

Does Stress Lead to a Loss of Team Perspective?

James E. Driskell
Florida Maxima Corporation

Eduardo Salas
University of Central Florida

Joan Johnston
Naval Air Warfare Center Training Systems Division

One of the more well-established findings in the research literature is that stress leads to a restriction or narrowing of attentional focus. In the present study, we extend this research to the group context. We propose that, in a team environment, the narrowing of attention induced by stress may result in a shift in perspective from a broad team perspective to a more narrow or individualistic self-focus, and this loss of team perspective may result in degraded team performance. The results of an empirical study found that stress resulted in a narrowing of team perspective and that team perspective was a significant predictor of team performance. Moreover, when the effects of team perspective were controlled, the effects of stress on team performance were substantially weakened. These results suggest that one way in which stress impacts team performance is by narrowing or weakening the team-level perspective required for effective team behavior.

Research indicates that individuals respond to stress by a restriction or narrowing of attentional focus (Cohen, 1980; Combs & Taylor, 1952; Easterbrook, 1959). For example, Salovey (1992) showed that unexpected events may result in a shift of individual attention from external cues to a more internal self-focus. If we assume that this restriction of attention extends to social cues as well, then we may expect a narrowing of social perspective to occur at the group level. More specifically, we propose that a narrowing of attention at the group level is accompanied by a shift from a broader, team perspective to a more narrow, individualistic focus. Furthermore, in a team task environment, we expect this narrowing of perspective to lead to a degradation of performance. However, although considerable research has examined

individual reactions to stress, comparatively little work has examined the effects of stress on group performance (see Driskell & Salas, 1991). The purpose of this study is to examine the relationship between stress, team perspective, and performance in task groups.

Group Performance Under Stress

Real-world incidents provide anecdotal but often vivid illustrations of team effectiveness and ineffectiveness under stress. On July 19, 1989, United Airlines Flight 232 experienced the failure of an engine and complete loss of hydraulic pressure, leaving the airplane with virtually no flight controls. The airplane crashed during an attempted landing at Sioux City, Iowa, and 111 of the 296 passengers and crew members were fatally injured. However, experts noted that the crew's performance in landing the plane under at least some measure of control was just short of a miracle. The report of the National Transportation Safety Board (NTSB, 1990) and subsequent evaluations of the cockpit transcripts (Predmore, 1991) suggested that one reason for the crew's effectiveness was that they maintained a high level of team coordination, interaction, and communication during the emergency.

To provide a contrasting example, United

James E. Driskell, Florida Maxima Corporation, Winter Park, Florida; Eduardo Salas, Department of Psychology, University of Central Florida; Joan Johnston, Naval Air Warfare Center Training Systems Division, Orlando, Florida.

The views expressed herein are those of the authors and do not reflect the opinion, policy, or views of the Department of Defense.

Correspondence concerning this article should be addressed to James E. Driskell, Florida Maxima Corporation, 507 North New York Avenue, R-1, Winter Park, Florida 32789. Electronic mail may be sent to james.driskell@rollins.edu.

Airlines Flight 173 crashed near Portland, Oregon, in December 1978, as it ran out of fuel while the crew attempted to deal with a landing gear malfunction. The NTSB report (1979) cited a breakdown in teamwork as a primary cause of this accident. The report indicated that the captain was preoccupied with an individual task, that "the first officer's main responsibility is to monitor the captain" and this was not done, and that "the flight engineer's responsibility is to monitor the captain's and first officer's actions" and this was not done (p. A-5). In a review of crew performance in aviation, Foushee (1984) noted that a majority of accidents are related to breakdowns in crew or team coordination. Foushee (1982) reported one commercial aviation incident in which, after ignoring repeated inquiries from a copilot, the captain responded, "Just look out the damn window" (p. 1063).

Why does group coordination become more problematic under stress or emergency conditions? Research examining individual reactions to stress suggests that individuals' focus of attention shifts from a broader to a narrower perspective when under stress, and we believe this phenomenon may have significant implications for group interaction. One of the more well-established findings in the stress literature is that as stress or arousal increases, the individual's breadth of attention narrows (Combs & Taylor, 1952; Easterbrook, 1959). Perhaps the earliest statement of this phenomenon was William James's (1890) belief that the individual's field of view varied from a broader perspective under normal conditions to a more narrow, restricted focus under stress. Pennebaker, Czajka, Cropanzano, and Richards (1990) provided an empirical test of the hypothesis that normal thought processes and attentional focus are restricted under stress, finding that individuals confronted with uncontrollable noise tended to move from high to lower levels of thought, from a broad to a narrow perspective, when under stress. Other research showed that stress may increase individual self-focus. Baumeister and colleagues (Baumeister, 1984; Butler & Baumeister, 1998) showed that performance pressure engenders higher levels of self-focused attention. This research adopts an attentional theory approach that assumes that performance pressure focuses an individual's attention inward. This may increase self-awareness but disrupt the performance of skilled tasks by

diverting attention from external task-relevant information or by inhibiting automated performance processes (Lewis & Linder, 1997).

Does this phenomenon occur at the group level? The analogue to this process at the group level is that group members under stress may become more self-focused and less group focused. Indeed, some evidence suggests this may occur. Several studies showed that stress leads to a decrease in prosocial behaviors, such as helping. For example, Mathews and Canon (1975) found that individuals were less likely to help or assist others when exposed to loud ambient noise. Rotton, Olszewski, Charleton, and Soler (1978) found that loud noise reduced participants' ability to discriminate among people occupying different roles. Cohen (1978, 1980) concluded that the narrowing of attention that occurs under stress may include social phenomena as well and that stress may lead to a neglect of social or interpersonal cues and decreased sensitivity to others.

Some preliminary evidence on attentional focus in groups lends peripheral support to this analogy. For example, Mullen (1991) showed how group composition has consequences for attentional focus in groups. Yet despite the explosion of research on cognition, attention, and decision making in the past several decades, relatively little work has addressed stress and team performance. Certainly, the debilitating effect of stress on team performance has been recognized in the work of Cannon-Bowers and Salas (1998), Karau and Kelly (1992) and others, and interventions have been developed to enhance individual and team decision making under stress (Härtel & Härtel, 1997). However, as Littlepage and Karau (1997) noted, despite these efforts, a number of fundamental questions remain unanswered. Most lacking is an understanding of the processes by which stress affects team performance.

In summary, a large body of research indicates that the individual's breadth of attention narrows, and individuals tend to become more self-focused when under stress. In the present study, we extend this research to examine group performance by arguing that stress decreases group focus. We argue that, under stress, group members adopt a narrower, more individual perspective of task activity. With this narrowing of perspective, team members' cognitions shift from a broader, team

perspective to a more narrow, individualistic focus.

Team Perspective

From the early days of our discipline, theorists noted the importance of team perspective to group interaction. Mead (1934) argued that only to the extent that individuals develop a group concept does cooperative activity become possible. Asch (1952) claimed that group action was possible "only when each participant has a representation that includes the actions of others and their relations" (p. 251). In more recent work describing the knowledge, skills, and attitudes required for effective team performance, Cannon-Bowers, Tannenbaum, Salas, and Volpe (1995) noted the importance of group members adopting a team concept, or collective orientation (Driskell & Salas, 1992), that places team considerations above individual concerns. Taking an information-processing perspective, Hinsz, Tindale, and Vollrath (1997) described how the attentional resources of group members may be directed internally (self-focused attention) or externally. They further argued that the manner in which attention is allocated can determine the nature and outcome of group interaction, noting that greater self-focus can divert attention from the task.

We define team perspective as a perception of the interrelations of actors and actions in a group system. Team perspective consists of two primary components. The first component is a collective representation of the group, or group identity. Some argued that a critical element that defines a functioning group is the existence of a common group identity. In Lewin's (1951) terms, a key component of group membership is that individuals perceive the dynamic interdependence of group members; this has also been termed a mutual awareness (McGrath, 1984), or a common social identification (Reicher, 1982). Thus, one component of team perspective is a "we-ness," a sense of being part of a team versus a more individualistic self-focus.

A second component of team perspective is a collective representation of the task or a team mental model of task activity. To coordinate activity to pursue group goals, a group must construct a common cognitive environment. That is, team members must develop a team-level perspective of the task and of the inter-

dependent roles that comprise the task. Cannon-Bowers, Salas, and Converse (1993) argued that a team mental model includes a model of task interaction—how team members must interact with one another to perform the task. Other research suggested that teams are more effective when group members share a common perspective on group resources, goals, and performance strategies (Hackman, 1987). Group members' mental models of the task may range from a team orientation (i.e., viewing the task as an interdependent team effort) to a more individualistic focus (i.e., viewing the task as an individual activity).

Present Study

Our overall goal in this study was to examine the extent to which stress degrades team performance and, more specifically, to examine whether the effect of stress on team performance is due to the more fundamental effect of stress on team perspective. We designed a study to examine the relationship among stress, interdependence, team perspective, and performance. We first wished to examine the effects of stress and team interdependence on team perspective. To document the team perspective phenomenon, we wanted to observe whether greater interdependence among team members would lead to a stronger team perspective. Further, we wished to examine the effects of stress on narrowing of team perspective. Second, we wished to examine the extent to which stress and team interdependence affected team performance. Finally, we wished to examine the role of team perspective in mediating the effects of stress and interdependence on performance.

We adopted the mediation model of Baron and Kenny (1986) as an analytic strategy to test these relationships. According to this model, first, variation in the independent variable must account for variation in the hypothesized mediator. Second, variation in the independent variable must account for variation in the dependent variable. Third, the hypothesized mediator must affect the dependent variable. Finally, when the mediator is controlled, the relationship between the independent and dependent variable is substantially decreased. This strategy is formalized in the following hypotheses.

Hypotheses

We reasoned that the greater the degree of interdependence among group members, the more likely group members are to develop a strong team perspective. That is, one factor that distinguishes an interdependent team from an aggregate of individuals is that the interdependent team members develop a broad team perspective. To examine this proposition, we designed an experimental task in which participants performed either independently in a coacting team or as members of an interdependent team. Those who comprised the coacting teams were introduced as members of a team (thus, they had a "nominal" team identity) and were told that their team's performance would be evaluated against that of other teams (thus, team members possessed a common fate). However, coacting team members performed the task independently with no interaction with other group members (i.e., the coacting group members were simultaneously engaged in a similar activity).¹ By contrast, in the interdependent teams, group members were mutually dependent and worked together to perform the task. We predict that greater interdependence among group members should lead to a broader team perspective. Thus, we proposed the following:

Hypothesis 1a: Greater interdependence among group members will result in a broader team perspective.

As we noted earlier, research indicates that individuals respond to stress with a narrowing of attention and increased self-focus. Extending this proposition to the group level, we predicted that increased stress would result in a restriction of social cues and a narrowing of team perspective. To examine this proposition, we had half of the teams perform under high-stress conditions (increased auditory distraction, task load, and time pressure) and half of the teams perform under low-stress conditions without these distractions. We predicted that, under stress, group members would shift from a broader team perspective to a more narrow, individualistic perspective. Thus, we proposed the following:

Hypothesis 1b: Increased stress will result in a narrowing of team perspective.

We predicted that stress and team interdepen-

dence would affect team performance. Stress has been shown to degrade performance in a number of studies (Driskell & Salas, 1991; Johnston, Driskell, & Salas, 1997), and we predicted that high-stress conditions would lead to poorer performance on the present task than lower stress conditions. Furthermore, given that the task used in this study is a team-level task, we expected that greater interdependence among group members would lead to more effective performance. Thus, we proposed the following:

Hypothesis 2a: Greater interdependence among group members will lead to more effective performance.

Hypothesis 2b: Increased stress will lead to degraded task performance.

However, the more interesting issue is the role of team perspective in mediating the effects of interdependence and stress on performance, that is, the extent to which the effects of stress and team interdependence on performance are due to the more fundamental effects of stress and team interdependence on team perspective. We propose that one way stress degrades team performance is by narrowing team perspective. If this is the case, then the effects of stress on performance should weaken when variability as a result of team perspective is partialled out. Similarly, if we argue that one way in which interdependence enhances team performance is by strengthening team perspective, then the effects of interdependence on performance should weaken when the variability as a result of team perspective is partialled out. Thus, we proposed the following:

Hypothesis 3: When team perspective is controlled, the effects of stress and interdependence on performance will be substantially reduced.

Method

Participants

Participants in this study were 95 U.S. Navy technical school personnel who volunteered to take part in a study of decision making. The study was a 2 (type of group: coacting vs.

¹ Many hold that a coacting group is not a task group at all. However, others such as Shaw (1981) noted that group tasks differ in the degree of cooperation required, from instances in which group members must coordinate their actions to instances in which group members work independently.

interdependent) \times 2 (stress: high vs. low) design. Participants were randomly assigned to one of four experimental conditions.

Procedure

The participants arrived at the experimental laboratory to take part in a study of team performance and were assigned to a three-person group. Participants were seated at individual work stations in an open room and interacted over a computer network. For the first half hour of the session, participants were briefed on the nature of the experimental task, first listening to a video training tape and then receiving individualized instruction and practice. The task was a computer simulation of a naval decision-making task. The task required that participants monitor a radar screen that contained their own ship at the center and numerous unidentified contacts positioned at concentric rings away from the ship. The objective was to identify and label each contact according to three classifications: type of craft (aircraft, surface craft, or subsurface), its status (civilian or military), and intentions of the craft (hostile or peaceful). To make each classification, the participant would access one of three information fields or menus: A, B, and C, corresponding to these headings. For example, Menu A contained five items of information used to help identify the type of craft. Within Menu A, the participant could access the altitude item to ascertain whether the contact was above the surface, on the surface, or below the surface of the water. After the participant determined the type of craft, he or she then proceeded to gather identifying information from Menu B and Menu C. Once the contact had been labeled as to the type of craft, its status, and its intentions, the contact would then be either cleared from the screen if it was determined not to be a threat or engaged (targeted) if it was determined to be hostile. Participants were told to work as quickly and as accurately as possible to identify each contact before it reached their ship.

After receiving detailed task instructions and practice, participants performed the task. After 15 min, action was stopped and participants completed a task questionnaire. At this point, they were asked to complete several items: measures of their perception of the group, task focus, and collective orientation (these measures

are described later). We chose to administer these items during task performance rather than at completion of the task to enhance the immediacy of their responses. Participants then continued the task for an additional 15 min, after which play was stopped and participants received a postexperimental questionnaire. After the questionnaire was completed, participants were interviewed individually, received a full explanation of the study, and were thanked for their participation.

Experimental Manipulations

Type of Group

The task was configured so that participants performed as part of a three-person coacting team or an interdependent team. In the coacting group condition, participants were introduced to one another as team members Alpha, Bravo, and Charlie. They were told that they would be working as a team on a computer-based task and their team's performance would be compared with that of other teams. However, the task was structured so that each group member performed the task independently. That is, Alpha's task was to select an unidentified contact, gather information from Menu A, Menu B, and Menu C, and then clear or engage the contact. Bravo and Charlie did the same. Thus, in the coacting group condition, group members worked on the task independently, with no interdependence required.

In the interdependent team condition, the task was structured so that Alpha, Bravo, and Charlie worked interdependently. Menu A was only available to Alpha, Menu B was only available to Bravo, and Menu C was only available to Charlie. Furthermore, the information items within each menu were shared across participants. For example, Alpha was responsible for ascertaining the five items of information that would allow him or her to determine the type of craft in Menu A; however, two of these pieces of information were held by the other team members. That is, Alpha would have to get one item of information from Bravo and one item from Charlie to combine with the information in Menu A to determine the type of craft. Thus, to process a contact, each team member had to request needed information from others and provide required information to others. There-

fore, in the interdependent team condition, the task was configured so that participants had to work interdependently to perform the task.

Stress

Participants performed the task in either a normal-stress or a high-stress environment. To induce high stress, we manipulated three factors: auditory distraction, task load, and time pressure. Auditory distraction was implemented by playing a multitrack audio recording of task-related chatter over the participants' headphones during the task. Task load was implemented by increasing the rate at which contacts were presented on the screen. Thus, in the high-stress conditions, participants were presented with a greater number of potentially threatening contacts. Finally, time pressure was induced by the experimenters telling the participants to "hurry up" and "work harder" at 5-min intervals during the task. We implemented multiple stressors rather than a single stressor to provide a more robust manipulation of task stress.

Measures

We defined team perspective as consisting of two primary components: (a) a collective representation of the group, or group identity, and (b) a collective representation of the task.

Collective Representation of the Group

This component of team perspective represents the extent to which group members perceive themselves as belonging to a distinct social unit or team. We assessed this component of team perspective using two measures: (a) group members' perception of the group and (b) the extent to which group members evaluated the outcome of performance in egocentric versus group terms.

Perception of the group. We adapted an item previously used by Gaertner, Mann, Murrell, and Dovidio (1989) to assess the extent to which participants perceived themselves as a group. This item was designed to assess participants' conceptual representations of the group by asking them to rate the extent to which they perceived themselves as a team or as three separate individuals. This measure has been

successfully used in previous research to differentiate groups of varying salience (Gaertner, Mann, Dovidio, Murrell, & Pomare, 1990; Gaertner et al., 1989). This item ("To what extent do you feel like a team, or do you feel more like three individuals?") was presented on a scale ranging from 1 (*team*) to 7 (*individuals*). We administered this item immediately when play was paused after the first 15 min of task performance.

Egocentricity. This measure of group identity was designed to assess the extent to which participants evaluated task performance in individual versus team terms. Beck (1993) noted that one aspect of egocentricity is the tendency to interpret the meaning of events in terms of what they mean to the individual rather than the meaning of the event to the group as a whole. Therefore, we devised an item to measure the extent to which participants interpreted task performance in terms of how they performed versus how well the team performed. At the end of the task, each participant was given a printout showing purported individual and team scores. The experimenter described the chart, which indicated that the individual's score was in the higher range (80–90th percentile) compared with how others had performed on the task. However, the team score was shown to be in the lower performance range (20–30th percentile). After participants were left for several minutes to review their score sheets, they were given a postexperimental questionnaire, which asked them to rate how well the task was performed on a scale ranging from 0 (*extremely poor*) to 100 (*extremely well*). Note that this question was intentionally broad in that it asked participants how well "the task" was performed, thus leaving the participants to interpret this question in terms of their individual performance or their team's performance. Group members providing a higher evaluation of performance were perceived as interpreting the task according to how well they themselves did. Group members providing a lower evaluation of performance were perceived as interpreting the task according to how well the group did.

Collective Representation of the Task

The second component of team perspective is a collective representation of the task, or a team-level model of task activity. To assess this

aspect of team perspective, we used measures of (a) task focus, (b) collective orientation, and (c) the elaboration of a team task model.

Task focus. The extent to which individuals were focused on individual versus team activities was assessed by three items. The first item asked participants to rate where their attention had been focused on a scale ranging from 1 (*interacting with the team*) to 7 (*doing individual tasks*). The remaining two items asked participants whether they felt more responsible for their own efforts rather than how others were doing and whether they felt they concentrated more on their own tasks rather than interacting with others. This three-item scale rendered an alpha of .93.

Collective orientation. Collective orientation refers to the mutual interdependence of team members (Driskell & Salas, 1992). Group members who are collectively oriented perceive themselves as working together as a group to solve the task. Group members who are less collectively oriented view their actions in a more autonomous manner. We assessed the extent of collective orientation in the following manner. After participants had performed the task for 15 min, we paused the action and administered a task questionnaire. We asked participants to describe the events that had occurred during the task. Participants were asked, "If you were asked to explain to someone what has been going on the last 10 to 15 minutes, what would you say?" Participants were given 5 min to write down their response on a blank form.

The measure of collective orientation used was the proportion of first person plural pronoun usage (e.g., we, us, our, ours, ourselves) in the written transcripts. This approach is an adaptation of a technique used by Wegner and Giuliano (1980) and Mullen, Chapman, and Peaugh (1989) to assess the self-focus of individuals. We expected that participants with a more collective or group focus would respond with a greater proportional usage of first person plural pronouns (i.e., *We identify targets close to our ship*). For each subject, we calculated the total number of first person plural pronouns used in describing task activities divided by the total word count.

Team task model. We assessed the extent to which group members elaborated a team-level model of the task by having three independent

judges who were unaware of the conditions rate each written transcript according to the extent to which it illustrated a team perspective of the task versus an individual perspective. A team task perspective was defined as emphasizing the interdependency of group members (i.e., "Alpha, Bravo, and Charlie must exchange information to identify targets"). An individual task perspective was defined as emphasizing individual actions or perceptions (i.e., "I have to determine whether a target is peaceful or hostile"). Transcripts were rated on a 5-point scale, ranging from 1 (*emphasis on individual perceptions, feelings, and actions*) to 5 (*emphasis on group perceptions and activities of other group members or the group as a whole*). The three judges' ratings were reliable, yielding a mean interrater correlation of .86 and Spearman-Brown effective reliability of .95.

Performance. During the 30-min performance period, group members were required to determine three classifications for each contact: type of craft, its status, and its intentions. Group member performance was assessed by the proportion of classifications that were correctly identified.

Results

Manipulation Check

As a check on the success of the stress manipulation, participants were asked to rate the extent to which they felt distracted and pressured during the task. Participants performing under high-stress conditions reported feeling more distracted ($M = 2.29$, $SD = 1.06$) than those in the no-stress conditions ($M = 1.50$, $SD = .86$), $t(93) = 4.00$, $p < .01$, and reported feeling more pressured ($M = 2.71$, $SD = 1.06$) than those in the no-stress conditions ($M = 1.86$, $SD = 1.00$), $t(92) = 4.02$, $p < .01$. There were no significant effects of team interdependence on the distraction or pressure measures ($ps > .1$).

Team Perspective

To gauge the effects of stress and team interdependence on team perspective, we examined the various indicators of team perspective and found that they were highly intercorrelated

(mean $r = .70$).² Therefore, these various indicators were standardized into Z scores and aggregated into a composite measure of team perspective (for which a higher score indicates greater team perspective). Then this composite indicator of team perspective was subjected to a 2 (type of group: coacting vs. interdependent) \times 2 (stress: low stress vs. high stress) analysis of variance (ANOVA). Means and standard deviations for team perspective scores are presented in Table 1. The expected main effect of stress was significant, $F(1, 91) = 11.99, p < .001$. Group members performing under high-stress conditions exhibited lower team perspective ($M = -.010$) than those operating under low stress ($M = .086$). Similarly, the expected main effect of type of group was significant, $F(1, 91) = 396.84, p < .001$. Participants operating in interdependent teams exhibited higher levels of team perspective ($M = .766$) than those operating in mere coaction ($M = -.783$).

The interaction between stress and type of group was also significant, $F(1, 91) = 8.91, p = .004$. In the interdependent teams, there was a significant loss of team perspective from low stress ($M = 1.016$) to high stress ($M = .515$), $t(91) = 4.60, p < .001$. In the coacting teams, there was no loss of team perspective from low stress ($M = -.766$) to high stress ($M = -.803$), $t(91) = 0.34, p = .369$.

Performance

To gauge the effects of stress and team interdependence on performance, a 2 (type of group: coacting vs. interdependent) \times 2 (stress: low stress vs. high stress) ANOVA was conducted on performance scores. Means and standard deviations for performance scores are

also presented in Table 1. The expected main effect of stress was marginally significant, $F(1, 87) = 2.47, p = .059$. Participants operating under conditions of low stress performed better ($M = .922$) than those operating under conditions of high stress ($M = .875$). Similarly, the expected main effect of type of group was marginally significant, $F(1, 87) = 2.09, p = .076$. Participants operating in interdependent teams performed better ($M = .919$) than those operating in mere coaction ($M = .877$). The interaction between stress and type of group was not significant, $F(1, 87) = 0.22, p = .639$.

Mediating Role of Team Perspective

The foregoing analyses reveal that stress and team interdependence exert predictable effects on team perspective and performance. However, the critical issue that drives this research effort is the extent to which the effects of stress and interdependence on performance are due to the more fundamental effects of stress and interdependence on team perspective. The most direct way to test the proposed relationship is to test for mediation.

To test the mediating role of team perspective, we conducted an analysis of covariance (ANCOVA), wherein a 2 (type of group: coacting vs. interdependent) \times 2 (stress: low stress vs. high stress) analysis was conducted on performance scores, with team perspective scores serving as a covariate. If the effects of stress and team interdependence on performance are primarily a result of their effects on team perspective, then the effects of stress and team interdependence on performance should be reduced when variability resulting from team perspective is partialled out. Indeed, this is precisely what happened: In this ANCOVA, the expected main effect of stress was now reduced to negligible magnitude, $F(1, 86) = 0.93, p = .169$. Similarly, the expected main effect of type of group was now reduced to negligible magnitude, $F(1, 86) = 0.62, p = .216$. Once again, the interaction between stress and type of group was not significant, $F(1, 86) = 0.0002$,

Table 1
Means and Standard Deviations for Team Perspective and Performance as a Function of Stress and Type of Group

| Measure | Low stress | | | High stress | | |
|------------------|------------|-------|----|-------------|-------|----|
| | M | SD | n | M | SD | n |
| Team perspective | | | | | | |
| Interdependent | 1.016 | 0.393 | 24 | 0.515 | 0.492 | 24 |
| Coacting | -0.766 | 0.319 | 26 | -0.803 | 0.260 | 21 |
| Performance | | | | | | |
| Interdependent | 0.950 | 0.112 | 24 | 0.888 | 0.156 | 24 |
| Coacting | 0.892 | 0.145 | 23 | 0.859 | 0.160 | 20 |

² The egocentricity measure did not show the overall pattern of results that was consistently shown by the other measures of team perspective and failed to correlate highly with the other measures of team perspective (average $r = .31$). Therefore, this measure was not included in the composite measure of team perspective.

$p = .987$. The results of this ANCOVA are illustrated in Figure 1. It can be seen that the main effect and interactive effects of stress and interdependence on performance are reduced when the effects of stress and interdependence on team perspective are first partialled out.

Discussion

Teams have become a critical means to accomplish complex tasks from the company boardroom to the commercial airliner. Teams are often called on to respond effectively under crisis or emergency conditions. Sometimes they are able to coordinate their resources and activities to land an immobilized airliner, and sometimes team performance deteriorates to a point at which team members barely acknowledge one another.

The idea that stress narrows the scope of attentional focus is well documented in the research literature. There has been some suggestion that stress may affect how group members attend to social information as well. In an early examination of small group behavior under stress, Torrance (1954) wrote, "Under stress . . .

linkages between members may become confused and thus people do not have a clear perception of what they can expect from one another, with whom they can relate, [and] how they can relate to one another" (p. 754).

Although the effects of stress on disrupting team performance have been well documented in the research literature, reviewers often bemoan the fact that we lack a clear understanding of the processes by which this occurs (cf. Littlepage & Karau, 1997). The results of this study provide one explanation for the tendency for groups to function less effectively under stress: Stress leads to a loss of team perspective.

The results of this study demonstrate that interdependence leads to a broader team perspective and that stress results in a narrowing of team perspective. The results further indicate that the narrowing of perspective that occurred under stress led to impaired team performance. This is not altogether surprising; however, what is striking is the central role played by team perspective. After partialing out the effects of team perspective, both group interdependence and stress became insignificant predictors of performance. These results suggest that team

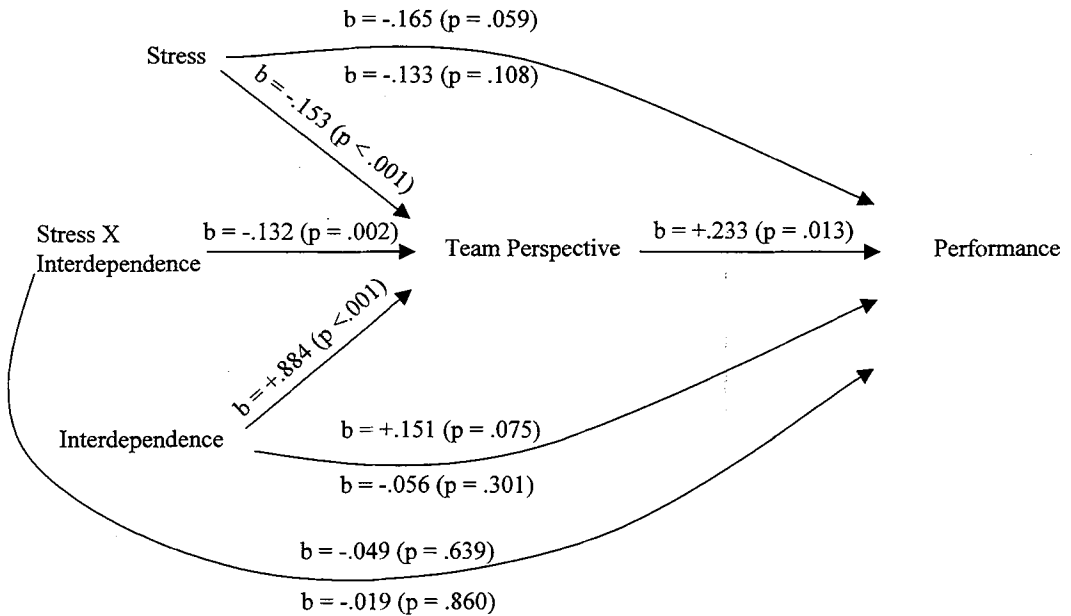


Figure 1. Path analysis illustrating the interrelations of stress, interdependence, team perspective, and performance. Values above lines represent direct effects; values below lines represent indirect effects (after the mediating role of team perspective is partialled out).

perspective is a critical factor in group performance and that one way in which stress and group interdependence impact performance is through their influence on team perspective.

We now examine the theoretical rationale for why stress narrows team perspective. The classic arousal perspective argues that stress results in heightened arousal and that arousal leads to a narrowing of attention (see Broadbent, 1971; Easterbrook, 1959). As attention narrows, peripheral (less relevant) task cues are first ignored, followed by further restriction of central or task-relevant cues. To the extent that task-relevant cues are neglected, performance suffers. Accordingly, tasks that demand attention to a wide range of cues are more susceptible to degradation under stress. Team tasks require attention to both direct task-related activities and interpersonal or teamwork activities such as coordination and communication. To the extent that these social or team cues are marginalized as attention is narrowed under stress, team perspective is weakened and performance may suffer.

Cohen (1980) presented a related argument, noting that stress leads to increased demand as the individual must attend to novel and distracting stimuli. This information overload results in a narrowing of attentional capacity. To reduce this informational overload, attention is restricted to those cues most relevant to the task. Cohen proposed that this restriction may affect both social and nonsocial cues. As important social cues (such as attention to others' requests or actions) are neglected, individuals become less socially cognizant. Accordingly, a team-level perspective is likely to become weakened in task groups under stress as these social or interpersonal cues are disregarded. In summary, both the arousal and the information overload positions maintain that stress leads to a narrowing of perspective as attention is focused on the most central or salient task cues. The results of the present research provide evidence that this theoretical approach can be extended to the group level as well and that the narrowing of attentional focus under stress may include a weakening of team perspective.

It is further worthwhile to consider the practical implications of this research. The results indicate that teams are indeed vulnerable to stress, and one mechanism through which

stress affects team performance is by narrowing team perspective. Both the arousal and information overload theories contend that stress results in a narrowing of attention. As external demands increase, teamwork behaviors, such as attending to others, may be neglected to the benefit of more central task cues, such as those involved in performing one's own immediate task. If we assume that the narrowing of attention is an adaptive response to the stress environment, an attempt to simplify an increasing complex and demanding task environment, then one approach to maintaining effective performance is to simplify the task environment. For those settings in which effective teamwork is critical, it may be necessary to structure the task to make it less demanding (i.e., by delegating subtasks), so that attention can be maintained on essential task and teamwork cues. In brief, if stress restricts attentional resources, the task environment may need to be restructured so that group members are not forced to sacrifice attention to teamwork matters to maintain performance. Unfortunately, for many real-world tasks, reducing the complexity of the task environment is a difficult undertaking.

A second approach to counter the effect of stress on narrowing team perspective is the attempt to enhance or strengthen team perspective. Wickens (1996) noted that the attentional narrowing resulting from stress is, at least to some degree, determined by subjective importance. That is, attention is maintained on high-priority items to the exclusion of information that is perceived to be of lower importance. It is possible that, for many team tasks, the importance of teamwork behaviors such as coordination and communication may be perceived as secondary to other basic, individual task demands. Anecdotally, highly interdependent sports such as soccer seem to illustrate this phenomenon: When teams get behind, team members often ignore team play and each person tries to win the game on his or her own, with predictable results. (Interestingly, this seems to occur more on inexperienced vs. more experienced teams.) Interventions that attempt to enhance team perspective, such as team building (see Safas, Rozell, Driskell, & Mullen, 1999), or the use of preparatory information to reinforce the interrelations of actors and the interdependent nature of the task (Inzana,

Driskell, Salas, & Johnston, 1996) may be effective approaches to counter stress effects.

We should also note several limitations of the present study. First, although we conducted this research in an applied setting with real-world participants, the teams that were formed were short-lived, and the nature of the experimental task did not allow the observation of other factors that may be important in more natural settings. Whether these results hold for groups that have been together for longer periods of time or that juggle multiple tasks is unknown.

Second, the primary objective of this study was to examine the extent to which team perspective mediates the relationship between stress and team performance. A variable such as team perspective functions as a mediator if it meets several conditions: (a) Variations in levels of the independent variable (stress) account for variations in the level of the mediator, (b) variations in the mediator account for variations in the dependent variable (team performance), and (c) when the mediator is controlled, the relationship between the independent variable and the dependent variable is substantially weakened (Baron & Kenny, 1986). These conditions were all upheld. Although the mediation analysis was the most direct way to test the hypothesized relations, mediation is best done when there is a strong relation between the independent variable and the dependent variable, and in the present case this effect was modest. For example, the main effect of stress on team performance translates into a small effect size of .17 ($p = .059$). Future researchers should be advised to test these relationships with a larger sample size, rendering greater statistical power.

Finally, the present research has revealed a novel effect of stress on team perspective that has not been previously demonstrated. We have identified one mechanism through which stress impacts team performance: by narrowing team perspective. If we adopt Hinsz et al.'s (1997) model of groups as information processors, it is likely that, in addition to affecting attentional processes, stress may disrupt other aspects of group functioning, such as memory, retrieval, processing, and response. Further research should be directed toward gaining a more complete understanding of the processes by which stress impacts team performance.

References

- Asch, S. E. (1952). *Social psychology*. Englewood Cliffs, NJ: Prentice Hall.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.
- Baumeister, R. F. (1984). Choking under pressure: Self-consciousness and paradoxical effects of incentives on skilled performance. *Journal of Personality and Social Psychology*, *46*, 610-620.
- Beck, A. T. (1993). Cognitive approaches to stress. In P. M. Lehrer & R. L. Woolfolk (Eds.), *Principles and practice of stress management* (pp. 333-372). New York: Guilford Press.
- Broadbent, D. E. (1971). *Decision and stress*. New York: Academic Press.
- Butler, J. L., & Baumeister, R. F. (1998). The trouble with friendly faces: Skilled performance with a supportive audience. *Journal of Personality and Social Psychology*, *75*, 1213-1230.
- Cannon-Bowers, J. A., & Salas, E. (1998). Team performance and training in complex environments: Recent findings from applied research. *Current Directions in Psychological Science*, *7*, 83-87.
- Cannon-Bowers, J. A., Salas, E., & Converse, S. (1993). Shared mental models in expert team decision making. In J. Castellan (Ed.), *Current issues in individual and group decision making* (pp. 221-246). Hillsdale, NJ: Erlbaum.
- Cannon-Bowers, J. A., Tannenbaum, S. I., Salas, E., & Volpe, C. E. (1995). Defining competencies and establishing team training requirements. In R. A. Guzzo & E. Salas (Eds.), *Team effectiveness and decision making in organizations* (pp. 333-380). San Francisco: Jossey-Bass.
- Cohen, S. (1978). Environmental load and the allocation of attention. In A. Baum, J. E. Singer, & S. Valins (Eds.), *Advances in environmental psychology* (Vol. 1, pp. 1-29). Hillsdale, NJ: Erlbaum.
- Cohen, S. (1980). Aftereffects of stress on human performance and social behavior: A review of research and theory. *Psychological Bulletin*, *88*, 82-108.
- Combs, A. W., & Taylor, C. (1952). The effect of the perception of mild degrees of threat on performance. *Journal of Abnormal and Social Psychology*, *47*, 420-424.
- Driskell, J. E., & Salas, E. (1991). Group decision making under stress. *Journal of Applied Psychology*, *76*, 473-478.
- Driskell, J. E., & Salas, E. (1992). Collective behavior and team performance. *Human Factors*, *34*, 277-288.

- Easterbrook, J. A. (1959). The effect of emotion on cue utilization and the organization of behavior. *Psychological Review*, *66*, 183–201.
- Foushee, H. C. (1982). The role of communications, socio-psychological, and personality factors in the maintenance of crew coordination. *Aviation, Space, and Environmental Medicine*, *53*, 1062–1066.
- Foushee, H. C. (1984). Dyads and triads at 35,000 feet: Factors affecting group process and aircrew performance. *American Psychologist*, *39*, 885–893.
- Gaertner, S. L., Mann, J. A., Dovidio, J. F., Murrell, A. J., & Pomare, M. (1990). How does cooperation reduce intergroup bias? *Journal of Personality and Social Psychology*, *59*, 692–704.
- Gaertner, S. L., Mann, J., Murrell, A., & Dovidio, J. F. (1989). Reducing intergroup bias: The benefits of recategorization. *Journal of Personality and Social Psychology*, *57*, 239–249.
- Hackman, J. R. (1987). The design of work teams. In J. Lorsch (Ed.), *Handbook of organizational behavior* (pp. 315–342). Englewood Cliffs, NJ: Prentice Hall.
- Härtel, C. E. J., & Härtel, G. F. (1997). SHAPE-assisted decision making and problem solving: Information-processing-based training for conditions of cognitive business. *Group Dynamics*, *1*, 187–199.
- Hinsz, V. B., Tindale, R. S., & Vollrath, D. A. (1997). The emerging conceptualization of groups as information processors. *Psychological Bulletin*, *121*, 43–64.
- Inzana, C. M., Driskell, J. E., Salas, E., & Johnston, J. (1996). Effects of preparatory information on enhancing performance under stress. *Journal of Applied Psychology*, *81*, 429–435.
- James, W. (1890). *The principles of psychology* (Vol. 1). New York: Holt.
- Johnston, J., Driskell, J. E., & Salas, E. (1997). Vigilant and hypervigilant decision making. *Journal of Applied Psychology*, *82*, 614–622.
- Karau, S. J., & Kelly, J. R. (1992). The effects of time scarcity and time abundance on group performance quality and interaction process. *Journal of Experimental Social Psychology*, *28*, 542–571.
- Lewin, K. (1951). *Field theory in social science*. New York: Harper.
- Lewis, B. P., & Linder, D. E. (1997). Thinking about choking: Attentional processes and paradoxical performance. *Personality and Social Psychology Bulletin*, *23*, 937–944.
- Littlepage, G. E., & Karau, S. J. (1997). Utility and limitations of the SHAPE-assisted intuitive decision-making procedure. *Group Dynamics*, *1*, 200–207.
- Mathews, K. E., & Canon, L. K. (1975). Environmental noise level as a determinant of helping behavior. *Journal of Personality and Social Psychology*, *32*, 571–577.
- McGrath, J. E. (1984). *Groups: Interaction and performance*. Englewood Cliffs, NJ: Prentice Hall.
- Mead, G. H. (1934). *Mind, self, and society*. Chicago: University of Chicago Press.
- Mullen, B. (1991). Group composition, salience, and cognitive representations: The phenomenology of being in a group. *Journal of Experimental Social Psychology*, *27*, 297–323.
- Mullen, B., Chapman, J. G., & Peaugh, S. (1989). Focus of attention in groups: A self-attention perspective. *Journal of Social Psychology*, *129*, 807–817.
- National Transportation Safety Board. (1979). *Aircraft accident report: United Airlines Flight 173, DC-8-61, N8082U* (NTSB/AAR-79/12). Washington, DC: Author.
- National Transportation Safety Board. (1990). *Aircraft accident report: United Airlines DC-10-10 engine explosion and landing at Sioux City Iowa* (NTSB/AAR-90/06). Washington, DC: Author.
- Pennebaker, J. W., Czajka, J. A., Cropanzano, R., & Richards, B. C. (1990). Levels of thinking. *Personality and Social Psychology Bulletin*, *16*, 743–757.
- Predmore, S. C. (1991). Microcoding of communications in accident analyses: Crew coordination in United 811 and United 232. In R. S. Jensen (Ed.), *Proceedings of the sixth annual international symposium on aviation psychology* (pp. 353–358). Columbus: Ohio State University.
- Reicher, S. (1982). The determination of collective behavior. In H. Tajfel (Ed.), *Social identity and intergroup relations* (pp. 41–83). Cambridge, England: Cambridge University Press.
- Rotton, J., Olszewski, D., Charleton, M., & Soler, E. (1978). Loud speech, conglomerate noise, and behavioral aftereffects. *Journal of Applied Psychology*, *63*, 360–365.
- Salas, E., Rozell, D., Driskell, J. E., & Mullen, B. (1999). The effect of team building on performance: An integration. *Small Group Research*, *30*, 309–329.
- Salovey, P. (1992). Mood-induced self-focused attention. *Journal of Personality and Social Psychology*, *62*, 699–707.
- Shaw, M. E. (1981). *Group dynamics: The psychology of small group behavior*. New York: McGraw-Hill.
- Torrance, E. P. (1954). The behavior of small groups under the stress conditions of survival. *American Sociological Review*, *19*, 751–755.
- Wegner, D. M., & Giuliano, T. (1980). Arousal-induced attention to self. *Journal of Personality and Social Psychology*, *38*, 719–726.
- Wickens, C. D. (1996). Designing for stress. In J. Driskell & E. Salas (Eds.), *Stress and human performance* (pp. 279–295). Hillsdale, NJ: Erlbaum.