The Effects of Critical Team Member Assertiveness on Team Performance and Satisfaction

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Journal of Management 2006; 32; 575
DOI: 10.1177/0149206306289099

The Effects of Critical Team Member Assertiveness on Team Performance and Satisfaction

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In an effort to extend theory and research linking personality to team effectiveness, this study used the workflow networks literature to investigate the effects of critical team member dispositional assertiveness on team performance and satisfaction. Results from 64 teams working on a command-and-control simulation indicated that critical team member dispositional assertiveness positively affected team performance and team satisfaction. Results also indicated that both of those effects were due to improvements in the team's transactive memory system.

Keywords: *assertiveness; teams; transactive memory; criticality*

Organizations are increasingly structuring work around self-managed teams (e.g., Devine, Clayton, Philips, Dunford, & Melner, 1999). Composed of two or more members who work interdependently and autonomously toward a common objective, these teams allow organizations to take advantage of distributed expertise and adapt to complex and constantly changing environments (e.g., Cohen & Bailey, 1997; Salas, Dickinson, Converse, & Tannenbaum, 1992). The increased dependence on self-managed teams has resulted in a considerable amount of research aimed at identifying factors that enhance their effectiveness (see Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Kozlowski & Bell, 2003). One such factor

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Journal of Management, Vol. 32 No. 4, August 2006 575-594
DOI: 10.1177/0149206306289099

that has received significant attention is team member personality (e.g., Barrick, Stewart, Neubert, & Mount, 1998; Barry & Stewart, 1997; Neuman & Wright, 1999).

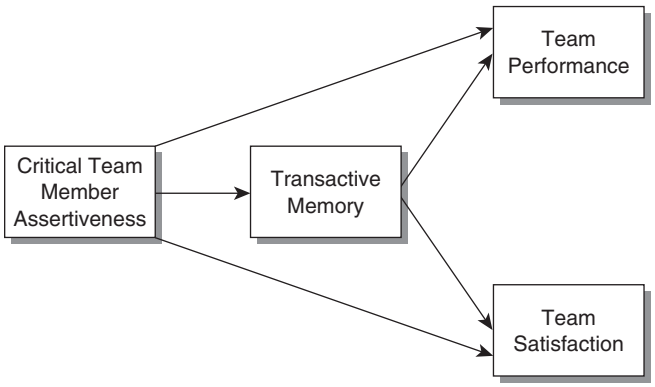
Most research on the effects of personality in teams has focused on the Big Five (see Kozlowski & Bell, 2003). However, recently researchers have suggested that the Big Five factors may be too broad, and it may be more useful to examine specific subdimensions (e.g., Dudley, Orvis, Lebiecki, & Cortina, 2006; Moon, 2001; Schneider, Hough, & Dunnette, 1996). For example, although the broad trait of extraversion has been studied extensively in teams, researchers have found mixed results regarding its impact on performance (e.g., Barrick et al., 1998; Barry & Stewart, 1997; Neuman & Wright, 1999). Barry and Stewart (1997) suggested that the benefits of extraversion on team performance may lie primarily in the subdimension of assertiveness. Assertive individuals tend to be decisive, outspoken, forceful, and direct (Bakan, 1966; Deluga, 1988) and share ideas and information in a clear, confident manner (Hayes, 1991).

When examining the effects of team member personality on team effectiveness, researchers have traditionally aggregated individual-level data according to the task-type typology proposed by Steiner (1972). For example, when the task is structured such that one individual can perform the majority of the work (i.e., disjunctive), researchers focus on the highest scoring team member. However, researchers have recently argued that focusing solely on task type may mask the influence of individual team members' contributions and that alternative aggregation techniques should be examined (Ellis, Bell, Ployhart, Hollenbeck, & Ilgen, 2005; Hinsz, Tindale, & Vollrath, 1997).

One approach is to focus on the roles members hold in their team (Barry & Stewart, 1997). Recently, researchers have begun to view teams as networks, whose members are embedded within a system of interconnected relationships that provide opportunities and constrain patterns of behavior (e.g., Klein, Lim, Saltz, and Mayer, 2004; Reagans, Zuckerman, & McEvily, 2004; Roberson & Colquitt, 2005; Sparrowe, Liden, Wayne, & Kraimer, 2001). Within teams, workflow networks operate through the formally proscribed set of interdependencies between task positions and are based on the actual flow of work (e.g., Brass, 1981). Information and work flow through the group via the exchange of inputs and outputs between workers (Mehra, Kilduff, & Brass, 2001). Because of the division of labor inherent in the flow of work, certain positions within teams may have more influence on team performance than others. These positions are defined as *critical* because their removal "breaks the workflow chain" (Brass, 1984: 522). Critical team members are not formal leaders, nor are they necessarily the most skilled or valued members of the team. Rather, the position they hold within the team involves the control of vital information that without which other members would not be able to perform their tasks. All other positions are therefore dependent on the critical team member because of that individual's access to unique knowledge and resources.

Researchers suggest that the personality of individuals in specific network positions can influence outcomes at the team level (e.g., Ellis et al., 2005; Mehra et al., 2001). Given that critical team members represent the focal point for communication and distribution of information within the team, dispositional assertiveness should be particularly important in this role.

Figure 1
A Mediated Model of the Effects of Critical Team Member Assertiveness on Team Performance and Satisfaction



Therefore, the primary purpose of this study is to examine the effects of critical team member dispositional assertiveness in teams. To do so, we use the widely accepted Input-Process-Outcome (IPO) model of team effectiveness (e.g., Hackman, 1987; Mathieu, Gilson, & Ruddy, 2006; McGrath, 1984). The IPO model suggests that inputs affect team outcomes through their influence on certain mediating processes. In this study, critical team member dispositional assertiveness serves as our input variable. On the basis of theory, we then directly link critical team member dispositional assertiveness to two principal effectiveness outcomes, performance and satisfaction (e.g., Gladstein, 1984) and suggest that those effects are mediated by transactive memory processes (see Figure 1).

This study contributes to the literature in a number of ways. Specifically, we hope to further our understanding of the effects of dispositional assertiveness in teams, to expand the nomological network surrounding the effects of personality in teams, to offer an alternative approach to aggregating personality to the team level, and to add to our understanding of why personality influences team effectiveness by highlighting the crucial role of transactive memory.

The Effects of Dispositional Assertiveness

As noted above, dispositional assertiveness is the aspect of extraversion most closely tied to the effective communication of ideas as assertive individuals tend to speak forcefully and without hesitation (Costa & Widiger, 1994). Assertiveness has been defined as the capacity to effectively communicate in interpersonal encounters by sharing ideas clearly and directly (Wolpe & Lazarus, 1966). Smith-Jentsch, Salas, and Baker (1996) suggested that assertive team members share their opinions with their teammates in a manner that is persuasive to others, facilitating the communication process in team contexts (Marks, Zaccaro, & Mathieu, 2000).

We propose that these characteristics are crucial for members occupying critical positions and have the potential to affect both team performance and satisfaction.

Regarding team performance, individuals occupying critical positions must be willing and able to share knowledge in order for their teammates to quickly and clearly receive specific task-related information. Dispositional assertiveness can help ensure that a critical team member's information is available to the team and that other members receive the expertise-specific information they need to effectively perform their tasks (Smith-Jentsch et al., 1996). Consider a cross-functional sales team staffed by members with different product and geographic responsibilities, including a junior marketing analyst who gathers information about competitor and customer activities. Although not considered the most important member of the team, the marketing analyst occupies a critical position within the unit's workflow because of his or her sole access to this information. Other members may be more valued and skilled but cannot gather this critical information from any other source. An assertive individual in that position would actively direct new information to the specific salesperson possessing the appropriate area of responsibility, enabling them to apply their expertise. Someone much lower in dispositional assertiveness might wait until another team member requests the information or simply be hesitant to bother a busy or senior colleague, impeding team performance. Although the analyst's job description may only include gathering and providing the data, the team's performance would likely be enhanced by the active, forceful direction of information to teammates.

Beyond directing information, critical team member dispositional assertiveness can improve team performance by elucidating the provision of performance feedback, offering solutions to problems, providing assistance, and initiating action (Smith-Jentsch et al., 1996). Dispositional assertiveness is less important for noncritical team members who do not control the flow of vital information. In essence, noncritical team members primarily remain on the receiving end, relying on the critical team member for information and expertise.

Researchers have suggested that assertive behavior can determine whether teams succeed or fail in dangerous environments such as nuclear power plants, air crews, and emergency medical units (Smith-Jentsch et al., 1996) because it can reduce the number of life-threatening mistakes (Jentsch & Smith-Jentsch, 2001). A number of studies have empirically supported these claims, finding that assertive behavior can improve group-level performance (Driskell, Hogan, & Salas, 1988; Williams & Sternberg, 1988) and decision making (Oser, McCallum, Salas, & Morgan, 1989; Prince & Salas, 1993). For example, Smith-Jentsch, Salas, and Brannick (2001) examined the effects of assertive behavior on the performance of licensed pilots in a flight simulator designed to evaluate aircrew coordination and found that assertive behavior in key positions positively affected team performance. Although past research has failed to examine the dispositional effects of assertiveness, we expect similar results and hypothesize the following:

Hypothesis 1: Critical team member dispositional assertiveness will positively affect team performance.

Regarding team satisfaction, which reflects members' attitudes toward their work unit and their willingness to continue working together over time (Hackman & Morris, 1978), critical team members hold expertise-specific information that determines whether other members are able to complete their tasks efficiently and effectively. If that information fails

to be distributed within the team, members may begin to feel disconnected. Furthermore, if workers are unable to provide input into the operation of the team, they may feel that the value of their role in achieving their collective goals and objectives is minimized. Continuing the example of the cross-functional sales team, the marketing analyst needs to distribute information about competitor and customer activities to the appropriate salespeople. Without that information, salespeople will likely feel cut off from their team, devalued, and underappreciated. In addition, they may feel that other members are preventing them from doing their job. All of these perceptions may lead to feelings of dissatisfaction with their team.

In support of these arguments, researchers have shown that, when team members fail to distribute necessary information, this creates divisiveness and leads to lower levels of satisfaction (e.g., Hackman, 1991; Janz, Colquitt, & Noe, 1997; Jehn, Northcraft, & Neale, 1999). Satisfaction will also suffer when members fail to coordinate their interdependent roles and responsibilities toward the completion of the team task and are left to fend for themselves (e.g., Saavedra, Earley, & Van Dyne, 1993; Van Der Vegt, Emans, & De Vliert, 2000, 2001; Wageman & Baker, 1997). As a result, we hypothesize the following:

Hypothesis 2: Critical team member dispositional assertiveness will positively affect team satisfaction.

The Role of Transactive Memory

We expect critical team member assertiveness to positively affect team performance and satisfaction by stimulating the team's transactive memory system, defined as the cooperative division of labor for learning, remembering, and communicating team knowledge (e.g., Hollingshead, 2001; Lewis, 2003; Wegner, 1987). Transactive memory consists of three dimensions: specialization, coordination, and credibility. Specialization refers to the recognition of distributed expertise within the team, coordination refers to the ability of the team members to work together efficiently, and credibility refers to team members' beliefs about the reliability of other members' knowledge (e.g., Lewis, 2003; Moreland & Myaskovsky, 2000). Although transactive memory contains multiple dimensions, researchers have suggested that each represents an indicator of the underlying latent construct (e.g., Lewis, 2003). Transactive memory systems allow team members to allocate and retrieve domain-specific knowledge in order to efficiently and effectively distribute information-processing responsibilities (e.g., Ellis, in press; Hinsz et al., 1997). As a result, research has consistently supported the positive effects of transactive memory on team effectiveness (e.g., Lewis, 2003, 2004; Liang, Moreland, & Argote, 1995; Moreland, Argote, & Krishnan, 1996; Moreland & Myaskovsky, 2000).

Because transactive memory systems involve the communication of domain-specific information between team members, we suggest that the system will be influenced by critical team member dispositional assertiveness. Transactive memory theory recognizes that the contributions of each team member may differ according to their role (e.g., Wegner, 1987). When one team member occupies a critical role, each member must provide unequal contributions of knowledge and expertise in order for the team's transactive memory system to operate smoothly. The critical team member is the hub that links the various satellites of expertise together. He or she needs to share and integrate his or her information and knowledge in order for team members to understand who needs to talk to whom and when.

Although researchers have yet to link dispositions and transactive memory, we suggest that the characteristics associated with dispositional assertiveness should help the critical team member stimulate the team's transactive memory system. Assertive critical team members' willingness to actively share expertise-specific information with other members will advance the recognition of specialization and will provide members with a link to their teammates' knowledge, enhancing awareness of each member's area of expertise. Assertive critical team members share information confidently and without hesitation, leading to greater trust in their expertise and the knowledge of those connected to him or her. Finally, assertive critical team members' decisive, forceful nature will prompt them to clearly direct information to the appropriate team member, controlling the workflow and enhancing team members' ability to coordinate with one another. As the number of successful assertiveness-driven interactions increases, awareness and trust in member expertise will likely grow, allowing for the coordinated, effective application of team member knowledge. This is consistent with Korsgaard, Roberson, and Rymph's (1998) contention that assertive communications increase the level of knowledge and understanding between group members.

On the basis of these arguments, we expect that critical team member dispositional assertiveness will positively affect transactive memory. Given that transactive memory has repeatedly been linked to team effectiveness (e.g., Austin, 2003; Ellis, in press; Lewis, 2003, 2004), we suggest that transactive memory represents the mechanism through which critical team member dispositional assertiveness influences team effectiveness. Therefore, we hypothesize the following:

Hypothesis 3: Transactive memory will mediate the relationship between (a) critical team member dispositional assertiveness and team performance and between (b) critical team member dispositional assertiveness and team satisfaction.

Method

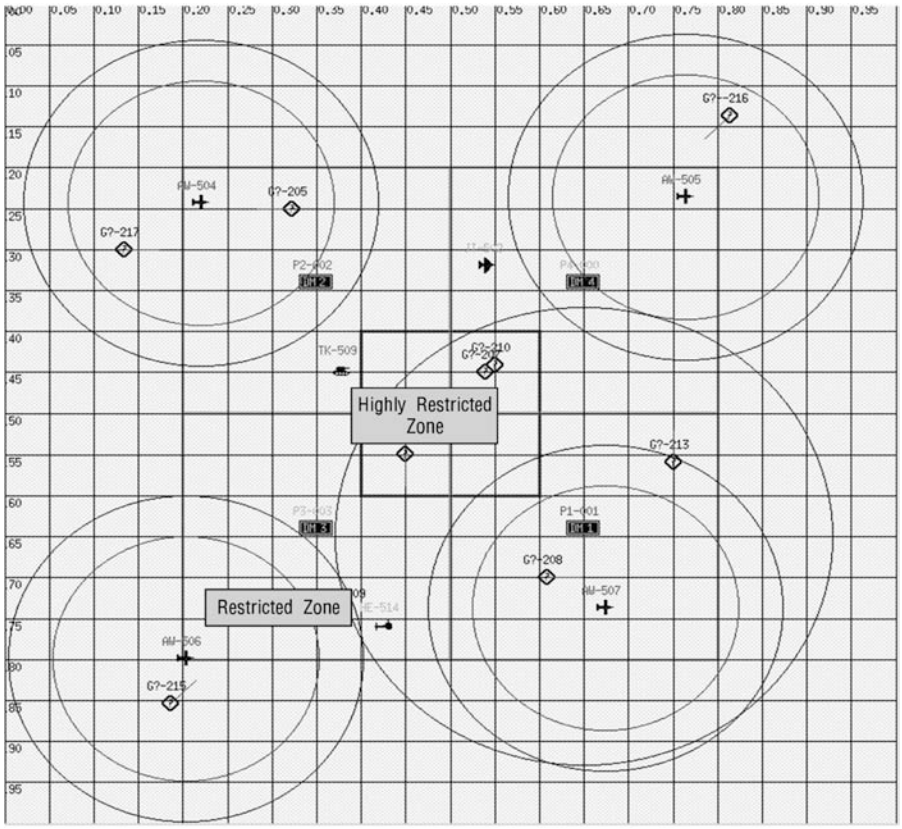
Research Participants

Participants included 268 students from introductory management courses at a large southwestern university who were arrayed into 67 four-person teams. Three teams that were unable to adequately perform the task because of language problems with one or more team members were removed from the original sample, leaving 64 teams. Out of the 256 remaining students, 136 (53%) were male and 166 (65%) were White, with an average age of 21.6 years. In exchange for their participation, each earned class extra credit, and all were eligible for cash prizes (up to $120 per team) based on the team's performance.

Task

Participants engaged in a modified version of the Distributed Dynamic Decision-making (DDD) simulation (see Miller, Young, Kleinman, & Serfaty, 1998). The DDD is a computerized, dynamic command-and-control simulation requiring team members to monitor a geographic region and defend it against invasion from unfriendly targets, which are radar representations

Figure 2
The DDD Grid, Including Bases, Vehicles, and Targets



Note: DDD = Distributed Dynamic Decision-making simulation.

of enemy forces moving through the region (see Figure 2). The objective of the task is to maximize the number of team points, which can be accomplished by identifying targets, determining whether they are friendly or unfriendly, and, if unfriendly, keeping them out of the restricted zones by engaging them. However, to maximize their score, team members also had to make sure that they were not disabling a friendly track or disabling an unfriendly one outside the restricted zones.

Geographic region. As shown in Figure 2, the geographic region is partitioned into four quadrants of equal size (one per team member). In the center of the screen is a 4×4 square designated as the "highly restricted zone" that is nested within a larger 12×12 square called the "restricted zone." Outside the restricted zone is neutral space.

Table 1
Summary of Vehicles and Targets

Vehicles						Targets			
Vehicle	Duration (in minutes)	Speed	Vision	Power	Identify Targets	Targets	Power (Task)	Nature (Task)	Power (Train)
AWACS	6	Fast	Very far	None	Yes	A	Low (1)	Enemy	None
Tank	8	Slow	Very limited	High (5)	No	B	High (5)	Enemy	Low (1)
Helicopter	4	Medium	Limited	Medium (3)	No	C	Medium (3)	Enemy	Medium (3)
Jet	2	Very fast	Far	Low (1)	No	D	None	Friendly	High (5)

Note: For vehicles: *duration* = amount of time a vehicle may stay away from base before refueling; *speed* = how fast the vehicle travels across the task screen; *vision* refers to the range of vision the vehicle has to see and/or identify targets; *power* = the ability of the vehicle to engage enemy targets; *identify targets* = the ability to identify the power level and nature of targets. For targets: *power* = the level of power needed to successfully engage the target for both the experimental task and training sessions; *nature* = whether the target is friendly or enemy. All targets move at the same speed. AWACS = surveillance planes.

Bases and vehicles. In terms of monitoring the geographic region, each team member has a home base of operations located in their quadrant with a detection ring that allows them to detect the presence or absence of targets within its radius. To detect targets outside of their base's detection ring, team members must rely on teammates or the vehicles located at their base.

Each team member was assigned four vehicles that were used to defend the space (i.e., keep unfriendly targets out of restricted areas). There are four different types of vehicles: (a) AWACS (surveillance planes), (b) tanks, (c) helicopters, and (d) jets. Assets vary on five capabilities: range of vision, speed, duration of operability, identification capacity, and power (see Table 1). Capabilities are distributed among the assets so that each has both strengths and weaknesses. For example, the AWACS has the greatest range of vision but no power to engage unfriendly targets. Tanks, on the other hand, have the highest level of power, but their range of vision is small and their speed is slow. Although all vehicles can detect targets, only the AWACS planes can identify targets as friendly or enemy and share the information with the rest of the team.

Targets. When targets enter a detection ring, they show up as unidentified. Once the target is identified using an AWACS plane, a team member can engage it with a tank, helicopter, or jet, depending on the power level of the target and the vehicle engaging it. If the vehicle has the correct level of power, the target can be disabled. In this study, teams faced four different types of targets: A, B, C, and D. Each target had either a power of 0 (friendly), 1, 3, or 5 depending on whether it appeared in the training or experimental task (see Table 1).

Team member specialties. During DDD training, team members did *not* have specific areas of expertise. Each team member controlled one AWACS plane, one tank, one helicopter, and one jet and knew that A, B, C, and D targets corresponded to power 0, 1, 3, and

5, respectively. During the actual experimental task, team members *did* have specific areas of expertise. Areas of expertise were created by splitting up knowledge regarding the targets and possession of four different vehicles. Each team member knew the power level of one target and was responsible for one type of vehicle. DM1 knew that Track D had a power of 0 (friendly) and had all four AWACS planes, DM2 knew that Track B had a power of 5 and had all four tanks, DM3 knew that Track C had a power of 3 and had all four helicopters, and DM4 knew that Track A had a power of 1 and had all four jets.

Procedure

Immediately after entering the laboratory, participants were randomly assigned to one of four computer stations (e.g., DM1, DM2, DM3, or DM4) within a four-person team. Participants were trained on the declarative and procedural knowledge necessary for successful task completion for approximately 30 minutes. Participants then played a 30-minute practice game, where they learned how to launch and move vehicles, identify targets, and attack targets *without* specific areas of expertise.

After training, each team performed a 30-minute experimental task *with* specific areas of expertise. Each team member was given a sheet that illustrated his or her own specific role, which they were able to keep during the experimental task. Each team faced a total of 100 targets during the task and could only communicate verbally with one another. At the end of the experimental task, participants completed the dispositional assertiveness, team satisfaction, and transactive memory measures.

Measures

Critical team member dispositional assertiveness. The 30-item Rathus (1973) Assertiveness Schedule (see Caplan, Vinokur, Price, & van Ryn, 1989; Swann & Rentfrow, 2001; Twenge, 2001), which is "probably the most frequently used self-report of assertiveness" (Holtgraves, 1997: 627), was used in this study to measure dispositional assertiveness (e.g., "I am quick to express an opinion" and "Most people seem to be more aggressive and assertive than I am"). Each item was scored on a 5-point Likert-type scale ranging from 1 *(strongly disagree)* to 5 *(strongly agree).* Coefficient alpha was .81 in this study.

Transactive memory. Transactive memory was measured using the scale developed by Lewis (2003). The scale contains 15 items (5 items per dimension) designed to assess team member specialization (e.g., "Different team members are responsible for expertise in different areas"), credibility (e.g., "I trusted that other members' knowledge about the project was credible"), and coordination (e.g., "Our team worked together in a well-coordinated fashion"). Each item was scored on a 5-point Likert-type scale ranging from 1 *(strongly disagree)* to 5 *(strongly agree).* Coefficient alpha for this study was .76 for transactive memory. To examine the extent to which measures are sufficiently reliable to be aggregated at the team level, we computed intraclass correlation (ICC) coefficients (see Klein et al. 2000). ICC(1) represents the reliability of a single rating of the team construct, whereas ICC(2)

represents the reliability of the average of team member responses. For transactive memory, ICC(1) = .36 and ICC(2) = .69, justifying aggregation (Bliese, 2000).

Team performance. The measure of team performance is this study was adapted from Ellis et al. (2003) and focused on the team's main objective, which was to maximize the number of points represented by offensive and defensive scores. The offensive score went up by 5 points every time an enemy target was disabled within one of the restricted zones. If an enemy target was disabled in the neutral space or a friendly target disabled, the offensive score dropped by 25 points. The defensive score decreased 1 point for every second an enemy resided within the restricted zone and 2 points for every second an enemy resided within the highly restricted zone. Team performance was measured by standardizing and combining the offensive and defensive scores. Although team members were aware of their nominal score, they received no performance feedback from experimenters and were unable to compare their scores with those of other teams. Therefore, they had no means of assessing their performance relative to other teams.

Team satisfaction. The measure of team satisfaction in this study was measured with a six-item Likert-type scale adapted from previous work (e.g., Phillips, Douthitt, & Hyland, 2001; Seashore, Lawler, Mirvis, & Camman, 1982). An example item read, "Overall, I am satisfied with my team." The coefficient alpha reliability of this scale was .84. An ICC(1) of .44 and an ICC(2) of .76 suggested that member-level scores could be aggregated to the team level using the average of the four team members' scores.

Manipulation

Criticality. The criticality manipulation used in this study was adapted from Ellis et al. (2005). According to Brass (1984, 1985), criticality can be indexed by the number of alternative workflow routes remaining if a team member is removed from the team: The higher the number, the less critical the team member. For example, when a team member provides the same resources as the majority of his or her teammates, he or she would be low in criticality. Therefore, in this study, we manipulated criticality by distributing assets unequally between the team members. Specifically, during the task, one team member was in charge of all four AWACS planes, whereas the others were in charge of all four tanks, helicopters, or jets.

In this resource allocation structure, the team member who was in control of the AWACS was the only one capable of identifying the power level and nature of targets. None of the other team members could act as his or her replacement. They had to rely on him or her for the continual flow of work, providing that member with a high degree of control over the team's workflow. None of the other team members' roles exhibited the same characteristics and, with the exception of the critical team member, there was horizontal substitutability to varying degrees for all other roles (Hollenbeck et al., 2002). Therefore, the team member in charge of the AWACS was labeled as the critical team member and was the focus of our hypothesis tests. Although team members were aware of each other's resources, they were not informed of the relative criticality of their roles.

Table 2
Means, Standard Deviations, and Intercorrelations Among Variables of Interest

Variable	*M*	*SD*	1	2	3	4
1. Critical team member dispositional assertiveness	3.40	0.39	—			
2. Transactive memory	3.67	0.28	.27*	—		
3. Team performance	0.00	1.44	.30*	.40**	—	
4. Team satisfaction	3.76	0.43	.29*	.66**	.47**	—

Note: $N = 64$.
*$p < .05$
**$p < .01$

Results

Table 2 reports the descriptive statistics and correlations for all the variables included in the hypothesis tests. Team performance had an overall mean of 0.00 as it was a standardized composite of team offensive and defensive scores. Regarding our results, critical team member assertiveness was positively and significantly correlated with team performance, team satisfaction, and transactive memory. Tests of specific hypotheses are presented below.

Tests of Hypotheses

Hypothesis 1. The first hypothesis proposed that critical team member dispositional assertiveness would be positively related to team performance. As shown in Table 2, critical team member dispositional assertiveness was significantly and positively related to team performance ($r = .30$, $p < .05$), explaining 9% of the variance and supporting Hypothesis 1.

Hypothesis 2. Our second hypotheses proposed that critical team member dispositional assertiveness would be positively related to team satisfaction. As shown in Table 2, critical team member dispositional assertiveness was significantly and positively related to team satisfaction ($r = .29$, $p < .05$), explaining 9% of the variance and supporting Hypothesis 2.

Hypothesis 3. Our third hypothesis proposed that the effects of critical team member dispositional assertiveness on team performance and team satisfaction would be mediated by transactive memory. Researchers have suggested that path analysis is appropriate when testing mediation with multiple paths (e.g., Baron & Kenney, 1986; Barry & Stewart, 1997; Humphrey, Ellis, Conlon, & Tinsley, 2004; Tierney & Farmer, 2004) and with small to moderate sample sizes (e.g., Efron & Tibshirani, 1993; Shrout & Bolger, 2002). Because this approach allows for simultaneous analysis, it captures the mediation effect on both dependent variables and reports a coefficient for each that can be tested for significance. If the *t* test of the indirect effect is significant, mediation can be inferred.

Accordingly, we performed a path analysis using EQS version 5.7b (Bentler, 1995). Transactive memory was entered as a mediator, critical team member dispositional assertiveness

Table 3
Mediation Effects Decomposition

Dependent Variable	Direct Effect (Unmediated Effect)	*t* (Direct)	Indirect Effect (Mediated Effect)	*t* (Indirect)	Total Effect
Team performance	.21	1.80	.34	2.91*	.55
Team satisfaction	.13	1.34	.62	6.37**	.75
Model statistics					
IFI = .94					
CFI = .93					
SRMR = .04					

Note: N = 64. This model examines transactive memory as a mediator for critical team member dispositional assertiveness on both dependent variables. IFI = Incremental Fit Index; CFI = Comparative Fit Index; SRMR = standardized root mean square residual.
*$p < .05$
**$p < .01$

was entered as the independent variable, and team performance and satisfaction were entered as dependent variables. Table 3 presents the direct, indirect, and total effects for the mediated structural model; a *t* test for each coefficient; and full-model fit statistics. Given the size of the sample, we followed researchers' recommendations (see Hoyle & Panter, 1995) and evaluated model fit using the standardized root mean square residual (SRMR), Incremental Fit Index (IFI), and the Comparative Fit Index (CFI). Other indices (e.g., chi-square, Goodness-of-Fit Index, Adjusted Goodness-of-Fit Index, Normed Fit Index, Akaike Information Criterion) were not used because they tend to behave erratically and are less robust when sample sizes are small (see Hu & Bentler, 1995).

The path analytic results for the mediated structural model indicated that both indirect paths were significant with all indices falling within acceptable ranges. For team performance, the amount of variance accounted for by critical team member assertiveness dropped from 9% to 3% in the presence of transactive memory, becoming nonsignificant ($\beta = .21$, *ns*), whereas transactive memory significantly predicted team performance ($\beta = .34$, $p < .05$). For team satisfaction, the amount of variance accounted for by critical team member assertiveness dropped from 9% to 2% in the presence of transactive memory, becoming nonsignificant ($\beta = .13$, *ns*), whereas the effects of transactive memory were significant ($\beta = .62$, $p < .01$). In addition, delta chi-square comparing the hypothesized model with the unmediated model indicated a significantly better fit ($\Delta\chi^2_{(3)} = 36.92$, $p < .001$). Therefore, Hypothesis 3 was supported.

Discussion

Based on the workflow networks literature, this study examined the effects of critical team member dispositional assertiveness within an IPO framework. Results supported our hypotheses. We found that critical team member dispositional assertiveness positively

affected team performance and satisfaction and that those effects were mediated by transactive memory. These results have a number of theoretical and practical implications.

Theoretical Implications

The results of this study extend our understanding of the effects of personality in teams. In the organizational literature, researchers have primarily focused on the Big Five when examining the impact of personality on team effectiveness (e.g., Barrick et al., 1998; LePine, 2003; LePine, Hollenbeck, & Ilgen, 1997; Lim & Ployhart, 2004; Neuman & Wright, 1999). Although several of the Big Five have been shown to have an impact, each contains a host of subdimensions that address narrower and more criterion-specific aspects of the larger constructs. Researchers suggest that examining these subdimensions may uncover certain effects that would otherwise be hidden (e.g., Dudley et al., 2006; Moon, 2001). Hough (1992), for example, found that the subdimensions of extraversion exhibited inconsistent effects on performance, and Mount, Barrick, Scullen, and Rounds (2005) found that the association between enterprising interests and extraversion was explained only by the level of assertiveness.

Our results indicate that critical team member dispositional assertiveness significantly affected team performance and satisfaction and, like Hough (1992) and Mount et al. (2005), these effects could not be replicated with the primary factor. We assessed extraversion using the 12-item scale from the NEO-FFI (Costa & McCrae, 1992). This measure was correlated at $r = .24$ with our dispositional assertiveness measure. We found that critical team member extraversion exhibited no significant relationship with team performance ($r = .05$, *ns*) or satisfaction ($r = .00$, *ns*). Although extraversion has been shown to benefit team members in leadership roles (Judge, Bono, Ilies, & Gerhardt, 2002), it failed to benefit the team members occupying critical roles in the workflow network.

As one of the subdimensions of extraversion, dispositional assertiveness captures specific elements of dominance and task-related communication, but not the gregariousness and sociability facets of the extraversion construct, which may actually hinder team performance when held by critical team members. As noted by Barry and Stewart, extraverts tend to "seek pleasurable social interactions at the expense of efficient management of task demands" (1997: 66). The critical team member is the focal point for communication and resource allocation within the team, and the responsibilities inherent in such a central role dictate that the individual focus on the efficient and effective flow of work. These findings suggest that dispositional assertiveness is a more task-focused personality trait and that extraversion may be too broad a construct to accurately predict certain types of task-related team effectiveness.

As further evidence, the dispositional assertiveness levels of the noncritical team members were unrelated to team performance (DM2: $r = .04$, *ns*; DM3: $r = .11$, *ns*; DM4: $r = .15$, *ns*), satisfaction (DM2: $r = .08$, *ns*; DM3: $r = -.02$, *ns*; DM4: $r = .16$, *ns*), and transactive memory (DM2: $r = .14$, *ns*; DM3: $r = .07$, *ns*; DM4: $r = .12$, *ns*), indicating that the influence of dispositional assertiveness corresponds more closely with the critical team member's roles and responsibilities.

In sum, the results of this study emphasize the value in examining the subdimensions of the Big Five such as assertiveness in teams and suggest that the effects of personality can be

maximized when specific dimensions and subdimensions are matched with specific team roles and effectiveness outcomes.

Our results also offer an alternative method of aggregation based on team members' position within the workflow that adds to our understanding of the effects of personality in teams. This supports Hinsz et al.'s (1997) argument that the individual contributions of team members should be examined and that new ways of aggregating individual contributions are needed for studying team-level outcomes. For example, given the interdependent nature of the teams in this study, this task corresponds to the conjunctive model (see Steiner, 1972). However, the lowest scoring team member did not affect team performance ($r = .19$, *ns*) or satisfaction ($r = .23$, *ns*). The average score (i.e., additive) and highest score (i.e., disjunctive) also failed to significantly affect team performance ($r = .19$, *ns*; $r = .11$, *ns*) and satisfaction ($r = .23$, *ns*; $r = .13$, *ns*). We also examined extraversion using Steiner's (1972) typology and found no additive, conjunctive, or disjunctive effects on team performance ($r = .15$, *ns*; $r = -.12$, *ns*; $r = .19$, ns) or satisfaction ($r = .08$, *ns*; $r = -.11$, *ns*; $r = .08$, *ns*).

The results of this study also further our understanding of *how* personality affects team performance. Although personality is recognized as an important predictor of team effectiveness, research has yet to determine the mechanisms underlying its effects (see Kozlowksi & Bell, 2003). We found that the effects of critical team member dispositional assertiveness on team performance operate through transactive memory. Assertive critical team members are better able to stimulate the development of specialization, credibility, and coordination among the team members. In other words, with assertive critical team members, teams are able to ensure that resources, information, and specialized knowledge flow efficiently and effectively between the hub and the various satellites of expertise. In doing so, the critical team member significantly improves the effectiveness of the team.

Finally, the results regarding satisfaction expand our understanding of the nomological network surrounding the effects of personality in teams. Although Barrick et al. (1998) found that mean levels of extraversion in teams were positively related to supervisor ratings of team viability, this is the first study to establish a relationship between member personality and team satisfaction, and the first to link assertiveness to satisfaction.

Practical Implications

The practical implications of our results focus on organizational staffing, whereby the requirements for certain positions within the organization are defined and individuals are assessed and selected in order to fill those positions (Schneider & Schmitt, 1976). Although staffing individual jobs has received a lot of attention within the literature, little is known about the staffing process at the team level (Klimoski & Jones, 1995). Organizations need to understand how work flows through the team network and to identify employees who "input" the correct factors to meet the requirements of their role in order to maximize specific aspects of team effectiveness. In this study, we showed that if organizations are interested in improving the effectiveness of self-managed work teams, individuals should be selected with high levels of dispositional assertiveness for critical positions within the team's workflow network. This may be particularly important when the critical member has lower

status (e.g., Milanovich, Driskell, Stout, & Salas, 1998). However, organizations need to use caution because selecting team members in less critical roles based on their level of dispositional assertiveness may not affect team performance and satisfaction in a similar manner.

The results of this study also provide a method of diagnosing and solving problems in preexisting teams. Our results suggest that if teams are ineffective, this may be due to a lack of assertiveness among critical team members. If so, the organization can implement one of two solutions: The organization can identify the member with the highest level of dispositional assertiveness and restructure the team's workflow through that individual, or the organization can replace members in critical positions with more assertive individuals, thereby enhancing the team's ability to effectively coordinate specialized knowledge.

Limitations and Directions for Further Research

Several limitations should be highlighted, including the fact that this study focused on one type of team. The teams examined in this study closely resembled self-managed action or project teams, where members are brought together for a short period of time and possess distinct areas of expertise. Examples include surgery teams, rescue units, cockpit crews, military units, engineering teams, and programming teams (see Sundstrom, 1999). Although Sundstrom notes that these types of self-managed teams are a popular choice for organizations, the effects of dispositional assertiveness observed in this study may be much different in teams with lower degrees of differentiation and integration. In units where members are not highly interdependent or areas of expertise overlap, no single member's position will become critical to the workflow of the team. For example, service teams vary in terms of specialization and exhibit low levels of interdependence. In such cases, there may be no member particularly critical to the team's workflow, and individual assertiveness may play a less significant role in facilitating team performance.

In other cases, teams may have multiple critical members. In this study, we purposely created teams with a single critical member to isolate the effects of that member's personality. In organizational teams, there may be more than one critical role. Because criticality is based on the flow of work through team positions rather than the skills and attributes of the team members themselves, the structure of team workflow will determine the number of critical members a team possesses. For example, a production forecasting team may have one member who is responsible for gathering information regarding supplier material availability and a second member who has access to their organization's sales projections. Both sources of information are critical to the flow of work within the forecasting team, and both would benefit from high levels of dispositional assertiveness. Our understanding of how multiple critical members interact and influence team effectiveness would benefit from further research, including examining teams with varied levels of interdependence and differentiated expertise.

The nature of the assertiveness construct also raises issues about the implications of our findings in other cultures. Although researchers have been careful to differentiate assertiveness from aggression and hostility (e.g., Jentsch & Smith-Jentsch, 2001), certain cultures may perceive assertive behavior as inappropriate in business settings, particularly from lower status team

members (see Javidan, Dorfman, de Luque, & House, 2006). Researchers have also suggested that personality traits in general are less relevant in collectivist cultures (Cross & Markus, 1999). Although Costa, Terracciano, and McRae (2001) did find that the magnitude of differences between the assertiveness levels of men and women varied between cultures, little has been done to study the effects of dispositional assertiveness in other societies, and further research is needed to examine the influence of personality on team effectiveness in other cultures.

Finally, because this study was conducted in a laboratory context, future research needs to examine the external validity of these results. Although the nature of the research participants' experiences did not exactly mirror those of a real organizational situation, there were certain features of this task and our participants that achieved what Berkowitz and Donnerstein (1982) referred to as "mundane realism." As participants were engaged in a psychologically absorbing task and were aware of cash bonuses that were available to the top performing teams, we believe this study also exhibited an acceptable degree of "psychological realism" (Berkowitz & Donnerstein, 1982). Humphrey, Hollenbeck, Ilgen, and Moon noted that simulations such as the DDD "bridge the gap between field operations and university-based theoretical research" (2004: 201) and "allow for an increase in the level of mundane realism while increasing the level of experimental rigor" (2004: 202).

One needs to keep the nature of the research question in mind when assessing the relevance of external validity. We are simply asking the "can it happen" question, which according to Ilgen (1986) is exactly the type of question that bears investigation in this type of a laboratory setting. As Driskell and Salas noted, "Experimental research is generalized on the basis of the theoretical relationships that are tested, not through the concrete results of a single study" (1992: 113). As researchers have estimated that the correlation between the effect sizes obtained in the field and those obtained in the lab generally exceed .70 (Anderson, Lindsay, & Bushman, 1999), we anticipate that the generalizability of our findings will become evident after other researchers replicate our work in other experiments, with different samples and tasks, conducted at different times.

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