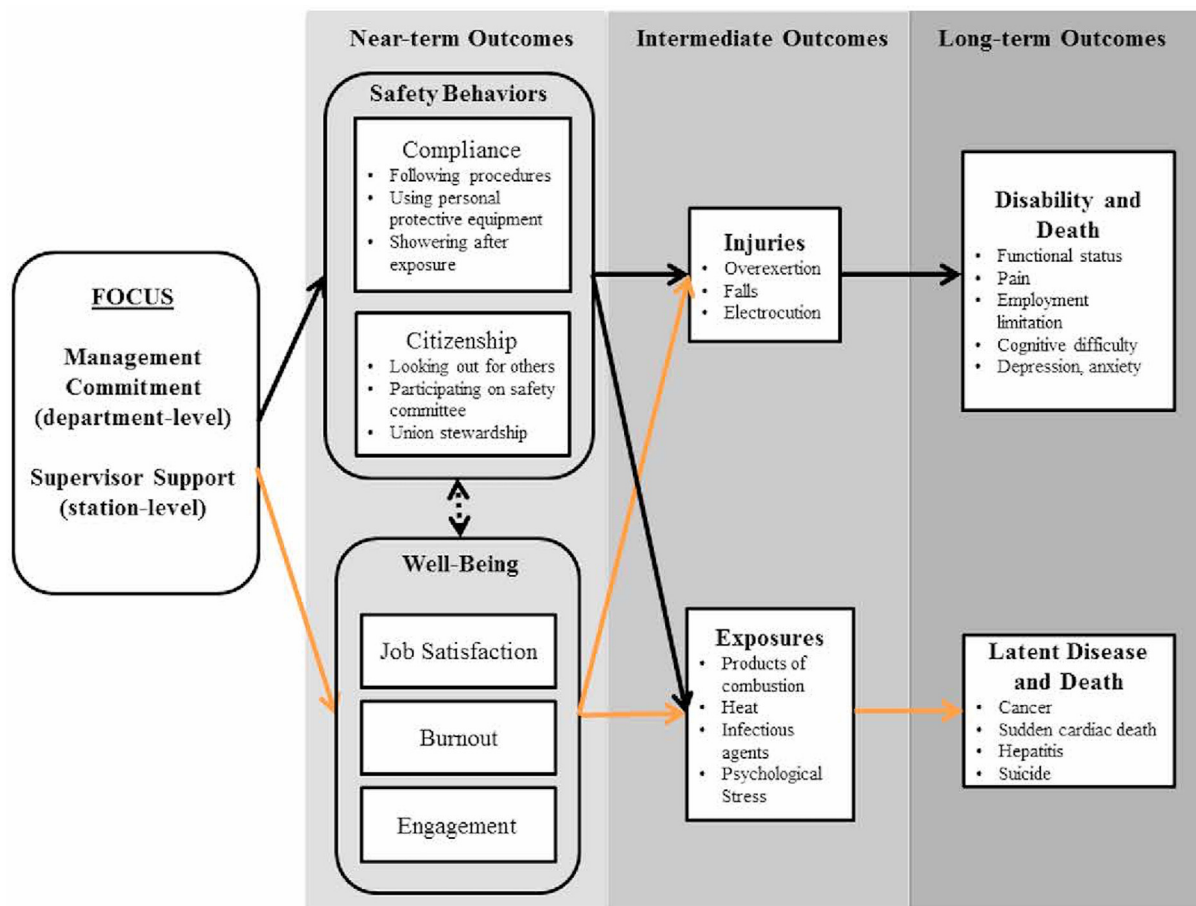

Fig. 11. . The relationship between FOCUS, safety outcomes, and organizational outcomes (Taylor & Davis, 2019).

are learning. We will be implementing a pre-post testing strategy with the matching game in subsequent Culture Camps.

5. Conclusion

5.1. Moving FOCUS upstream

Traditionally, the fire service focused on reducing negative safety outcomes: near misses, injuries, and line of duty deaths. FOCUS is helping the fire service shift their attention further upstream in the prevention pathway through the adoption of organizational outcomes as important factors to measure and manage. This becomes especially poignant as organizational factors have been shown to predict safety outcomes (Huang et al., 2016; Lee & Huang, 2019; Taylor & Davis, 2019). This upstream focus has two major benefits. The first is practical. When the FOCUS survey was developed, approximately 30% of departments that helped validate it had no injuries in the last year (Taylor & Davis, 2019). So there is no way to demonstrate the relationship between safety climate and injury for their particular department. Only the pooled estimate from the entire sample could be used. But since organizational outcomes are measurable every day, addressing them can help a department prevent injuries *before* they occur. This is the second benefit.

Taylor and Davis (2019) expanded Christian & Huang's theoretical models to include mental health outcomes and exposures that lead to occupational disease (Fig. 11). The relationship of safety climate with these outcomes has not yet been tested, but they are both responsive to the growing awareness of cancer in the fire service and the psychosocial demands of fire service work. Future versions of FOCUS will capture these and then the contributions of burnout, engagement, and job satisfaction to these fire service exposures can be ascertained. The opportunities and possibilities for the future of FOCUS are ample and expanding. From 2012 to 2019, the FOCUS survey has evolved from a research and development grant product to a practice tool being used in the field through survey assessment and interactive training curricula. As of July 2019, the FOCUS survey has been assessed in 417 fire departments and 35,256 fire service members have participated. The assessment opportunity for the current grant cycle was announced in the spring of 2019 and has the resources to serve up to 1,000 fire departments, including approximately 120,000 respondents. Additional fire departments who are interested in participating in FOCUS assessment can enroll via the FIRST Center's website: https://drexel.edu/dornsife/research/centers-programs-projects/FIRST/our-projects/FOCUS/.

Declaration of interest statement

The authors of this manuscript declare no conflicts of interest.

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Andrea L. Davis, MPH, CPH is the Senior Project Manager for the Center for Firefighter Injury Research and Safety Trends at the Drexel University Dornsife School of Public Health in Philadelphia, PA. She earned her Master's of Public Health degree from Drexel University in 2012 and holds the designation of Certified in Public Health from the National Board of Public Health Examiners. Ms. Davis also has received her Master's of Liberal Arts from the Harvard University Extension School and Bachelor of Art from the University of Delaware.

Joseph Allen, PhD is a Professor in Industrial and Organizational (I/O) Psychology and the Director for the Center for Meeting Effectiveness at the University of Utah. He completed his doctorate in Organizational Science at the University of North Carolina at Charlotte in 2010 and received his Master of Arts degree in I/O Psychology at the UNCC in 2008. Dr. Allen's research focuses on three major areas of inquiry including the study of workplace meetings, non-profit organizational effectiveness, and emotional labor in various service-related contexts.

Lauren Shepler, MPH is the Outreach and Communications Manager for the Center for Firefighter Injury Research and Safety Trends at the Drexel University Dornsife School of Public Health in Philadelphia, PA. Ms. Shepler earned her Master's of Public Health degree from the Drexel University School of Public Health in 2015. Ms. Shepler also has received her Bachelor of Science from North Carolina State University.

Christian Resick, PhD is an Associate Professor of Management and Organizational Behavior with the LeBow College of Business at Drexel University in Philadelphia, PA. He completed his doctorate in Industrial/Organizational Psychology at Wayne State University in Detroit, MI. His research focuses on the social and cognitive psychological processes associated with leader influence, teamwork, and organizational culture and fit.

Jin Lee, PhD research focus is an Industrial and Organizational (I/O) psychologist at Kansas State University. His research focuses primarily on workplace safety, health, and well-being. Currently, he is a principal investigator for a project about the design of safety climate intervention based on socio-technical systems approach. Also, he is interested in data visualization and application of machine learning approaches to I/O psychology.

Rich Marinucci serves as the executive director of the Fire Department Safety Officers Association. He earned his Master's Degree from Eastern Michigan University and Bachelor of Science degrees from Western Michigan University, Madonna University, and the University of Cincinnati. Chief Marinucci has over 40 years of experience in the fire service as Fire Chief, President of the International Association of Fire Chiefs, Acting Chief Operating Officer of the United States Fire Association, and national program manager for the National Fallen Firefighters Foundation Everyone Goes Home Program.

Jennifer A. Taylor, PhD, MPH, CPPS is an injury epidemiologist and Associate Professor of Environmental and Occupational Health at the Drexel University Dornsife School of Public Health in Philadelphia, PA. Dr. Taylor is the founding Director of the Center for Firefighter Injury Research & Safety Trends (FIRST) at Drexel University. She received her doctorate from the Johns Hopkins Bloomberg School of Public Health, specializing in Injury Prevention and Control. Dr. Taylor's research focuses on the impact of safety climate to occupational injury and related psychosocial outcomes.

Appendix I. FOCUS Culture Camp Matching Game Exercise

Matching Game – FOCUS Culture Camp