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After-Action Reviews: The Good Behavior, The Bad Behavior, And Why We Should Care

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Abstract

After action reviews have been a common learning and reliability intervention in organizations for decades, and though they have attracted the interest of scholars in recent years, researchers have yet to consider practitioner views of what makes these meetings more or less effective and to check their association with desired outcomes. The current multi-study begins by investigating what makes for good and bad after-action reviews (AARs) using an inductive approach and analyzing responses to open-ended questions about AAR attendee behaviors perceived as more or less effective by participants. Building upon Study 1, Study 2 focuses on the effects of good attendee behavior on desirable outcomes for AARs in high-reliability organizations (HROs). Self-reported data were obtained through online surveys (N = 311). As hypothesized, the first study found that when open-ended questions were posed to firefighters there was strong agreement on what is required to facilitate a good AAR and prevent a bad one. The second study found that conducting AARs provides a venue for team building and potentially enhancing the safety climate on crews.

Keywords: after-action reviews, high-reliability organization, trauma, safety, firefighting

After-Action Reviews:

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As the complexity of work environments increase, so does the importance of practical experiential learning (Carroll, 1995). High-reliability organizations' unique combination of intricacy, propensity towards hazards, and necessary team cohesion makes it particularly difficult for members to anticipate – and subsequently train for – all possible contingencies (Baran & Scott, 2010). An After Action Review (AAR) is a discussion of an event that enables professionals and colleagues with similar or shared interests to discover for themselves what happened, why it happened, and how to sustain strengths and improve on weaknesses for future incidents (United States Agency for International Development, 2006). Practical experience can be utilized by the facilitation of After Action Reviews (Morrison & Meliza, 1999).

Within some specific types of organizations, organizational members have learned how to manage error and risk in a way that has made them remarkably accident-free despite the inherent dangers of their respective industries. These organizations, known as high-reliability organizations, develop organizational practices that promote a higher attention to detail due to mindfulness, which is characterized by a greater focus on failure and avoiding oversimplification, among other features (Weick & Sutcliffe, 2001). Such a mindset allows individuals to collectively recognize and respond to error signals in their environments during the earliest stages of crisis development. One method used in these organizations to promote mindfulness and safety is the after-action review (Allen, Baran & Scott, 2010). More formal than a conversation, but less formal than an annual review meeting, AARs are a location where informal discussion between

individuals can provide for enhanced learning and sensemaking in groups and teams (Scott, Allen, Bonilla, Baran & Murphy, 2013). Previous research shows that simply holding AARs improves group safety climate (Allen, Baran, & Scott, 2010).

Although plentiful research exists regarding AARs (e.g., Tannenbaum & Cerasoli, 2013; Morrison & Meliza, 1999; Rankin, Gentner, & Crissey, 1995) and HROs (e.g., La Porte, 1996; Roberts, 1989; Weick & Sutcliffe, 2001) separately, considerably less work considers the impact of *quality* AAR behavioral content within the sphere of HROs (i.e., what people do and say during AAR meetings themselves separate and apart from meeting design characteristics such as self-directed vs. facilitated). Scholars emphasize the importance of post-incident discussion (i.e., AARs) that highlights strengths, weaknesses, and near misses and describes this communication as a key feature of safety cultures (Mearns et al., 2013).

A focus on the behavioral content of AARs and relationships between participant perceptions of that content and AAR outcomes is needed for reasons that are both practical and theoretical. First, practitioners (e.g., leaders who develop policy and training around AARs) may benefit from a systematic look at what end users of this intervention believe are functional best practices with regard to how people participate in AARs. This could provide guidance regarding how this intervention should be implemented (e.g., learning objectives for training of AAR facilitators and participants). Second, with regard to AAR theory, inductive analysis of the end user perspective on AAR content (Study 1), when connected analytically to quantitative measures of desired outcomes (Study 2), may not only provide heuristic insight into interesting gaps between theory and practice of AARs but also holds the potential for added theoretical direction regarding what

antecedents and outcomes are likely to be most promising in future research. So far, the research available on these meetings links them to desired outcomes, including enhanced individual performance (Ellis & Davidi, 2005), group learning (Ellis, Mendel & Nir, 2006), group safety norms (Allen, Baran, & Scott, 2010), and the reduction of incident ambiguity (Scott et al., 2013). Given the unique constraints faced by HROs and their members, a look at behaviors in this context would add considerably to scholars' understanding of this powerful intervention.

The current study begins to fill this gap (i.e., the lack of research on AAR meeting quality) by undertaking a multi-study approach. In the first study, we investigate what makes for good or bad AARs using an inductive approach--analyzing responses to open-ended questions about AAR attendee behaviors perceived as more or less effective by participants. Research shows that behaviors in meetings indeed matter to meeting outcomes (Allen, Baran, & Scott, 2010; Allen, Scott, Tracy, & Crowe, 2014; Kauffeld & Lehmann-Willenbrock, 2012; Scott et al., 2013) but little is known from an end-user perspective concerning the behaviors individual participants carry out in after-action review meetings and how these qualitatively derived behaviors may relate to desirable outcomes of this type of meeting. Thus, study 1 aims to first identify the good and bad behaviors that end users subjectively believe occur in after-action review meetings, and study 2 seeks to assess in variable-analytic fashion whether those behaviors are actually associated with desired outcomes.

Reliability scholars argue that HROs not only have a unique structure but also members in HROs think and act differently from those in other organization types. HROs emphasize anticipation not just of expected events but also aberrant events that typically

would not be expected. Because inexperienced workers are more prone to occupational injuries (Laberge, Calvet, Fredette, Tabet, Tondoux, Bayard, & Breslin, 2016), it is important to build such efforts into training protocols. Building upon this theory regarding the positive relationship between how people behave in meetings and the degree to which it matters to the outcomes of those meetings (Kauffeld & Lehmann-Willenbrock, 2012; Neininger, Lehmann-Willenbrock, Kauffeld, & Henschel, 2010) we use the results from the first study to create a measure of good attendee behaviors in after-action review meetings and illustrate its relationship to both meeting satisfaction and the development of group safety norms. Additionally, previous research showed that having more meetings makes them a more salient aspect of one's job thereby making them a more meaningful component of an employee's attitudes towards their job (Rogelberg, Allen, Shanock, Scott, & Shuffler, 2010) and positive outcomes such as performance and engagement (Yoerger, Crowe, & Allen, 2015). Thus, it is believed that the perceived frequency with which these meetings occur will moderate the strength of these relationships. The hope is that by first identifying the behaviors and using that information to develop a measure to connect those behaviors to meaningful outcomes, methodological triangulation will confirm that what happens in after action reviews matters.

STUDY 1: END-USER PROSPECTIVES ON AAR CONTENT

One of the most promising ways to enhance the safety climate of an organization is to improve the way supervisors and employees communicate about events after the fact (Allen, Baran, & Scott, 2010) and groups who effectively appraise events via interaction may be more likely to increase organizational effectiveness (Allen, Scott, Tracy, &

Crowe, 2014). Meetings are usually meant to serve several purposes such as exchanging information, solving problems, and finding consensus or making decisions (Leach, Rogelberg, Warr, & Burnfield, 2009), but in order for an organization that is team-based to be successful, it is paramount that employees meet for the purposes of trouble-shooting, decision-making, and to generate ideas (Kauffeld & Lehmann-Willenbrock, 2012), and in the case of AARs, these meetings are focused on a specific prior incident on which the participants collaborated. Although some scholarship has explored the end-user perspective on the behavioral content of meetings in general (Allen et al., 2012), this work did not focus on meetings about a specific prior incident, nor did it look at meetings in relation to learning and reliability. Thus, in the current project, it is important to first seek identification of behaviors that matter to practitioners in the AAR context of retrospective discussion and HROs.

We sought to obtain a preliminary sense of what AAR behaviors seem to matter most by developing categories of AAR attendee behavior inductively from end user responses to open-ended survey items about “good” and “bad” AAR participation. Consistent with the inductive aims of study 1, these qualitative data were analyzed in an emic fashion that was intentionally grounded in the perspective and textual responses of study participants (i.e., people who actually participate regularly in AARs) rather than coding the data in a more traditional etic manner with an a priori coding scheme based on prior research that was either never intended for the study of AARs and/or was never grounded conceptually in the perspective of everyday AAR participants to begin with. The objective of this analytic approach was to develop a preliminary understanding of what regular AAR participants categorize as helpful or unhelpful in an AAR discussion

so that these behaviors could be assessed in relation to desired AAR outcomes in the second study reported here.

Sample and Procedure

To investigate the behaviors of attendees in AARs in an HRO context, we chose to examine data collected from active career (non-volunteer) firefighters within a large municipal fire department in the eastern United States. Work within the fire service involves frequent encounters with occupational hazards (e.g. extreme temperatures, toxic smoke and fumes, collapsing structures, etc.) and limited room for error. Many fire departments try to minimize accidents and injuries through AARs (Allen et al., 2010). Thus, the fire service functioned as an ideal setting in which to study AARs and relationships between their behavioral content and desired outcomes. With the permission of departmental officials, we distributed an electronic survey to departmental personnel; 119 (25.14%) participants responded to the survey. Most of the respondents were male (95.1%), Caucasian (92.6%), middle-aged (M = 36.08 years, SD = 7.86), and experienced in terms of years as a firefighter (M = 10.54 years, SD = 6.68). All respondents indicated that they had, at the minimum, completed high school, with a sizable portion reporting that they attended some college (63.4%) or completed a bachelor's degree (23.2%).

Instrumentation

The administered online survey contained two questions concerning After Action Review experiences posed to the participants: "What makes a good After Action Review?" and "What makes a bad After Action Review?" These questions were intentionally broad and designed to avoid leading study participants to comment more or less on particular issues or specific types of AAR behavioral content (e.g., verbal vs.

nonverbal). Similar to the approach taken by Griffith, Brosnan, Lacey, Keeling, and Wilkinson (2004), the respondents answered the open-ended question by entering text into a blank essay box on the survey, offering as much detail as they believed pertinent. Responses ranged from two to 96 words with the average length being 12.92.

Data Analysis

Responses to the focal questions (i.e., what makes for a good/bad AAR) were thematically analyzed. Analysis began with the first author inductively developing thematic categories (i.e., types of "good" and "bad" AAR behavior) from the current study data itself via constant comparative analysis (Strauss & Corbin, 1998). Multiple coders were then trained and independently coded the emergent themes. The independent coders began with open, line-by-line coding of the responses, noting when a phrase or sentence in the data brought to mind a particular theme allowing for the assessment of intercoder reliability. In line with Tracy's (2013) recommendations for this primary cycle coding, this initial set of open codes was reduced through constant comparison of data to thematic codes. Categories were divided, combined and eliminated to produce a more refined and mutually exclusive set of response themes.

Independent coders were trained to identify and properly categorize coding eight "good" themes (Asking for Honest Feedback, Sharing Observations, Accepting Responsibility, Respect/Safe Environment, Specificity, Affirmation/Praise, Prompt, and Humor) and nine "bad" themes (Pretend Like Everything Is Fine, No Suggestions/Group Input, Assigning Blame, Argument, Unclear, Punish Individual, Private Meetings, Not Prompt, and Aggressive Sharing Environment) were identified. Independent raters that were unfamiliar with the overall purpose of the project then coded each statement within

each response into the respective themes with relatively high initial percent agreement and verified with Cohen's Kappa (Good: 81.75%; Bad: 85.02%; $\kappa = .84$). Coders discussed and developed a consensus about remaining disagreements.

Results and Discussion

A single variable chi-square analysis confirmed that the frequencies of the various themes were more different than would occur by chance ($\chi^2(16) = 26.29$, $p < 0.05$). "Respectful/Safe Environment" was the most frequently mentioned good theme (29.67%; see Table 1); one example from a participant was, "I have the ability to say something without retribution." Participation in conversations and decision making in meetings relates to increased levels of engagement (Yoerger, Crowe, & Allen, 2015) and engagement has a direct, positive correlation with rates of job satisfaction and organizational commitment (Saks, 2006). Trust and openness are central concepts within several domains (i.e., healthcare, education, commercial) and have been linked to more connected work relationships (Eriksson & Nilsson, 2008). These, coupled with the understanding that exposure to a social sharing situation is confirmed as itself emotion inducing (Christophe & Rime, 1997), suggests that maintaining a proper sharing environment could lead to greater satisfaction with AARs. The qualitative finding that a safe discussion environment free from retribution is also consistent with recent quantitative work on AARs, which found that freedom to dissent in AARs attenuated the negative influence of incident ambiguity on AAR satisfaction. The second most mentioned Good AAR theme was "Asking for Honest Feedback" (22.41%) with a given example being, "I would like to see an officer asking if there were things missed and/or if the lines of communication were understood." The allocation of resources (e.g., effort,

voice, responsibility) is a necessary process in team cohesion (Rasker, Post, & Schraagen, 2000) and recent research in team management has focused in on the importance of feedback as it contributes to performance adherence (Jabri, 2004). Depending on the nature of the meeting, providing input is an obligation and responsibility of meeting participants (Carlozzi, 1999) and therefore should be not only suggested but also encouraged by meeting facilitators as a way of enhancing performance (Kluger, & DeNisi, 1996).

In terms of the bad AAR themes, "Assigning Blame" is the most frequently mentioned (35.74%; see Table 2); one example was, "Some individuals spend all their time talking about the negatives and who did them instead of finding ways to turn them into positives." When dealing with blame assignment for the negative outcome of a chain of events, people assign too much causality to the participants in those events (Sherman & McConnell, 1996) causing a rift between the participants. It should be noted that people who have experienced a traumatic event – such as those in many high-reliability organizations – often assume responsibility for the event despite having done anything to cause it (Davis, Lehman, Silver, Wortman, & Ellard, 1996), making it unnecessary to compound self-blame with assigned-blame (Brown & Siegel, 1988). The drive for efficiency usually wins out over long-term efforts to improve cohesion (Weick, Sutcliffe, & Obstfeld 1999). However, there is evidence that while some competition breeds excellence (Shields & Bredemeier, 2009), competition and blame in groups leads to communication breakdown (Burton-Chellew, Ross-Gillespie, & West, 2010).

Table 1: What makes a "good" AAR Themes

Theme	**Conceptual Definition**	**Example**	**Number Mentioned**	**Percentage Mentioned**
Asking for Honest Feedback	Employees discussing issues and providing candid information.	How could we improve	102	22.41%
Sharing Observations	Employees contributing practiced and observed behaviors in a meeting setting.	Discussing things learned	35	7.69%
Accepting Responsibility	Upon recognition of mistakes, focus on what was wrong, not on being bad or incompetent allowing criticism to be less personal, allowing a correction of problems.	Admitting mistakes	69	15.16%
Respect/Safe Environment	Showing respect for other members of the crew. This can involve emotional respect, listening to others, or generally showing empathy for other crewmembers.	If they don't have the same opinions then respect their opinions even if you disagree	135	29.67%
Specificity	Being precise with regard to what happened.	Detailed accounts of our actions	34	7.47%
Affirmation/Praise	To state or assert in a positive manner.	talk about what went right	38	8.35%
Prompt	Making sure that the AAR starts on time and does not run long.	Do it as soon as possible.	18	3.95%
Humor	Any mention of jokes, laughing, or comedy.	Good jokes. Pointing out funny things that happened.	5	1.09%

Table 2: What makes a "bad" AAR Themes

Theme	Conceptual Definition	Example	Number Mentioned	Percentage Mentioned
Pretend Like Everything Is Fine	Intentionally misdirecting and engaging in subversion to extoll the best possible outcome while ignoring the facts of the situation.	We made no mistakes!	4	.96%
No Suggestions/Group Input	Group members who are not communicating or providing feedback about the event.	No participation from crew members.	33	7.97%
Assigning Blame	Identifying the steps (decision, operators, and so on) chiefly responsible for a failure in the overall process of achieving a goal instead of working towards a resolution.	Point the finger	148	35.74%
Argument	Begin or engage in an oral disagreement; verbal opposition; contention; altercation for the express purpose of assigning blame.	Arguing	23	5.55%
Unclear	Uncertainty of meaning or intention during which open exchanges are stifled.	No specific direction	20	4.83%
Punish Individual	Reprimanding an individual in front of the group.	Ridiculing individual in front of others.	20	4.83%
Private Meetings	Meeting for education or training purposes without inclusion of all relevant/pertinent parties.	Talking about a situation with out the whole crew being involved	2	.48%
Not Prompt	An AAR not happening soon after the event.	Waiting too long to start.	8	1.93%
Aggressive Sharing Environment	Proactively or passively working to create a setting in which it is not acceptable or encouraged to engage in discussion and debate.	Inability to speak freely	144	34.78%

The second most mentioned bad theme is “Aggressive Sharing Environment” (34.78%) with a given example being, “I never have the ability to speak freely for fear of retribution.” Compounding the finding above that “Respectful/Safe Environment” is the most mentioned good theme, the fact that “Aggressive Sharing Environment” is mentioned so often in the bad themes only strengthens the support for the importance of an environment in which members' strengths, contributions, and views are shared in a guided, open, and respectful manner (Green & Lazarus, 1991). Disrespectful treatment in the workplace can lead to decreased job satisfaction, decreased trust in management, and decreased commitment to the organization (Colquitt, Conlon, Wesson, Porter, & Ng, 2001). That, coupled with the understanding that exposure to a social sharing situation is confirmed as itself emotion inducing (Christophe & Rime, 1997), suggests that maintaining a proper sharing environment could lead to greater satisfaction.

STUDY 2: THE IMPACT OF ATTENDEE BEHAVIOR

Building upon Study 1, Study 2 focuses on the effects of good attendee behavior on desirable outcomes for AARs in high reliability organizations. It is established that making AARs both consistent and routine is important in building comfort and acceptance in a unit (DeGrosky, 2005). As per Allen et al. (2010), “sensemaking increases attention toward the concept that everyday life is an ongoing accomplishment, that takes shape and forms as individuals and groups try to organize and make retrospective sense of the situations they find themselves in” (p. 755). In other words, participants collectively attempt to understand events that occur in their environment through internalization and mindful cognition of events. AARs provide a venue for

establishing these communication patterns because, by their very nature, they force participants to describe and interpret specific elements of an incidents and receive feedback from collaborators (Weick, 1995).

Take, for example, the following comment from a fire report from the Department of Homeland Security, "A forestry crew of 6 and I were on a forest fire. The fire started out small. When we arrived we saddled up and started the attack. The dozer operator was a retired forest ranger and a long friend of my family. He cut the dozer line to the top of the hill. We were planning out the attack and he said 'Guys, something doesn't feel right. I'm going to get off the hill and you should come too"' (U.S. Department of Homeland Security). This situation resulted in casualties and the enforcement of applicable AAR system adherence. Therefore, conducting AARs provides a venue for team building and potentially enhancing the safety climate on crews (Allen et al., 2010). However, the link between what happens inside after-action reviews (attendee behaviors) and the outcomes of those meetings (satisfaction and safety norms) has not been investigated to a great degree (Scott et al., 2013).

Sensemaking theory (Weick, 1995) asserts that events are not uncontrollable situations in which people are passive bystanders. Rather, work incidents unfold according to how they are enacted and interpreted in groups. Sensemaking involves turning circumstances into a comprehendible situation that then turns actionable (Allen et al., 2010). In the case of after-action reviews, the AAR serves as the sensemaker allowing various perspectives to coalesce into a single understandable situation. Using both sensemaking and HRO theories, safety and increased reliability in hazardous work environments can be increased. Through positive meeting behaviors the mitigation of

unwanted key outcomes can be avoided while positive effects can be highlighted and reinforced.

There have been various criticisms of sensemaking theory over the years. For example, Basbøll (2010) claimed that relatively few authors who cite Weick's work consider it in a critical manner or attempt to identify flaws in the research. Weick (2010) has responded by pointing out that such criticisms themselves do not actually refute his arguments or ideas. Indeed, based on our review of the literature, there is no actual empirical evidence that refutes the process of sensemaking in the time that it has been tried and tested in the field.

In addition to Weick's sensemaking theory, another conceptual framework that may be used to understand the impact of AARs on performance outcomes is the multi-facet model of organizational learning (Lipshitz, Popper, & Friedman, 2002). According to Lipshitz and colleagues (2002), the quality of organizational learning can be comprised of a variety of facets, including structural, contextual, policy and leadership, and contextual factors. Structural mechanisms of learning pertain to both the individuals who identify and rectify issues, as well as the time and place that the learning takes place. Contextual factors include situational factors, such as environmental uncertainty (Jabnoun, Khalifah, & Yusuf, 2003). Policy and leadership aspects can include whatever steps organizational leadership takes, either formally or informally, in order to facilitate learning. Aspects of an organization's culture include the degree to which feedback may be exchanged in an open way, the level of focus on relevant issues, and the responsibility assumed to actually implement learning, among other factors. Additionally, psychological aspects of this model include psychological safety, which has been

acknowledged as being essential for trying new behaviors or ideas (Edmondson, 2004), and organizational commitment, which can help encourage information sharing (Lipshitz et al., 2002).

The relationship between attendee behavior in meetings and desirable meeting outcomes is supported by Cohen, Rogelberg, Allen, & Luong (2011), in that executing successful meetings requires facilitators to design them in such a way as to evoke positive attendee behavior and increase the wanted outcomes. It has been shown that creating and developing practices at the organizational level to facilitate efforts to emphasize anticipation of unexpected events in addition to those that are more likely to be expected creates an atmosphere in which members of an organization collectively identify environmental error signals while they can still be managed and before they become catastrophic (Allen, Baran, & Scott, 2010). Further, high reliability theory postulates that as internalization of organizational learning from both successes and failures increase so too does the attention to detail paid by the enactors. This further supports the use of AARs to promote safety in high reliability organizations thus making the behavior in those meetings an important factor to consider. Thus, using the results from study 1, we constructed a measure of good attendee behaviors to test the following hypotheses:

Hypothesis 1: Good attendee behaviors are positively related to AAR meeting satisfaction.

Hypothesis 2: Good attendee behaviors are positively related to group safety norms.

AAR Frequency as a Moderator

As meeting load increases, so does fatigue and workload (Luong & Rogelberg, 2005), and a pattern of meetings that are not experienced positively by participants may amplify this effect with negative consequences (e.g., turnover, work-family conflict, etc.). The link between team meetings and success (Kauffeld & Lehmann-Willenbrock, 2012) suggests that meetings should be valuable to both the attendees and the organization. When HROs increase employee's meeting load it interferes with abilities and motivation causing effective performance to decline such that meetings with content perceived as a poor use of limited time resources may actually be counterproductive (Allen, Baran, & Scott, 2010). Given the prevalence of statistics indicating the rise in frequency of and time spent in meetings (Greenhaus & Beutell, 1985; Kushnir & Melamed, 1991; Virkkunen & Newnham, 2013) – as well as the benefits for the organization and the individual employee (Baran, Shanock, Rogelberg, & Scott, 2012) – the extent that meetings help organizations and employees achieve their goals can be viewed as an enhancing factor (Luong & Rogelberg, 2005).

It is believed that the perceived frequency with which meetings occur influence the extent to which these positive relationships exist. Previous research showed that having more meetings makes them a more salient aspect of one's job thereby making them a more meaningful component of an employee's attitudes towards their job (Rogelberg et al., 2010). Previous research has also shown that leaders can positively influence safety (Smith, Eldridge, & Dejoy, (2016). Building upon this salience argument, we assert that when leaders in high reliability contexts call more after-action reviews, they become more salient thus making the behaviors in those meetings more

important to the outcomes of those meetings. Thus, the following moderation hypotheses are proposed:

Hypothesis 3a: Perceived frequency of AARs moderates the relationship between good attendee behaviors and AAR meeting satisfaction such that the positive relationship is stronger when frequency of AARs is high.

Hypothesis 3b: Perceived frequency of AARs moderates the relationship between good attendee behaviors and group safety norms such that the positive relationship is stronger when frequency of AARs is high.

Sample and Procedure

To test our hypotheses, we chose to take the information garnered from Study 1 and apply it to a different sample; therefore we examine data collected from active career (non-volunteer) firefighters within a large municipal fire department in the Midwest United States. Work within the fire service involves frequent encounters with occupational hazards (e.g. extreme temperatures, toxic smoke and fumes, collapsing structures, etc.) and limited room for error. Many fire departments try to minimize accidents and injuries through AARs (Allen et al., 2010). Thus, the fire service functioned as an ideal setting in which to study AARs, attendee behavior, meeting satisfaction, group safety norms, perception of meeting frequency, and quality of the review experience. With the permission of departmental officials, we distributed an electronic survey to departmental personnel; 311 (60.21%) participants responded to the survey. Most of the respondents were male (91.01%), Caucasian (82.03%), middle-aged (M = 40.64 years, SD = 6.45), and experienced in terms of years as a firefighter (M = 11.20 years, SD = 5.05). All respondents indicated that they had, at the minimum,

completed high school, with a sizable portion reporting that they attended some college (46.2%) or completed a bachelor's degree (43.1%). After data collection, we were invited by the fire department to give a debriefing to the various fire stations that participated in the survey. Upon completion of the debriefing a report was given to the fire department personnel.

Measures

Attendee Behavior. We assessed attendee behavior using an online survey containing two questions concerning After Action Review experiences posed to the participants: "What makes a good After Action Review?" and "What makes a bad After Action Review?" The respondents answered the open-ended essays offering as much detail as they believed pertinent. Responses to the focal questions (i.e. what makes a good/bad AAR) were thematically analyzed. A total of 8 good themes (Asking for Honest Feedback, Sharing Observations, Accepting Responsibility, Respect/Safe Environment, Specificity, Affirmation/Praise, Prompt, and Humor) and 9 bad themes (Pretend Like Everything Is Fine, No Suggestions/Group Input, Assigning Blame, Argument, Unclear, Punish Individual, Private Meetings, Not Prompt, and Aggressive Sharing Environment) emerged. Independent raters then coded each statement within each response into the respective themes. After initial disagreements were discussed and consensus reached the final themes were used. Then we assessed attendee behavior using an 18-item assessment based on the newly emergent themes. Respondents rated the items (e.g., "During After Action Reviews, my crew is very supportive of one another") on a 5-point scale ranging from "Strongly Agree" to "Strongly Disagree."

Perceived Meeting Frequency. Perceived meeting frequency was assessed using a 9-item assessment based on work done by Allen, Baran, & Scott, (2010). Respondents rated the items (e.g., "My crew holds After Action Reviews more often than most other crews") on a 5-point scale ranging from "Strongly Agree" to "Strongly Disagree."

Meeting Satisfaction. We assessed meeting satisfaction using a modified version of the scale from Locke (1969). Respondents rated six items (e.g., "My After Action Reviews are stimulating; boring; pleasant; satisfying; enjoyable; annoying") on a 3-point scale including the answers "Yes, No, and I Don't Know."

Group Safety Norms. Group Safety Norms were measured using Zohar and Luria's (2005) 16-item scale (e.g., "My direct supervisor discusses how to improve safety with us") with the 5-point responses ranging from "Strongly Agree" to "Strongly Disagree."

Results

Table 3 contains the means, standard deviations, intercorrelations, and alpha reliability estimates for all the principle variables measured.

Hypothesis 1 stated that good attendee behaviors are positively related to AAR meeting satisfaction. To test this hypothesis a regression analysis was conducted. First, job level and age were entered with the result accounting for a significant amount of variance ($\Delta R^2 = .06$, $p < .05$). Next, attendee behavior was included and found to significantly relate to meeting satisfaction ($\Delta R^2 = .15$; $\beta = .40$, $p < .05$). Therefore, H1 was supported.

Hypothesis 2 stated that good attendee behaviors are positively related to group safety norms. To test this hypothesis a regression analysis was conducted. First, job level

and age were entered with the result not accounting for a significant amount of variance (ΔR^2= .01, p = .12). Next, attendee was included and found to significantly relate to group safety norms (ΔR^2 = .13; β = .36, p < .05). Therefore, H2 was supported.

Hypothesis 3a stated that perceived frequency of AARs moderates the relationship between good attendee behaviors and AAR meeting satisfaction such that the positive relationship is stronger when frequency of AARs is high. A regression analysis was run with job level and age being entered first with the result accounting for a significant amount of variance (ΔR^2 = .06, p < .05). Next, attendee behavior and perceived frequency were included with the results accounting for a significant amount of variance (ΔR^2 = .15, p < .05). Finally, the interaction term was included with the results accounting for a significant amount of variance (ΔR^2 = .01; β = .13, p < .05) (see Table 4). The interaction results were graphed and the shape of the interaction was in the direction hypothesized (see Figure 1). Therefore, H3a was supported.

Hypothesis 3b stated that perceived frequency of AARs moderates the relationship between good attendee behaviors and group safety norms such that the positive relationship is stronger when frequency of AARs is high. A regression analysis was run with job level and age being entered first with the result not accounting for a significant amount of variance (ΔR^2 = .01, p = .166). Next, attendee behavior and perceived frequency were included with the results accounting for a significant amount of variance (ΔR^2 = .13, p < .05). Finally, the interaction term was included with the results accounting for a significant amount of variance (ΔR^2 = .03; β = .20, p = .05) (see Table 4). The interaction results were then graphed and the shape of the interaction was in the direction hypothesized (see Figure 2). Therefore, H3b was supported.

Table 4: Moderated Multiple Regression Analysis of Perceived Frequency of AARs onto the Attendee Behavior to Meeting Satisfaction and Group Safety Norms Relationships

	Group Safety Norms					Meeting Satisfaction				
Model	R^2	ΔR^2	B	SE_B	β	R^2	ΔR^2	B	SE_B	β
Step 1	.01	.01				.05*	.06*			
Constant			4.15	.23				2.64	.31	
Job Level			.00	.03	.01			.15*	.04	.19*
Age			-.01	.01	-.11			-.03*	.01	-.19*
Step 2	.17*	.13*				.21*	.15*			
Constant			4.03	.21				2.47	.29	
Job Level			-.01	.03	-.03			.12*	.04	.15*
Age			-.01	.00	-.06			-.02*	.01	-.14*
Attendee Behavior			.48*	.07	.39*			.61*	.10	.35*
Perceived Frequency			.04	.07	.03			.13	.09	.08
Step 3	.20*	.03*				.22*	.01*			
Constant			3.93	.21				2.39	.29	
Job Level			-.02	.03	-.04			.11*	.04	.15*
Age			-.00	.00	-.04			-.02*	.01	-.13*
Attendee Behavior			.55*	.07	.45*			.67*	.11	.39*
Perceived Frequency			.11	.07	.09			.18	.10	.11
Interaction			.25*	.07	.21*			.21*	.09	.13*

Note. $N = 311$.

* $p < .05$

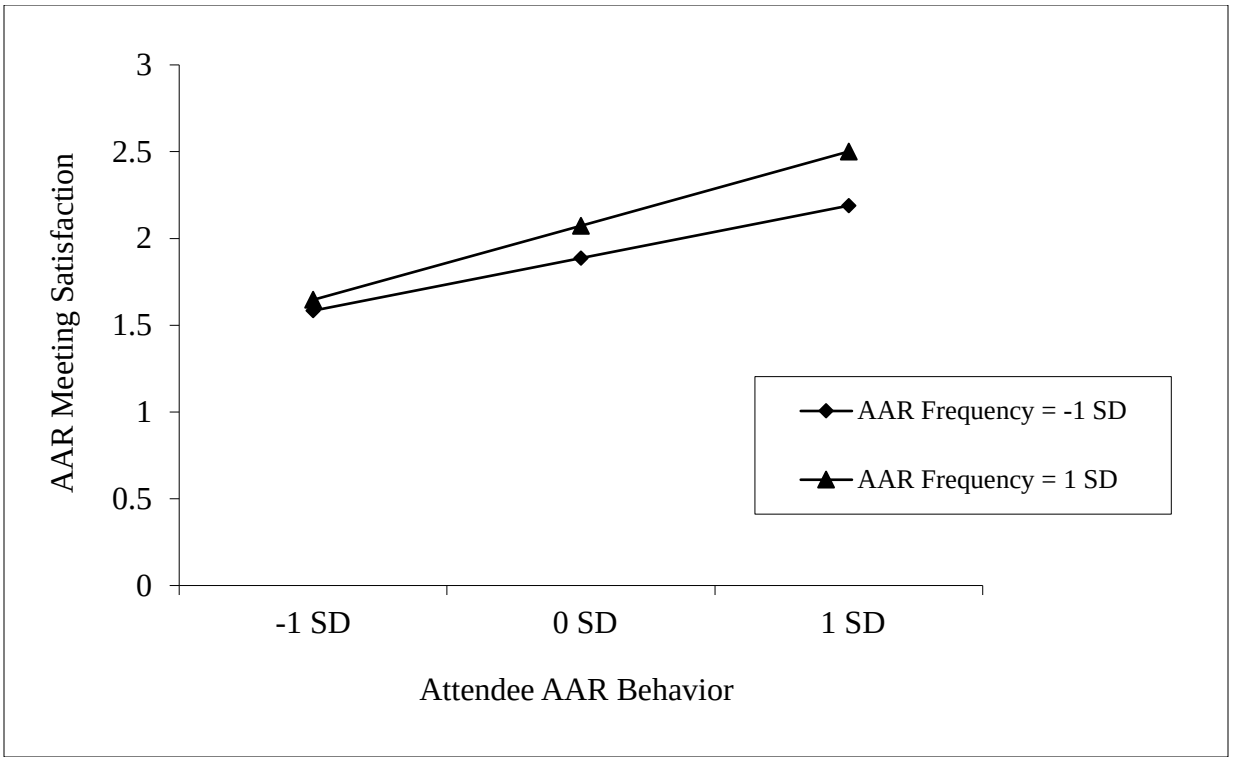

Figure 1. Moderating effect of AAR Frequency on Attendee Behavior and Meeting Satisfaction

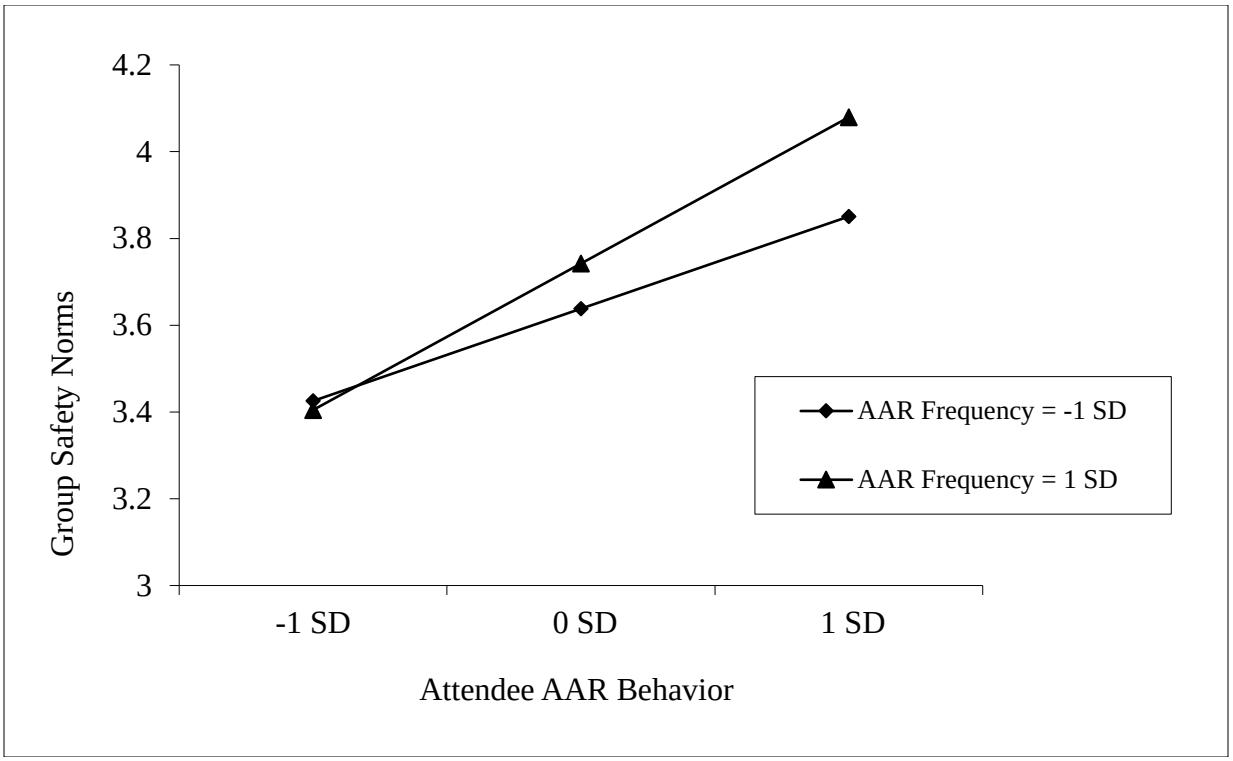

Figure 2. Moderating effect of AAR Frequency on Attendee Behavior and Group Safety Norms

General Discussion

The first study found that when open-ended questions were posed to firefighters there was strong agreement on what is required to facilitate a good AAR and prevent a bad one. It is established that making AARs both consistent and routine is important in building comfort and acceptance in a unit (DeGrosky, 2005). Further, consistent with prior research (Allen, Baran, & Scott, 2010) we found that conducting AARs provides a venue for team building and potentially enhancing the safety climate on crews. For instance, "I have the ability to say something without retribution" was one facet of the most mentioned good theme, "Respectful/Safe Environment." Because safe participation in conversations and decision making in meetings relates to increased levels of performance (Yoerger, Crowe, & Allen, 2015), the present finding suggest having these psychologically safe conversations may lead to increased safety climate (Eriksson & Nilsson, 2008). Future research should continue to investigate processes and behaviors that occur in the form of informal training that causes collective behavior to coalesce in a high-reliability unit.

Our second study took first steps in investigating an observable relationship between attendee behaviors and both meeting satisfaction as well as group safety norms. Our findings reinforced and extend past research findings (e.g. Scott et al., 2013) by identifying more explicitly the degree to which perceived frequency, safety, satisfaction, and behavior are intertwined. Our data suggest that attendee behavior is positively related to both meeting satisfaction and group safety norms. Additionally, these relationships are dependent, to some extent, upon the frequency with which AARs occur as called by the crew leader. This means that as attendees exhibit more positive behaviors, they have the

ability to effect positive outcomes. This is important for employees in high-reliability organizations because safety is of paramount importance in these fields. Knowing how to hold proper meetings allows individuals to make salient their organizational role and helps facilitate sensemaking.

Research Implication

The current study has implications for HRO theory, sensemaking research, and meetings research generally. First, in terms of HRO theory, this study suggests that HROs can use AARs to promote desired outcomes such as satisfaction with this learning environment and group safety norms. The latter is particularly important to HRO theory, in particular the notion that high reliability organizations have a sensitivity to operations that allows them to detect and mitigate weak signals of potential danger (Weick, 1995). AARs serve as one such location that will promote learning from near misses (i.e. weak signals detected) as well as enhance sensitivity to operations in terms of safety.

In terms of sensemaking research, this study actually uses both qualitative and quantitative approaches to investigating the process of sensemaking and its outcomes in a group meeting context. Specifically, the inductive study 1 allowed for individuals to provide ideas for how AARs could be performed better, thus asking them to reflect retrospectively on their own experiences in AARs. Further, study 2 applied the knowledge gained in study 1 and asked participants to again reflect on their experiences in AARs and how behavior in those meetings matters to key outcomes. Therefore, the approach to these studies is both applying sensemaking theory to explain the hypotheses as well as capitalizing on sensemaking processes among individuals to provide the data analyzed.

In terms of meetings research, this study continues the assertion that what happens in meetings impacts behavior and functioning of individuals, teams, and organizations outside the meeting context (Doyle & Straus, 1976; Bargiela-Chiappini & Harris, 1997; Thomson, Freemantle, Oxman, Wolf, Davis, & Herrin, 2002; Jarzabkowski & Seidl, 2008). Specifically, the inductively derived behaviors in AARs described by participants were shown to relate to both satisfaction with the meeting experience and the development of group safety norms. Thus, the behavior of attendees in these meetings spills over and impacts their attitudes after the fact, which in turn, likely impact subsequent behavior, though that should be further tested in future research.

Practical Implication

As AARs are further investigated there are several implications for practice. First, managers in HROs may want to consider holding more AARs. As has been suggested in these studies, as proper meeting facilitation practices are adhered to individuals have the ability to internalize and mindfully enact safety behaviors. If facilitators are able to hold after-action reviews in a way that enables good attendee behavior, then they will have to be called less frequently leaving employees happier and more able to internalize the lessons.

However, it is not enough to simply attempt to enhance good behaviors. Managers should look for active ways to reject and avoid reinforcing negative behaviors. While "Respect/Safe Environment" was the most mentioned good theme, "Aggressive Sharing Environment" was the second most mentioned bad theme. Depending on the manner in which attendees frame the situation, it could behoove facilitators to reinforce positive participation while simultaneously discouraging negative.

Upper level management in HROs should consider a mechanism for promoting the use of AARs in general with the goal of enhancing group and organizational safety climates. For example, in the municipal fire department in which this data was gathered there is a monthly training requirement. If after-action-reviews were seen as legitimate, certifiable training alternatives it could promote the facilitation of these types of meetings.

Research Limitations

The studies are not without limitations. First, it must be noted that the data were obtained through participants' self-report ratings on an electronically administered survey. Using this correlational method of inquiry is convenient and suitable for the task of the initial investigation into this area. However, such research is incapable of being used to establish causal relationships. Future research should consider quasi-experimental approaches where employees in HROs are trained, encouraged to perform AARs and pre-/post-assessments of their experiences and safety norms are provided.

Another potential limitation is the possibility that study 2 is susceptible to common-method bias. This is due to the fact that the variables were assessed simultaneously on a common, single instrument (Podsakoff, MacKenzie, & Podsakoff, 2012). Although the existence of this confounding factor cannot be entirely ruled out, there are several steps that were taken to mitigate this concern. First, a number of the methodological recommendations advocated by Podsakoff et al. (2012) to reduce common-method bias were applied. The survey tool create psychological and proximity separation by assessing the factors independently of one another. Also, Podsakoff et al. (2012) suggest the respondents be provided with anonymity due to social desirability

tendencies often being a precipitating agent of common-method bias. This was ensured on all surveys administered in both studies. Further, in study 2, moderation effects were hypothesized, tested, and found to be significant which suggests that a single common factor is unlikely to explain the relationships (Evans, 1985).

Because this sample consisted of active career, municipal firefighters the generalizability to other firefighting populations as well as other HROs is limited. For example, volunteer fire departments and smaller municipalities, by virtue of their size, may exhibit different coalescing cultures. For instance, in larger departments it is impossible to know all crewmembers, which could inhibit performance in given circumstances. Also, other HROs such as police departments, nuclear powerplants, and so forth will have uniquely different cultures and situations and likely feature populations more gender balanced than the organization analyzed here. Further research is needed to investigate how AARs in their various forms would impact the safety norms in these organizations and among their employees.

Conclusion

As our multi-study has suggested, when firefighters are posed questions about their AARs there was fairly strong agreement as to what makes both a good and bad meeting. When these emergent themes were used to investigate how to make AAR meetings not only more satisfying but increase safety norms as well, we found that conducting AARs provides a venue for enhancing the safety norms on firefighting crews. It is our belief that these findings may have implications for many other high reliability occupations.

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