Psychological Safety and Learning Behavior in Work Teams

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This paper presents a model of team learning and tests it in a multimethod field study. It introduces the construct of team psychological safety—a shared belief held by members of a team that the team is safe for interpersonal risk taking—and models the effects of team psychological safety and team efficacy together on learning and performance in organizational work teams. Results of a study of 51 work teams in a manufacturing company, measuring antecedent, process, and outcome variables, show that team psychological safety is associated with learning behavior, but team efficacy is not, when controlling for team psychological safety. As predicted, learning behavior mediates between team psychological safety and team performance. The results support an integrative perspective in which both team structures, such as context support and team leader coaching, and shared beliefs shape team outcomes.

A growing reliance on teams in changing and uncertain organizational environments creates a managerial imperative to understand the factors that enable team learning. Although much has been written about teams and about learning in organizations, our understanding of learning in teams remains limited. A review of the team effectiveness and organizational learning literatures reveals markedly different approaches and a lack of cross-fertilization between them. An emerging literature on group learning, with theoretical papers on groups as information-processing systems and a number of empirical studies examining information exchange in laboratory groups, has not investigated the learning processes of real work teams (cf. Argote, Gruenfeld, and Naquin, 1999). Although most studies of organizational learning have been field-based, empirical research on group learning has primarily taken place in the laboratory, and little research has been done to understand the factors that influence learning behavior in ongoing teams in real organizations.

Studies of work teams in a variety of organizational settings have shown that team effectiveness is enabled by structural features such as a well-designed team task, appropriate team composition, and a context that ensures the availability of information, resources, and rewards (Hackman, 1987). Many researchers have concluded that structure and design, including equipment, materials, physical environment, and pay systems, are the most important variables for improving work-team performance (Goodman, Devadas, and Hughson, 1988; Campion, Medsker, and Higgs, 1993; Cohen and Ledford, 1994) and have argued against focusing on interpersonal factors (e.g., Goodman, Ravlin, and Schminke, 1987). According to this research, organization and team structures explain most of the variance in team effectiveness.

In contrast, organizational learning research has emphasized cognitive and interpersonal factors to explain effectiveness, showing, for example, that individuals' tacit beliefs about interpersonal interaction inhibit learning behavior and give rise to ineffectiveness in organizations (e.g., Argyris, 1993). This cognitive emphasis takes different forms. Organizational learning theorists have offered both descriptive theory ex-

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plaining the failure of organizations to adapt rationally due to cognitive biases that favor existing routines over alternatives (e.g., Levitt and March, 1988) and prescriptive theory proposing interventions that alter individuals' "theories-in-use" to improve organization effectiveness (e.g., Argyris and Schön, 1978). The former theorists suggest that adaptive learning in social systems is fundamentally problematic and rare, and the latter, only slightly more sanguine, propose that expert intervention is necessary to bring it about (cf. Edmondson and Moingeon, 1998). This paper takes a different approach to understanding learning in organizations by examining to what extent and under what conditions learning occurs naturally in organizational work groups.

Much organizational learning research has relied on qualitative studies that provide rich detail about cognitive and interpersonal processes but do not allow explicit hypothesis testing (e.g., Senge, 1990; Argyris, 1993; Watkins and Marsick, 1993). Many team studies, in contrast, have used large samples and quantitative data but have not examined antecedents and consequences of learning behavior (e.g., Goodman, Devadas, and Hughson, 1988; Hackman, 1990; Cohen and Ledford, 1994). I propose that to understand learning behavior in teams, team structures and shared beliefs must be investigated jointly, using both quantitative and qualitative methods.

This paper presents a model of team learning and tests it in a multimethod field study. The results support an integrative perspective in which both team structures, such as context support and team leader coaching, and shared beliefs shape team outcomes. Organizational work teams are groups that exist within the context of a larger organization, have clearly defined membership, and share responsibility for a team product or service (Hackman, 1987; Alderfer, 1987). Their learning behavior consists of activities carried out by team members through which a team obtains and processes data that allow it to adapt and improve. Examples of learning behavior include seeking feedback, sharing information, asking for help, talking about errors, and experimenting. It is through these activities that teams can detect changes in the environment, learn about customers' requirements, improve members' collective understanding of a situation, or discover unexpected consequences of their previous actions.

These useful outcomes often go unrealized in organizations. Members of groups tend not to share the unique knowledge they hold, such that group discussions consist primarily of jointly held information (Stasser and Titus, 1987), posing a dilemma for learning in groups. More centrally, those in a position to initiate learning behavior may believe they are placing themselves at risk; for example, by admitting an error or asking for help, an individual may appear incompetent and thus suffer a blow to his or her image. In addition, such individuals may incur more tangible costs if their actions create unfavorable impressions on people who influence decisions about promotions, raises, or project assignments. Image costs have been explored in research on face saving, which has established that people value image and tacitly abide by social expectations to save their own and others'

face (Goffman, 1955). Asking for help, admitting errors, and seeking feedback exemplify the kinds of behaviors that pose a threat to face (Brown, 1990), and thus people in organizations are often reluctant to disclose their errors (Michael, 1976) or are unwilling to ask for help (Lee, 1997), even when doing so would provide benefits for the team or organization. Similarly, research has shown that the sense of threat evoked in organizations by discussing problems limits individuals' willingness to engage in problem-solving activities (Dutton, 1993; MacDuffie, 1997). The phenomenon of threat rigidity has been explored at multiple levels of analysis, showing that threat has the effect of reducing cognitive and behavioral flexibility and responsiveness, despite the implicit need for these to address the source of threat (Staw, Sandelands, and Dutton, 1981). In sum, people tend to act in ways that inhibit learning when they face the potential for threat or embarrassment (Argyris, 1982).

Nonetheless, in some environments, people perceive the career and interpersonal threat as sufficiently low that they do ask for help, admit errors, and discuss problems. Some insight into this may be found in research showing that familiarity among group members can reduce the tendency to conform and suppress unusual information (Sanna and Shotland, 1990); however, this does not directly address the question of when group members will be comfortable with interpersonally threatening actions. More specifically, in a recent study of hospital patient-care teams, I found significant differences in members' beliefs about the social consequences of reporting medication errors; in some teams, members openly acknowledged them and discussed ways to avoid their recurrence; in others, members kept their knowledge of a drug error to themselves (Edmondson, 1996). Team members' beliefs about the interpersonal context in these teams could be characterized as tacit; they were automatic, taken-for-granted assessments of the "way things are around here." For example, a nurse in one team explained matter-of-factly, "Mistakes are serious, because of the toxicity of the drugs [we use]—so you're never afraid to tell the Nurse Manager"; in contrast, a nurse in another team in the same hospital reported, "You get put on trial! People get blamed for mistakes . . . you don't want to have made one." These quotes illustrate markedly different beliefs about the interpersonal context; in the first team, members saw it as self-evident that speaking up is natural and necessary, and in the other, speaking up was viewed as a last resort.

An aim of the present study was to investigate whether beliefs about the interpersonal context vary between teams in the same organization, as well as to examine their effects on team outcomes. Existing theories do not address the issue of how such beliefs may affect learning behavior in teams, instead focusing primarily on structural conditions associated with overall team effectiveness (e.g., Hackman, 1987) or on the skills that must be learned by individuals to enable learning in difficult interpersonal interactions (e.g., Argyris, 1982). Similarly, research on group training has focused primarily on task knowledge and has paid little attention to the role of social knowledge (Levine and Moreland, 1991). Thus, the

role of beliefs about the interpersonal context in individuals' willingness to engage in otherwise-threatening learning behavior has been largely unexamined. This is the gap I seek to fill with a model and study of team learning.

A MODEL OF TEAM LEARNING

Team Learning Behavior

Organizational learning is presented in the literature in two different ways: some discuss learning as an outcome; others focus on a process they define as learning. For example, Levitt and March (1988: 320) conceptualized organizational learning as the outcome of a process of organizations "encoding inferences from history into routines that guide behavior"; in contrast, Argyris and Schön (1978) defined learning as a process of detecting and correcting error. In this paper I join the latter tradition in treating learning as a process and attempt to articulate the behaviors through which such outcomes as adaptation to change, greater understanding, or improved performance in teams can be achieved. For clarity, I use the term "learning behavior" to avoid confusion with the notion of learning outcomes.

The conceptualization of learning as a process has roots in the work of educational philosopher John Dewey, whose writing on inquiry and reflection (e.g., Dewey, 1938) has had considerable influence on subsequent learning theories (e.g., Kolb, 1984; Schön, 1983). Dewey (1922) described learning as an iterative process of designing, carrying out, reflecting upon, and modifying actions, in contrast to what he saw as the human tendency to rely excessively on habitual or automatic behavior. Similarly, I conceptualize learning at the group level of analysis as an ongoing process of reflection and action, characterized by asking questions, seeking feedback, experimenting, reflecting on results, and discussing errors or unexpected outcomes of actions. For a team to discover gaps in its plans and make changes accordingly, team members must test assumptions and discuss differences of opinion openly rather than privately or outside the group. I refer to this set of activities as learning behavior, as it is through them that learning is enacted at the group level. This conceptualization is consistent with a definition of group learning proposed recently by Argote, Gruenfeld, and Naquin (1999) as both processes and outcomes of group interaction activities through which individuals acquire, share, and combine knowledge, but it focuses on the processes and leaves outcomes of these processes to be investigated separately.

The management literature encompasses related discussions of learning, for example, learning as dependent on attention to feedback (Schön, 1983), experimentation (Henderson and Clark, 1990), and discussion of failure (Sitkin, 1992; Leonard-Barton, 1995). Research has demonstrated performance benefits for feedback seeking by individual managers (Ashford and Tsui, 1991), for teams seeking information and feedback from outside the team (Ancona and Caldwell, 1992), and for research and development teams that experiment frequently (Henderson and Clark, 1990). Similarly, because errors provide a source of information about performance by revealing

that something did not work as planned, the ability to discuss them productively has been associated with organizational effectiveness (Michael, 1976; Sitkin, 1992; Schein, 1993). On one hand, if feedback seeking, experimentation, and discussion of errors individually promote effective performance, learning behavior—which includes all of these activities—is also likely to facilitate performance, whether for individuals or teams. On the other hand, learning behavior consumes time without assurance of results, suggesting that there are conditions in which it may reduce efficiency and detract from performance, such as when teams are responsible for highly routine repetitive tasks with little need for improvement or modification. For teams facing change or uncertainty, however, the risk of wasting time may be small relative to the potential gain; in such settings, teams must engage in learning behavior to understand their environment and their customers and to coordinate members' actions effectively. Moreover, teams that perform routine production tasks may still require learning behavior for effective self-management as a team and for intermittent process improvement:

Hypothesis 1 (H1): Learning behavior in teams is positively associated with team performance.

Team Psychological Safety

Team psychological safety is defined as a shared belief that the team is safe for interpersonal risk taking. For the most part, this belief tends to be tacit—taken for granted and not given direct attention either by individuals or by the team as a whole. Although tacit beliefs about interpersonal norms are sometimes explicitly discussed in a team, their being made explicit does not alter the essence of team psychological safety. The construct has roots in early research on organizational change, in which Schein and Bennis (1965) discussed the need to create psychological safety for individuals if they are to feel secure and capable of changing. Team psychological safety is not the same as group cohesiveness, as research has shown that cohesiveness can reduce willingness to disagree and challenge others' views, such as in the phenomenon of groupthink (Janis, 1982), implying a lack of interpersonal risk taking. The term is meant to suggest neither a careless sense of permissiveness, nor an unrelentingly positive affect but, rather, a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up. This confidence stems from mutual respect and trust among team members.

The importance of trust in groups and organizations has long been noted by researchers (e.g., Golembiewski and McConkie, 1975; Kramer, 1999). Trust is defined as the expectation that others' future actions will be favorable to one's interests, such that one is willing to be vulnerable to those actions (Mayer, Davis, and Schoorman, 1995; Robinson, 1996). Team psychological safety involves but goes beyond interpersonal trust; it describes a team climate characterized by interpersonal trust and mutual respect in which people are comfortable being themselves.

For team psychological safety to be a group-level construct, it must characterize the team rather than individual members

of the team, and team members must hold similar perceptions of it. Previous researchers have studied the similarity of beliefs in social systems such as organizations and work groups (for reviews, see Klimoski and Mohammed, 1994; Walsh, 1995). Perceptions of psychological safety, like other such beliefs, should converge in a team, both because team members are subject to the same set of structural influences and because these perceptions develop out of salient shared experiences. For example, most members of a team will conclude that making a mistake does not lead to rejection when they have had team experiences in which appreciation and interest are expressed in response to discussion of their own and others' mistakes.

Team psychological safety should facilitate learning behavior in work teams because it alleviates excessive concern about others' reactions to actions that have the potential for embarrassment or threat, which learning behaviors often have. For example, team members may be unwilling to bring up errors that could help the team make subsequent changes because they are concerned about being seen as incompetent, which allows them to ignore or discount the negative consequences of their silence for team performance. In contrast, if they respect and feel respected by other team members and feel confident that team members will not hold the error against them, the benefits of speaking up are likely to be given more weight. Support for the centrality of interpersonal inferences in groups is found in research on distributive justice, which shows that people are more focused on relational than instrumental considerations in their assessments of allocation decisions made by authority figures; people are very attentive to the tone and quality of social processes and are more willing to comply with these when they feel valued (Tyler and Lind, 1992). Argyris and Schön (1978) made a connection between interpersonal threat and learning when they posited that interpersonally threatening issues impede learning behavior, but they did not address the possibility that dyads or groups may differ in their tacit beliefs about interpersonal threat, thereby giving rise to different levels of learning. In contrast, I propose that psychological safety varies from team to team, such that otherwise interpersonally threatening learning behavior can occur if the team has a sufficiently safe environment:

Hypothesis 2 (H2): Team psychological safety is positively associated with learning behavior in organizational work teams.

Psychological safety does not play a direct role in the team's satisfying customers' needs, the core element of performance; rather, it facilitates the team's taking appropriate actions to accomplish its work. Thus, learning behavior should mediate the effects of team psychological safety on performance outcomes:

Hypothesis 3 (H3): Team learning behavior mediates between team psychological safety and team performance.

Team Efficacy and Team Learning

Building on earlier work on the role of self-efficacy in enhancing individual performance (Bandura, 1982), a body of research has established group efficacy as a group-level phe-

nomenon (e.g., Guzzo et al., 1993) and also reported a relationship between group efficacy and performance (Lindsley, Brass, and Thomas, 1995; Gibson, 1996). This work has not specified mechanisms through which shared perceptions of efficacy lead to good performance, and one possibility is that efficacy fosters team members' confidence, which promotes learning behavior and helps accomplish desired team goals:

Hypothesis 4 (H4): Team efficacy is positively associated with team learning behavior.

Team members deciding whether to reveal errors they have made are likely to be motivated to speak up if two conditions are satisfied: first, they believe they will not be rejected (team psychological safety) and, second, they believe that the team is capable of using this new information to generate useful results (team efficacy). Team psychological safety and team efficacy are thus complementary shared beliefs, one pertaining to interpersonal threat and the other characterizing the team's potential to perform. Team efficacy thus should supplement team psychological safety's positive effect on team learning:

Hypothesis 5 (H5): Team efficacy is positively associated with team learning behavior, controlling for the effects of team psychological safety.

Team Leader Coaching and Context Support as Antecedents of Team Psychological Safety

A set of structural features—consisting of a clear compelling team goal, an enabling team design (including context support such as adequate resources, information, and rewards), along with team leader behaviors such as coaching and direction setting—have been shown to increase team effectiveness (Hackman, 1987; Wageman, 1998). These structural features provide a starting point for examining antecedents of team psychological safety. The extent of context support experienced by a team should be positively associated with team psychological safety because access to resources and information is likely to reduce insecurity and defensiveness in a team. Team leader coaching is also likely to be an important influence on team psychological safety. A team leader's behavior is particularly salient; team members are likely to attend to each other's actions and responses but to be particularly aware of the behavior of the leader (Tyler and Lind, 1992). If the leader is supportive, coaching-oriented, and has non-defensive responses to questions and challenges, members are likely to conclude that the team constitutes a safe environment. In contrast, if team leaders act in authoritarian or punitive ways, team members may be reluctant to engage in the interpersonal risk involved in learning behaviors such as discussing errors, as was the case in the study of hospital teams mentioned above (Edmondson, 1996). Furthermore, team leaders themselves can engage in learning behaviors, demonstrating the appropriateness of and lack of punishment for such risks.

Hypothesis 6 (H6): Team leader coaching and context support are positively associated with team psychological safety.

Through enhancing psychological safety, team leader coaching and context support are likely to facilitate team learning.

Team psychological safety thus serves as a mechanism translating structural features into behavioral outcomes:

Hypothesis 7 (H7): Team psychological safety mediates between the antecedents of team leader coaching and context support and the outcome of team learning behavior.

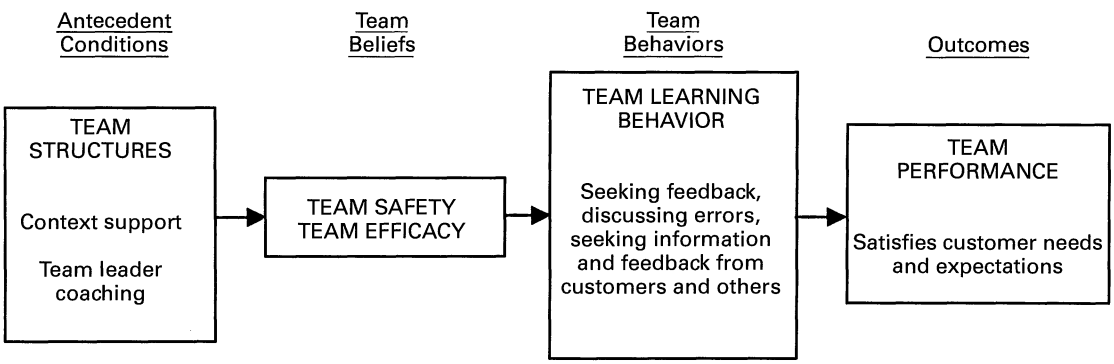
Context support and team leader coaching should also affect team efficacy. Effective coaching is likely to contribute to members' confidence in the team's ability to do its job, as is a supportive context, which reduces obstacles to progress and allows team members to feel confident about their chances of success. If coaching and context support promote team efficacy and team efficacy promotes team learning, this suggests that team efficacy also functions as a mediator:

Hypothesis 8 (H8): Team efficacy mediates between the antecedents of team leader coaching and context support and the outcome of team learning behavior.

Team Type

Organizations use a variety of types of teams. Team type varies across several dimensions, including cross-functional versus single-function, time-limited versus enduring, and manager-led versus self-led. These dimensions combine to form different types of teams, such as a time-limited new product development team or an ongoing self-directed production team. The team learning model should be applicable across multiple types of teams, because the social psychological mechanism at the core of the model concerns people taking action in the presence of others, and the salience of interpersonal threat should hold across settings. Therefore, although the utility of learning behavior may vary across types of teams, the association between team psychological safety and team learning behavior should apply across different team types. Thus, the effects of team type on learning behavior should be insignificant when assessed together with the other variables in the team learning model, shown in figure 1. For example, new product development teams might be expected to exhibit more learning behavior than production teams because of the nature of their task; nonetheless, mean differences in learning behavior that might be observed across types of teams should be explained by team psychological safety and team efficacy, as shown in figure 1, rather than by team type.

Figure 1. A model of work-team learning.



METHODS

To test the hypotheses in the team learning model, I studied real work teams in an organization that has a variety of team types, using a combination of qualitative and quantitative methods to investigate and measure the constructs in the model. Preliminary observation and interviews in the organization suggested that there was considerable variation in the extent to which teams engaged in learning behavior, making it a good site in which to explore the phenomenon and to investigate factors associated with team learning.

Research Site and Sample

"Office Design Incorporated" (ODI), a manufacturer of office furniture with approximately 5,000 employees and a reputation for product and management innovation, provided the research site for this study. Teams in this company, implemented in 1979 to promote employee participation and cross-functional collaboration, consisted of four types. Most were functional teams, made up of managers or supervisors and direct reports, and these included sales teams, management teams, and manufacturing teams; this type of team existed within and supported the work of a single functional department. Although encompassing dyadic reporting relationships, functional teams had shared goals, and members were interdependent in reaching them. As with other teams at ODI, they also typically had some training in teamwork. Second, ODI had a growing number of self-managed teams in both manufacturing and sales; these teams consisted of peers from the same function. The third type was time-limited cross-functional product development teams, and the fourth was time-limited cross-functional project teams, convened to work on other projects that involved multiple departments. The company was willing to participate in this research to obtain feedback on how well its teams were working.

My primary contact at ODI was a manager in an internal organization development group who worked closely with me to facilitate data collection. She scheduled interviews and meetings, recruited teams to participate in the study, and identified recipients of the work of each of these teams. As ODI did not have a central roster of all work teams, she distributed a memo to managers throughout the company describing the goal of the study (to assess team effectiveness at ODI) and asking for lists of teams in their area. This yielded a list of 53 teams, encompassing differences in organization level, department, type, size, self- versus leader-managed, and tenure or team age. At the time of survey data collection, the oldest team had been together for about seven years, and the newest had been in place for four months; both the oldest and newest teams were production teams. These 53 teams included 34 functional teams (in sales, manufacturing, and staff services such as information technology and accounting), nine self-managed teams (in manufacturing and sales), five cross-functional product development teams, and three cross-functional project teams. As the purpose of the study was to test a theoretical model rather than to describe properties of this particular organiza-

tion or to characterize teams of different types, this sample was not selected to ensure representativeness of the population of all teams at ODI, nor were the four subgroups of team types selected to ensure that they were representative of each type. The sample did satisfy the essential criterion to achieve the purposes of this study, however, which was to include sufficient variance on the variables in the model to test hypothesized relationships. Despite using a process characterized by voluntary participation in the research, the resulting sample was not a self-selected group of high-performing or highly satisfied teams; instead, there was substantial variance for all variables studied, including for such key measures as team psychological safety, learning behavior, and performance.

Procedure

The study involved three phases of data collection. First, I conducted interviews and observation that involved eight teams, selected from among those available during my two first visits to ODI, to ensure variance in team type. Second, I designed and administered two surveys and a structured interview instrument to obtain quantitative data for all teams in the sample. Third, I interviewed and observed seven teams, selected according to survey results as high or low in learning behavior.

Phase 1: Preliminary qualitative research. In two four-day visits to ODI, I observed eight team meetings, each of which lasted one to three hours, and conducted 17 interviews lasting from 45 minutes to an hour with members or observers of these eight teams. The eight teams included five product development teams, two management teams, and one self-managed production team. I interviewed at least one and as many as six members of each team, as well as one senior manager responsible for reviewing the work of one of the product development teams. The objectives of this phase of the study were to verify that the theoretical constructs of team psychological safety and team learning behavior could be operationalized at ODI and, if so, to develop survey items to assess these constructs in language that would be meaningful in this setting—a modified empathic strategy (Alderfer and Brown, 1972). In team meetings, I took notes and listened for examples of learning behavior, such as asking for feedback, asking for help, admitting errors, and proposing or describing instances of seeking help or information from others outside the team. In interviews, I asked team members to describe features of their team, such as the goal and the nature of its task, and to describe how the team organized its work and what challenges it faced. These general questions allowed me to listen for examples of learning behavior. I taped most interviews, except for some in the factory where noise levels made it difficult to do so, and reviewed tapes and notes to identify data that provided evidence of team psychological safety and learning behavior and to assess whether these constructs varied across teams. Examples of learning behavior and quotes that suggested the presence or absence of team psychological safety were transcribed, and these data suggested that both psychological safety and learning behavior varied across teams.

Table 1

Construct Development from Preliminary Qualitative Data*

Constructs	Positive form	Negative form
Beliefs about the team interpersonal context (inferred from informant quotes)		
Members of this team respect each other's abilities.	"I trust the people here that they're making the right decision, for the function and for ODI. And they feel the same way about me." [Finance member, New Product Development Team 1 (NPD 1)] "Each person is important. Everyone is respected." (Marketing member, NPD 1)	"The [other] team has a lot of trust in the expertise of other [member]s, unlike this one." (Engineering member, NPD 2)
Members of this team are interested in each other as people.	"There's much greater openness on this team—it's intangible. . . . We have a personal interest in each other. We're comfortable outside the realm of work, we've shared personal information . . . if you don't know anything about people, you don't know how to react to them." (Manufacturing member, NPD 1) "Our efforts to get to know each other led to our mutual respect. . . . At the core, these are outstanding human beings. (Finance member, NPD 1)	"What gets in the way is guys who hold information close to their chests, so knowledge doesn't get filtered out to the team." (Management team 2)
In this team, you aren't rejected for being yourself or stating what you think.	"Sally and Sue both had been getting a hard time on the first shift for outperforming. . . . That's why they like being on this team." (Chair production team 2) "[Members of this team are] willing to state what they believe . . . people, in other teams, if they don't get their way, they stay silent." (NPD 1)	"People try to figure out what [the team leader] wants to hear [before saying what they think]." (Management team 2)
Members of this team believe that other members have positive intentions.	"They're not out to corrupt my success." (NPD 1 team member, referring to the other team members)	". . . we struggled through the problem statement, because it [the project] was clearly for ODI's internal needs, not for customers. We had a lot of nay sayers who just wanted to do [the assignment from management] and not question it. They were worried about getting their hands slapped. . . ." (NPD 2)
Team behaviors (observed by researcher or reported by team members or team observers)		
Seeking or giving feedback	"We talked to over a hundred customers; this changed the project goal slightly, to make it integrate more with the [other] product as a top priority." (Marketing team member, NPD 1) "We also bring in people from Advanced Applications to bounce ideas off of, to get a check on what we're doing." (Engineering team member, NPD 1) "[NPD 1 team leader] asks me to come to certain meetings; she wants my view, my industry experience, and how [this product] fits with ODI's systems strategy." (Senior manager, R&D) "Am I missing the mark with how to proceed? Is there anything you can add?" (Team leader, management team 1, in a team meeting)	"They were too methodical, too detailed in their wandering . . . they did not do enough checking with customers until too far along." (Senior manager, R&D, describing NPD 2) NPD 2 hired a vendor to conduct customer interviews, in contrast to NPD Team 1 members, who frequently spoke to customers themselves.
Making changes and improvements (vs. avoiding change or sticking with a course too long)	"Every three months we decide we need to improve how we get our information. *We look for better ways to do something and we make changes.*" (NPD 1) ". . . every six months, they take time out to look at what works . . . and a lot happens in those meetings." (NPD 1)	"We did make changes, but too slowly." (NPD 2) "They did learn, but not fast enough." (Senior manager describing NPD 2) ". . . [there were a lot of] blind alleys. . . . We had a preconceived notion of what was important that prevented us from seeing it. . . ." (NPD 2) "We found ourselves going around in circles a lot. Sometimes this took a lot of time." (NPD 2)

Table 1 (*continued*)

Construct Development from Preliminary Qualitative Data*		
Constructs	Positive form	Negative form
		"This team gets stuck. . . . It's hard to get a decision. The dynamics are that the conversation gets shut down." (Management team 2)
Obtaining or providing help or expertise	"[NPD 1] used the applications specialists [an ODI internal design group] more than any other team I know of." (Senior manager, R&D) "I've learned a lot about marketing a product—about how and why we make decisions." (Finance team member, NPD 1) "Are there any concerns right now on regional fleets?" (Team leader, management team 1)	
Experimenting	"There's a lot of testing of new ways to do stuff. We're doing design and engineering at the same time. It's wild. It's incredibly complex. We need to be constantly creative about the mechanisms. . . ." (NPD 1) "There have been a lot of iterations. It's like reducing a sauce by half. It's a more flavorful sauce, a more complex group of ingredients, but the end result is simpler. We made it easier to use . . . by continually challenging ourselves to find what is essential." (NPD 1) One team member called the other eight together at the beginning of the shift and asked who was interested in trying which new task. She listened carefully to responses and suggested a plan that she explained would allow several people to learn a new role. (Chair production team 1) Another team member raised the question of what goal to set for the shift; after discussion, the team settled on a new (ambitious) target of producing 83 chairs. (Chair production team 1)	
Engaging in constructive conflict or confrontation	"They bring conflict up directly; they don't let it fester. . . ." (Team leader, NPD 1) "People speak openly in team meetings, [whereas in other teams] they *wait until the meeting is over and 'speak privately in the hall* [about their frustrations].'" (Finance team member, NPD 1)	

* NPD = new product development. Text in italics became the basis of a new survey item.

A set of related beliefs about the interpersonal context emerged as suggestive of the presence (or absence) of team psychological safety, including a belief that others won't reject people for being themselves, that team members care about and are interested in each other as people, that other members have positive intentions, and that team members respect each other's competence. Table 1 presents excerpts of these data to illustrate the constructs of team psychological safety and team learning behavior and to show the elements that made up each construct.

Phase 2: Survey research. All members of the 53 teams in the sample (496 individuals) were administered a five-section survey developed for this study. Most teams were re-

quested to complete surveys before or after a team meeting and to enclose them in sealed envelopes collected by ODI staff and mailed to me. In a few cases, surveys were mailed to team members with return envelopes attached and were then returned to me directly. In total, 427 team members from 51 teams completed the surveys, an 86-percent response rate; of these 51 teams, 90 percent of members responded. Two teams did not return any surveys; in both cases, the teams continued to express a desire to participate but ultimately failed to do so, attributing this to busy schedules. At the same time, for each team, two or three managers outside of each team were identified as recipients of the team's work and were given a short survey I developed to assess team learning behavior and performance; 135 of the 150 observers surveyed returned the survey, a 91-percent response rate. Three months after completing the survey, each team received an individual report, providing feedback about their team and department results compared with the overall ODI results, along with a brief explanation of how to interpret these data.

During this time, to obtain independent data that could help establish the construct validity of survey variables assessing team design, another researcher—blind to the survey results—interviewed 31 managers who were familiar with the design of one or more of the 51 teams and who had not served as team observers. The interview instrument included questions to elicit informants' descriptions of team design (goal, task, composition, and context support), probing for factual descriptions and examples rather than evaluations of the team. The interviewer reviewed the tapes, made notes and—using a five-point scale from very low to very high—assessed four variables: (1) presence of a clear goal, (2) team task interdependence, (3) appropriateness of team composition, and (4) context support.

Phase 3: Follow-up qualitative research. From the team survey data, I identified teams with the six lowest and six highest means for team learning behavior; seven of these twelve (four high and three low) were available for follow-up observation and interviews. The set of seven teams consisted of three functional teams (one high- and two low-learning), two product development teams (high and low), one self-managed team (high), and one project team (high); none of these overlapped with the eight teams I studied in the first phase. I observed six of these teams, individually interviewed one or two members of each, and conducted interviews with every member of the seventh team. The objective of this phase was to explore differences between high- and low-learning teams and to learn more about how team learning behavior works. I reviewed these field notes and tapes to construct short cases describing each team, which were then used to suggest patterns related to team learning.

Measures

Antecedent factors. I coded the team survey to identify respondents by team rather than by individual and to identify team type (functional, self-managed, product development, or project) and company department (operations, sales, staff

Table 2

Chronbach's Alpha and Intercorrelations between Group-level Survey Variables*

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Context support	4.78	.97	**.65**											
2. Team leader coaching	3.77	.81	.69	**.80**										
3. Team psychological safety	5.25	1.03	.70	.63	**.82**									
4. Team efficacy	5.07	1.07	.70	.50	.50	**.63**								
5. Team learning behavior	4.67	.93	.68	.63	.80	.50	**.78**							
6. Team performance	5.10	1.03	.60	.45	.72	.50	.71	**.76**						
7. Internal motivation	6.11	.68	(.03)	(−.06)	.15	(−.02)	.12	.33	**.64**					
8. Job involvement	3.30	1.69	−.16	−.22	(−.07)	−.26	−.09	(−.01)	.31	†				
9. Team tenure (in years)	2.40	1.70	(−.06)	.34	−.26	−.15	−.16	−.09	(.05)	(.01)	†			
10. Average company tenure (in years)	9.00	6.70	.33	−.31	.26	.15	.17	.14	(.06)	(−.01)	.16	†		
11. Team learning (observer rated)	3.48	.77	.49	−.48	.60	.52	.60	.34	−.16	(−.02)	−.21	.30	**.84**	
12. Team performance (observer rated)	4.95	1.29	.48	−.50	.47	.43	.52	.36	−.11	−.12	−.21	.22	.81	**.87**

* Chronbach's alpha coefficients are presented on the diagnonal. Correlations in parentheses not significant at $p < .05$; all other correlations are significant at $p < .05$.
† Only 1 survey item.

services, or cross-functional). I included in the survey scales developed by Hackman (1990) to assess team design features, including context support and team leader coaching.

Team shared beliefs. I developed scales to measure team psychological safety and team efficacy, using items designed to assess several features of each theoretical construct. In doing this, I also drew from qualitative data obtained in phase-1 interviews. Sample items for psychological safety include "If you make a mistake on this team, it is often held against you" (reverse scored), "It is safe to take a risk on this team," and "No one on this team would deliberately act in a way that would undermine my efforts." Team efficacy was measured with items such as "With focus and effort, this team can do anything we set out to accomplish." As in other sections of the survey, a mix of negatively and positively worded items was used to mitigate response set bias. (See the Appendix for all items.) The survey also measured team tenure (the average number of years each member had worked in the team) and company tenure (respondents' years of employment at ODI). Between-scale correlations for variables in the model are shown in table 2, at the group level of analysis ($N = 51$).

Team behavior. I developed scales to assess the extent of learning behavior for both the team and observer surveys. Team learning behavior includes items such as "We regularly take time to figure out ways to improve our team's work process" and "Team members go out and get all the information they possibly can from others—such as from customers or other parts of the organization."

Performance. Hackman's team performance scale was used to obtain self-report measures of team performance, and I developed a similar scale for the observer survey, including "This team meets or exceeds its customers' expectations" and "This team does superb work."

Team feedback variables. Additional variables, not included in the team learning model, such as presence of a clear goal, adequacy of team composition, team task design, quality of team relationships, job satisfaction, job involvement, and internal motivation were included in the team survey for the purpose of providing supplementary feedback to the teams.

Adequacy of Measures

I conducted preparatory analyses to assess psychometric properties of the two new instruments, including internal consistency reliability and discriminant validity of the scales. The results supported the adequacy of most of the measures for substantive analysis, although Cronbach's alpha was low for both context support and team efficacy (see table 2). Discriminant validity was established through factor analysis.[1] As the team antecedent and outcome sections yielded, respectively, six and three distinct factors with eigenvalues greater than one, these results demonstrated that the team survey was not hampered by excessive common-method variance, according to Harman's one factor test for common-method bias.[2]

I computed two scales from the observer survey (team learning behavior and team performance), and both showed high internal consistency reliability (see table 2). Discriminant validity was lacking; many team learning behavior items were as correlated or more correlated with team performance items as with themselves. Some of this between-scale (multitrait) correlation can be attributed to a substantive relationship between team learning behavior and team performance; however, because of the lack of discriminant validity, I avoided analyses that tested relationships between the two variables in the observer survey. Because it is likely that the team observers or customers are in a better position to judge performance—defined in part as meeting recipients' needs—than to assess specific behaviors, which they may not always observe, substantive analyses reported below rely primarily on observers' ratings of performance and members' ratings of behavior. Observers' ratings of learning are used in certain analyses to illustrate consistency in results across different measures of the same construct. Pearson correlations between team members' and independent observers' responses about team learning ($r = .60$, $p < .001$) and team performance ($r = .36$, $p < .01$) provided one measure of construct validity for the team survey. A substantial degree of correspondence between analogous measures in the team survey and structured interview data also contributed to establishing the construct validity of the survey measures of teams' structural features; correlations between each team-structure scale in the survey and the corresponding variable in the structured interviews were positive and significant.[3]

Finally, a group-level variable must satisfy two criteria (Kenny and LaVoie, 1985). First, the construct must be conceptually meaningful at the group level; for example, team size is a meaningful group attribute, internal motivation is not. Second, data gathered from individual respondents to assess the group attribute must converge, such that the intraclass correlation (ICC) is greater than zero. Intraclass correlation

1

Discriminant validity was also established by creating a multitrait multimethod (MTMM) matrix (Campbell and Fiske, 1959) for each group of variables, from which I confirmed that, for antecedent and outcome variables, correlations between items designed to measure the same construct were larger than correlations between these items and all other items in the section. For the antecedent variables, the average within-trait, between-method correlation was .35, and between-trait, between-method correlations (between each item of a given scale and all items in other scales) averaged .25. For the outcome variables, the average within-trait, between-method correlation was .36 and between-trait, between-method correlations averaged .25.

2

Factor analyses (principal components, varimax rotation), using a cut-off criterion of .40 for factor loadings and eigenvalues of 1.0 or above, yielded six factors for the antecedent variables, replicating most of the planned scales: items for team psychological safety, team efficacy, team task, and clear goal loaded onto four factors exactly as planned, while context support items loaded onto two factors, both conceptually related to context support, and team composition items loaded onto the first three factors. All items were retained in the planned scales because they made a positive contribution to Cronbach's alpha. For the team outcomes section, factor analysis replicated the planned scales—team learning behavior and team performance. To test whether team learning behavior and team psychological safety items were tapping into the same issues rather than into two distinct constructs, I ran a factor analysis on all items from both scales. Reassuringly, two clean factors resulted, replicating the planned scales precisely.

3

Three of the four interview variables were more correlated with the survey scale measuring the same construct than with any other scale in the survey. The interview measure of *adequacy of team composition* was more highly correlated with the survey measure of team composition ($r = .33$, $p < .01$) than with any of the other survey variables. The *degree of task interdependence and wholeness* was most correlated with the survey variable assessing task design ($r = .34$, $p < .01$), and *context support* was most correlated with context support ($r = .33$, $p < .01$). Although the differences between correlation values were in some cases small, the overall degree of convergence between the two different instruments is striking. The fourth interview variable, *clear team direction,* is more correlated with context support ($r = .28$, $p < .05$) than with the survey measure of team direction ($r = .17$, $p = .12$); however, this result is, in fact, reassuring for measurement reliability, as the survey and interview "direction" variables measured two distinct constructs. The survey measured the extent to which time and effort had been spent on clarifying team goals, and the interviews asked to what extent the team had a clear shared goal; the low correlation between the two is thus not surprising.

Table 3

Analysis of Variance and Intraclass Correlation Coefficients for Group-Level Scales

Team survey variables	$F_{(50,427)}$	p	ICC
Context support	4.80	<.001	.29
Team leader coaching	4.88	<.001	.30
Team psychological safety	6.98	<.001	.39
Team efficacy	5.70	<.001	.34
Team learning behavior	5.79	<.001	.27
Team performance	6.02	<.001	.35
Internal motivation*	1.13	.07	.03
Job involvement*	1.25	.06	.04
Observers' survey variables	$F_{(50,135)}$	p	ICC
Team learning behaviors	2.27	<.001	.19
Team performance	2.90	<.001	.21

* Two variables that are conceptually individual-level variables are included for purposes of comparison, to demonstrate the contrast between these results and those for the variables from the same survey that are conceptually group-level. One-way ANOVA shows these two variables are not significantly different across teams, in contrast to the group-level variables, which are significant to the $p < .0001$ level.

coefficients, measuring the extent to which team members' responses agree with each other and differ from other teams, were calculated for all group-level variables in the team survey; all were significant at the $p < .0001$ level.[4] Table 3 shows the results. It is particularly noteworthy that new measures such as team psychological safety and team learning behavior have high ICCs (.39 and .33, respectively), satisfying the methodological prerequisite for group-level variables. In contrast, ICCs were near zero for constructs that are conceptually meaningful at the individual rather than group level of analysis (*internal motivation,* with $r_{icc} = .03$ and *job involvement* with $r_{icc} = .04$); the data thus confirm that these individual-level constructs are less likely to be shared within and vary across teams. ICCs were calculated for observer variables as measures of interrater reliability for different observers of the same team; these were also positive and significant. These results allowed the creation of a group-level data set ($N = 51$) that merged group means for group-level variables from both surveys.

RESULTS

Team Psychological Safety, Efficacy, Learning Behavior, and Performance

To test hypotheses relating team shared beliefs, learning behavior, and performance, I conducted a series of regression analyses, using customers' ratings of team performance as the dependent variable and measures obtained from team members as regressors. Because respondents belonging to the same team are not independent, I performed regression analyses on the group-level data set ($N = 51$) to avoid violating the regression assumption of independence. The results are shown in table 4. First, regressing team learning (self-reported) on team performance (observer-rated) reveals that learning behavior is a significant predictor of team perfor-

4
To generate each intraclass correlation coefficient, one-way analysis of variance (ANOVA) was conducted on the full data set of 427 cases, with team membership as the independent variable and a team survey scale as the dependent variable. Intraclass correlations are significant when the one-way ANOVA from which the coefficients are derived are significant (Kenny and LaVoie, 1985).

mance, supporting H1 (model 1). This minimal test of two key variables in the model was utilized to increase power, given the small team *N,* and the same strategy was used to test other core relationships, such as between team psychological safety and team learning behavior. To explore alternative models, I then introduced additional regressors into the model—specifically, context support and team leader coaching, which in previous studies have been used to explain team performance—and these provided no additional explanatory value, nor did they, without learning behavior, account for more variance than learning behavior alone (table 4, models 2 and 3). Similarly, a series of alternative regressors (team psychological safety, team efficacy, context support, and team leader coaching) individually accounted for less of the variance in team performance than was accounted for by team learning behavior. Thus, of seven alternative models, team learning behavior accounts for the most variance in observer-rated team performance, providing support for H1.

I conducted four regressions to test hypotheses relating team psychological safety and team efficacy to team learning behavior. To assess the consistency of these predictions for differing data sources, I first used self-reported team learning behavior as the dependent variable and then repeated the same analyses using observers' ratings of team learning behavior. The results reveal a high degree of consistency across the two sets of equations using the two independent measures of team learning, as shown in table 5. First, regressing psychological safety on self-reported team learning behavior shows a significant positive relationship, providing initial support for H2 (panel A, model 1). I then regressed team efficacy alone on team learning behavior to test H4, and although team efficacy accounts for substantially less variance than team psychological safety, the relationship was positive and significant (panel A, model 2). H5, that team efficacy is positively associated with team learning behavior when controlling for team psychological safety, was not supported for self-reported team learning (panel A, model 3). With observer-rated team learning as the dependent variable, the results for H2 and H4 were similar to those obtained using self-reported team learning (panel B). When team psychological safety and team efficacy were entered into the model together, however, team efficacy remained significant (model 3, panel B), providing some support for H5. Finally, to explore alternative models, I regressed other antecedent variables on team learning behavior, and, as shown in table 5 (models 4, 5, and 6), team psychological safety accounts for more variance in both self-reported and observer-assessed team learning behavior than context support or team leader coaching. Model 7 then shows that when all regressors are entered into the model—for either measure of team learning behavior—only team psychological safety is significant. Together, these results provide substantial support for H2, that team psychological safety is associated with team learning behavior; support for H4, that team efficacy is associated with team learning behavior; and mixed support for H5, that team efficacy predicts team learning behavior when controlling for team psychological safety.

Table 4

Regression Models of Observer-assessed Team Performance (*N* = 51)

	Model						
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	1.31	.44	.87	1.41	2.04•	1.48	2.32•
Team learning behavior	.80••	.40					
Context support		.22	.43			.75••	
Team leader coaching		.45	.57				.93••
Team psychological safety				.67••			
Team efficacy					.60••		
Adjusted *R*-squared	.26	.27	.26	.21	.17	.22	.23

• $p < .05$; •• $p < .01$.

Table 5

Regression Models of Team Learning (*N* = 51)

	Model						
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Team learning (self-report)							
Constant	.69	2.45••	.41	1.06	1.41••	1.94••	.42
Team psychological safety	.76••		.70				.51••
Team efficacy		.45••	.11				−.05
Context support				.52••	.69••		.28
Team leader coaching				.31		.75••	.14
Adjusted *R*-squared	.63	.23	.63	.52	.45	.38	.66
B. Team learning behavior (Observer-assessed)							
Constant	.99•	1.5••	.48	1.27•	1.53••	1.73••	.53
Team psychological safety	.46••		.35				.33•
Team efficacy		.38••	.22•				.21
Context support				.27•	.40••		−.07
Team leader coaching				.23		.46••	.12
Adjusted *R*-squared	.35	.26	.40	.26	.23	.21	.36

• $p < .05$; •• $p < .01$.

To test H3, that team learning behavior mediates the effects of team psychological safety on team performance, I conducted a three-stage analysis to test whether three conditions for mediation were satisfied: (1) the proposed mediator significantly predicts the dependent variable, (2) the independent variable predicts the mediator, and (3) the contribution of the independent variables drops substantially for partial mediation and becomes insignificant for full mediation when entered into the model together with the mediator (Baron and Kenny, 1986). In these analyses, I used observers' ratings of performance as the dependent variable and self-reported team learning behavior as the mediating variable, because this created a higher hurdle for demonstrating a relationship between team learning and team performance. As shown above, team learning behavior is significantly positively associated with team performance, supporting the first of the three conditions. The second condition, that the independent variable (team psychological safety) significantly predicts the proposed mediator (team learning behavior) also was established above. Finally, the third condition for mediation is also satisfied: the contribution of team psychological

safety becomes insignificant (B = .25, p = .42) when entered into the regression model together with team learning, which remains significant (B = .60, p < .05).

Context Support, Leader Behavior, Psychological Safety, and Learning Behavior

Next, I used regression to test H6, H7, and H8, followed by GLM analysis to further explore the relationships in H6, that team leader coaching and context support are positively associated with team psychological safety. Results are shown in table 6. As a first test, I regressed these two variables on team psychological safety. Both were positively related to the dependent variable; context support was significant and team leader coaching was close to significant (condition 2). In testing H7, that team psychological safety mediates between coaching, context support, and team learning behavior, the first two conditions of the three-step analysis were already satisfied—team psychological safety predicted team learning behavior, and context support and coaching predicted team psychological safety. The third condition was also satisfied; when all three predictors were entered into the model simultaneously, the effects of context support and coaching were insignificant, and team psychological safety remained significant. This result supports H7, as did repeating the three-step analysis for self-reported learning behavior.

In contrast, the results shown in table 7 do not support H8, that team efficacy functions as a mediator. Team efficacy predicted observer-rated team learning behavior, but of the two independent variables, only context support predicted the proposed mediator, team efficacy. Despite insufficient support for the second condition, I checked the third condition by regressing context support and team efficacy on observer-rated team learning and found that the effects of context support were insignificant, while team efficacy remained barely significant. Finally, using self-reported team learning, I found no support for mediation.

Next, I examined relationships between context support, team leader coaching, team psychological safety, and team learning behavior using GLM analyses on the individual-level data set (N = 427). This allowed simultaneous testing of random effects of team membership and fixed effects of team type while exploring the relationship between predictor vari-

Table 6

Tests of Team Psychological Safety as a Mediator between Coaching, Context Support, and Learning

		Observer-assessed learning behavior				Self-report learning behavior			
Conditions to demonstrate mediation*	Independent variable	B	t	p	R^2	B	t	p	R^2
1. Does psychological safety significantly predict *team learning?*	Team psychological safety	.46	5.26	<.001	.33	.76	9.16	<.001	.63
2. Do coaching and context support significantly predict *team psychological safety?*	Team leader coaching Context support	.33 .56	1.89 3.82	.06 <.001	.52	.33 .56	1.89 3.82	.06 <.001	.52
3. Does the effect of the antecedents drop substantially or become insignificant? (*Team learning*)	Team psychological safety Context support Team leader coaching	.29 .09 .12	2.46 .66 .78	.02 .51 .21	.33	.51 .24 .14	4.56 1.83 1.00	<.001 .07 .32	.66

* Dependent variables are in italics.

Table 7

Tests of Team Efficacy as a Mediator between Coaching, Context Support, and Learning

		Observer-assessed learning behavior				Self-report learning behavior			
Conditions to demonstrate mediation*	Independent variable	*B*	*t*	*p*	R^2	*B*	*t*	*p*	R^2
1. Does team efficacy significantly predict *team learning?*	Team efficacy	.45	3.97	<.001	.23	.38	4.27	<.001	.26
2. Do coaching and context support significantly predict *team efficacy?*	Team leader coaching	.01	.06	.95		.01	.06	.95	
	Context support	.77	5.01	<.001	.49	.77	5.01	<.001	.49
3. Does the effect of the antecedents drop substantially or become insignificant? (*Team learning*)	Team efficacy	.26	2.05	.05		.02	.21	.83	
	Context support	.20	1.46	.15	.27	.67	4.44	<.001	.52

* Dependent variables are in italics.

ables and either team psychological safety or team learning behavior. Despite mean differences across team types in both team psychological safety and team learning behavior, GLM analyses revealed that these differences could be explained by context support and team leader coaching. As shown in table 8, context support, team leader coaching, and team membership (random effects of belonging to the same team) were significant predictors of individuals' ratings of team psychological safety. In contrast, the effect of team type was insignificant. Controlling for team tenure revealed that its effects on team psychological safety were also insignificant. Similarly, team psychological safety, team efficacy, and team membership were significantly related to team learning behavior, while team type and team tenure again were insignificant. Although the GLM analyses allowed a more detailed apportioning of the variance in individuals' responses than the group-level data set, which uses team means as data points, the direction and magnitude of the results are consistent with those obtained using regression analysis.

Exploring Differences between High- and Low-learning Teams

I used the data from the seven teams identified in phase 3 as high- or low-learning to better understand the relationship between team psychological safety and learning behavior.

Table 8

Results of GLM Analyses (*N* = 427)

Model	Independent variable	*F*-ratio	*p*
Team psychological safety R^2 = .60	Team type	$F(3,51) = 2.02$	.12
	Team membership*	$F(50,427) = 3.25$	<.001
	Context support	$F(1,427) = 26.83$	<.001
	Team leader coaching	$F(1,427) = 39.81$	<.001
	Team tenure	$F(1,427) = 0.10$	.74
Team learning behavior R^2 = .53	Team type	$F(3,51) = 2.21$	.10
	Team membership*	$F(50,427) = 2.64$	<.001
	Team psychological safety	$F(1,427) = 42.21$	<.001
	Team efficacy	$F(1,427) = 10.52$	<.001
	Team tenure	$F(1,427) = 0.22$	.49

* Team membership is the categorical variable identifying each team. The result that team membership accounts for significant variance in team psychological safety or in team learning behavior indicates that variance is attributable to unexplained effects of belonging to the same team.

My goal in studying them was to learn more about how they functioned as teams rather than to confirm or disconfirm a model. Table 9 summarizes these qualitative data by comparing aspects of context support, leader behavior, team psychological safety, and team learning behavior. A few observations stand out. First, team psychological safety is associated with learning behavior across all seven teams. Second, in all cases but two, team leader coaching is associated with team psychological safety and team learning behavior. The exceptions, shown in table 9, include the troubled Help Desk team, for which the leader's reported efforts to help and coach the team are juxtaposed against persistent conflicts and difficulties reported by team members, and a new product development team (NPD 3), in which the leader functioned primarily as a coordinator and offered an easy-going, passive style that did not match the team's energetic discussions, active brainstorming, and feedback seeking.

A third observation pertains to team design. The degree of context support varied across the teams in a way that was not tightly coupled with the high- or low-learning categorization. For example, a self-managed production team (the Stain Team) confronted persistent depletion of its members, who were frequently pulled off to work on other jobs in the plant, leaving two or three others to carry out the six-person team's work. Despite this obstacle, the team exhibited numerous examples of proactive learning behavior, illustrated below. The Publications Team had a similar initial design and degree of context support as two other publications teams in the larger sample, yet survey data suggested that this team was both lower in psychological safety (3.9 versus 5.0 and 5.9) and in learning behavior (3.9 versus 4.2 and 5.4) than the other two similarly appointed teams. Although their own survey responses show lower means for context support than the other two teams (3.3 versus 4.5 and 5.4), the structured interview data (capturing outside managers' views) place all three at roughly the same level (3 versus 3.5 and 3.5). This comparison shows that learning-oriented teams might be able to modify their work processes to be more interdependent, suggesting that team design features are not always unchangeable constraints. Implications of these observations are explored in the discussion section.

Examining in more detail the Stain Team, a self-managed production team (selected as a high-learning team from the survey data), and the Publications Team, a leader-led functional team (selected as low learning), provides some insight into how team members' experiences of psychological safety may enable learning behavior. Evidence of team psychological safety was evident in interviews with each member of the Stain Team. For example, Margie, a long-time team member, offered, "Two years ago in the Stain Team [under a different structure and leader], people were blaming each other and trying to make themselves look better, never taking responsibility . . . but this team is different." Matt, another member, explained, "This team . . . has more cooperation; we take more responsibility for helping each other. . . . Right now, I think this is the best team I've been on . . . [in other teams] it's people not carrying their share, or it's conflict. . . ."

These descriptions allude to a shared belief that one will not be blamed by other team members, who can be counted on to help each other and who are not punitive. Interviews with members also generated numerous examples of learning behavior. For example, Margie described how the team listened to and acted on negative feedback from recipients of the team's work output: "This is going to sound very childish, but let's say I just did a part and I got drips on it. Now, if they [those next in the production process] told me I got drips on the edge, I say 'thanks'—and then I'm glad I can get these drips off. Where it used to be, when that happened, we'd just try to find something wrong that person did—we'd keep an eye out for it! It wasn't to be helpful, it was to bring them down to your level or something like that. . . . Now, we don't think anything of it. We just fix it." In this quote, feedback about the team's work—and about mistakes, in particular—is seen as helpful. Margie offered a reason for this change: "I think that the reason we are now so open to that kind of thing is because we feel that the people who are telling us are not telling us because they want to put us down and say we're doing a bad job but because they want us to do a good job—do the product good—so they want to work together to make the product better."

Her explanation suggests that the team's interpretation of others' intentions plays an important role in its openness to feedback; by believing others' intentions to be helpful rather than critical, the team is more likely to interpret negative feedback as friendly rather than unfriendly data. Another member, Joe, described this phenomenon in similar terms, "Our group is very good; if something comes back to us, I think all of us will say, 'Yeah, I did that.' I don't think there is any of us who wouldn't—where before it was, 'I don't remember. . . .' Now I think everyone takes responsibility." Finally, Matt provided an example of learning behavior that combines the construct of conducting an experiment with that of seeking feedback: "Sometimes, if we have a quality issue—we're not sure about something we've just done—we'll bring others in without telling them what the issue is to ask them if they see a problem with this part. Second opinion type stuff. We do a lot of second opinions [from others not on the team but in the stain area]." The device of keeping the others blind to the real concern is used to generate honest and useful feedback. Knowing they cannot provide an objective opinion themselves, they seek an objective eye elsewhere. The Stain Team illustrates how a shared sense of psychological safety can allow team members to take interpersonal risks and act in learning-oriented ways. Margie alluded to understanding others' intentions to be helpful as making it easy to accept constructive criticism; Matt described proactive feedback-seeking that is enabled by the belief that the team takes responsibility for doing good work and is not focused on placing blame.

In contrast, interviews with the Publications Team, a functional team responsible for preparing brochures and other publications for a group of ODI dealers, revealed very different perceptions of the team's interpersonal context. The newest member (who joined the team two months earlier)

Table 9

Qualitative Data from High- and Low-learning Teams

	Team	Context support	Team leader behavior	Team psychological safety	Team learning behavior
High-Learning	Factory Support	Adequate support. Team has access to both resources and information to help structure and carry out the team's work.	Team leader is proactive, warm, coaching-oriented, and organized.	"We don't wear a mask." "We don't have to have a 'workface'." "They really care; that makes it easier to express yourself."	Team member asks me right away, "Were we OK as a team?" Leader asks, "Are you here to help us be better?" The team distributed its own shifts around the clock, on its own initiative, so that someone is always available, and the team is able to have daily meetings in the early morning.
	NPD3	Well-supported new product development team. Skilled disciplinary members, important initiative for ODI.	Leader as (largely passive) coordinator, not boss. In team meeting, a new data book is introduced by member, and team agrees that no changes can be made without a team decision. "Even Matt can't change it." Matt laughs, "You wouldn't let me!"	Members express mutual respect. Team selects humorous team name to encourage irreverence and unconventional ideas.	"We learned [how to learn from customers]; don't [over]present what you're thinking in advance, because they won't disagree—so you end up not learning from them. Sometimes have a non-team member present, to help them respond openly. . . . We learned to listen to what they're saying."
	Fusion	Formed to develop new protocols to provide a consistent interface for all ODI computer users to replace department-specific systems. Often short on time and resources as members were juggling other distracting responsibilities.	Leader is committed to being a good coach: "I learned to ask myself why I might be tuning someone else out . . . what is it about me? I recognize that it's a reinforcing cycle. . . ."	"We all respect each other, which is critical for being open." "Everyone on this team was very competent. . . . I respect them."	"We had a problem defining the scope and roles at first. We didn't get a lot of momentum. . . . We tried to develop a statement of [the scope], but there was a lot of disagreement. So we brought it to our 'customers,' but then ended up defining the scope ourselves. . . ." "We experimented with different meeting lengths, from a whole day to an hour, and ended up with half-day meetings as the best length."
	Stain	Lack of context support. Team members constantly pulled off the team to substitute for absent workers elsewhere.	Team is self-managed, but one member emerges as leader. "Brian" is approachable and interested in people, outside of work he acts as a director in community theater.	Member contrasts current stain team with former, which involved "blaming each other. . . ."	". . . if we have a quality issue—we're not sure about something we've just done—we'll bring others in without telling them what the issue is to ask them if they see a problem with this part. . . ."

Table 9 (*continued*)

	Team	Context support	Team leader behavior	Team psychological safety	Team learning behavior
Low-Learning	Help Desk	Adequate support, but team leader is not located adjacent to team. Team task lacks true interdependence.	Leader is located in office at a distance from the team. Team leader reports planning physical reorganization to relocate closer to team. Expresses concern about helping the team.	One team member "monitors the others, judging their behavior . . . but she can't confront them. This makes the problem bigger. . . . She has the most seniority, and she questions their competence and makes decisions on her own."	[One member] complains to others not on the team ("to vent") but is "not able to confront other team members openly."
	Chair Production 2	Information and resources are available, but often not used by team, which values opportunity for overtime work. Large team (30+ members) responsible for producing chairs on first shift. Work divided according to specialized subtasks.	Leader acts as traditional supervisor, monitoring attendance, job assignments, and output.	According to internal team consultant, "They don't want to look like brown-nosers." "They have bad attitudes."	"If there's a technical problem, they don't ask the engineers for help." "They were having problems with the glue, but they didn't get help; they just sit and don't work, then they get to do overtime on Saturday." Team has actively resisted cross-training.
	Publications	Adequate context support; identical to two other publications teams.	Leader acts as boss, distributes work, monitors progress.	"People are put down for being different . . . [there is a] lack of trust."	Apparent lack of learning behavior. See text.

volunteered, ". . . there are underlying tensions. I'm not sure where it comes from." A long-time member complained, "Amanda [the team leader] doesn't want to know if things aren't going well." Later he added, "I'm not being backed, not being supported." Another member said, "People are put down for being different . . . [there is a] lack of trust." These descriptions suggest a tangible lack of team psychological safety; the notion that someone does not "want to know if things aren't going well" exemplifies the construct.

There appeared to be little overt learning behavior in this team. The team's task was flexible enough to permit either a collaborative approach or division into relatively independent tasks, and the degree of interaction varied across the three publications teams included in the sample of 51 teams. All three teams had the same general task, which required integrating technical skills with an understanding of dealers' specific needs to create finished products for a certain group of dealers, but did not specify how team members were to work together. The leader of this team attempted to manage work allocation herself, by assigning tasks to individuals. As she explained, "Everyone has their own assignment, but they can help each other. . . . But are they pulling together to get it all done? No. . . . In the past, some were putting in more hours. I did not like that. It's not fair. . . . I try to take care of it by spreading out the volume, switching the dealers around." Other members explained that much of the interaction and information transfer is between team members and dealers rather than among team members, despite the fact that team members are co-located. Within the team, members revealed a lack of learning behavior such as asking questions. As one member reported, "If I have questions I ask others—but I'm pretty confident in what I do and I do it." Not surprisingly, team members also reported not receiving "honest feedback," "not feeling heard," and having "no opportunity to gain skills, no opportunity to grow." Another member complained, "People are leaving, but none of the problems get addressed." Overall, the data suggested that the team was stuck in a self-defeating pattern in which a lack of psychological safety discouraged reaching out to ask for or offer help or to discuss ways to improve the team's work process. Viewing the environment as unsafe, members developed their own coping strategies, such as planning to leave the team or planning to stay while remaining as insular as possible.

A similar contrast can be found in data collected in phase 1 of the study, in which the two new product development teams studied displayed very different experimentation behavior. NPD 1 demonstrated an eagerness to experiment, to try many things quickly and often simultaneously. One member, Bob, reported, "There's a lot of testing of new ways to do stuff. We're doing design and engineering at the same time. It's wild. It's incredibly complex. We need to be constantly creative about the mechanisms. . . ." Another member, Kim, said, "There have been a lot of iterations. It's like reducing a sauce by half. It's a more flavorful sauce, a more complex group of ingredients, but the end result is simpler. We made it easier to use . . . by continually challenging ourselves to find what is essential."

In contrast, members of NPD 2 described getting stuck in "blind alleys" in a process of perfecting one solution at a time before getting feedback: "We went down a lot of blind alleys. . . . We would go down a path for a while, develop details, then abandon it. Each path represented time wasted. . . ." The lack of experimentation behavior in NPD 2 appeared to be related to the team's concern that they had to produce a certain solution that "management" wanted. As one member explained, ". . . we had a lot of nay-sayers who just wanted to do [the project] and not question it. They were worried about getting their hands slapped by management." In contrast, NPD 1 members describe their team as able to make the right decisions: "I trust the people here that they're making the right decision for the function and for ODI. And they feel the same way about me"—a belief that may facilitate the rapid, low-stakes experimentation behavior the team exhibited.

DISCUSSION

Overall, the study shows the usefulness of the construct of team psychological safety for understanding collective learning processes. The existence of team psychological safety, conceptualized as a shared belief about the consequences of interpersonal risk-taking, at the group level of analysis was supported by qualitative and quantitative data. A set of salient beliefs about the interpersonal context that were consistent with this construct emerged from qualitative data collected in phase 1 of the study, and survey items designed to capture the experience of team psychological safety showed high internal consistency reliability. The data also suggest that team psychological safety is something beyond interpersonal trust; there was evidence of a coherent interpersonal climate within each group characterized by the absence or presence of a blend of trust, respect for each other's competence, and caring about each other as people. But building trust may be an important ingredient in creating a climate of psychological safety. Team members interviewed often referred to others' intentions, such as the Stain Team's belief that others pointing out their "drips" don't "want to put us down" but, rather, "want to work together to make the product better"; such beliefs suggest that a team's proclivity to trust others' intentions plays a role in psychological safety and learning behavior. Although building trust may not necessarily create a climate of mutual respect and caring, trust may provide a foundation for further development of the interpersonal beliefs that constitute team psychological safety.

Support for the Team Learning Model

The relationship between team psychological safety and learning behavior received substantial empirical support. Team members' own descriptions, taken from different types of teams and settings, illustrated how a climate of safety and supportiveness enabled them to embrace error—for example, the Stain Team's drips—or to seek feedback from customers and make changes in a product design, as did NPD 1. Conversely, a lack of psychological safety contributed to reluctance to ask for help in preparing publications for dealers and, in NPD 2, to an unwillingness to question the team goal for fear of sanction by management. Their sto-

ries lend weight to the premise that learning behavior in social settings is risky but can be mitigated by a team's tolerance of imperfection and error. This appeared to be a tolerance (or lack of tolerance) that was understood by all team members.

The results of the study supported the proposition that team psychological safety affects learning behavior, which in turn affects team performance. Quantitative analyses provided consistent support for six of the eight hypotheses. This included support for two mediating relationships: learning behavior appears to mediate between team psychological safety and team performance, and team psychological safety appears to mediate the effects of context support and team leader coaching on learning behavior. Data from team observers on team performance, independent of other data sources, strengthen these results.

Two hypotheses—that team efficacy would be associated with learning behavior when controlling for team psychological safety and that team efficacy mediates the effect of context support and leader behavior on team learning—were not supported. This outcome may in fact strengthen the core argument in this paper—that engaging in learning behavior in a team is highly dependent on team psychological safety—by suggesting that team members' confidence that they will not be punished for a well-intentioned interpersonal risk enables learning behavior in a way that team efficacy, or confidence that the team is capable of doing its work, does not. In contrast to the uneven results for efficacy, one of the most striking results is the degree to which the proposed relationship between team psychological safety and team learning behavior received consistent empirical support across several analyses and independent measures. The implication of this result is that people's beliefs about how others will respond if they engage in behavior for which the outcome is uncertain affects their willingness to take interpersonal risks. Because beliefs about team efficacy are unrelated to this central interpersonal concern, it may be less important for learning behavior. Thus, the theoretical premise that lies at the core of the team learning model does not appear to require the supplementary effects of team efficacy. Moreover, the conclusion that team psychological safety fosters team learning behavior is both consistent with existing organizational learning theory and has a certain degree of face validity; that is, the juxtaposition of team members' descriptions of the interpersonal context in their team with their stories of learning behavior is not a surprising one.

Quantitative and qualitative results both suggested that context support accounts for variance in learning behavior but, also, that it provides an incomplete explanation. The quantitative data demonstrated a positive association between context support and psychological safety, and the qualitative data allowed isolation of specific cases from within this general trend that suggested different ways real teams handle the absence or presence of enabling design conditions. For example, the Stain Team lacked context support and yet was learning-oriented. The Publications Team, despite having a similar set-up and level of context support as two other

publications teams, showed substantially less learning behavior than they did. Thus, a focus on just these two teams might suggest that context support and other features of team design account for little variance in learning behavior. In contrast, the seven high- and low-learning teams studied provided more data and do suggest an important role for team design in team learning.

First, the four high- and three low-learning teams differed markedly by team type. Functional teams were overrepresented in the low-learning teams (two of three), and product development, project, and self-managed teams made up three of the four high-learning teams. The two groups also differed somewhat on whether they exhibited key elements of a well-designed team (cf. Hackman, 1987). The low-learning teams' tasks at the time of the study tended to lack interdependence; for example, in the Publications Team, each member had his or her "own assignment"; other team members could be used as resources, but as a design for teamwork, the arrangement was suboptimal. But the fact that the two other publications teams in the survey sample had higher levels of learning demonstrates that the degree of task interdependence can be modified through learning behavior. Similarly, context support was adequate for the three low-learning teams and inadequate for two of the four high-learning teams, also illustrating that it is possible for teams to overcome limitations in their context through learning behavior. These few cases thus provided evidence that high-learning teams could overcome obstacles they faced in their initial set-up; a lack of structural support did not seal their fate. The Stain Team overcame personnel limits that repeatedly depleted their ranks, and the Fusion Team (described in table 9) overcame time and staffing constraints to push energetically forward on its shared project. In contrast, low-learning teams, such as the Publications and Help Desk teams, appeared vulnerable to a self-sealing pattern of members having private concerns about the team environment, which led to withholding relevant thoughts and actions and made it difficult to escape the low-learning condition. These cases suggest an asymmetry, in which high-learning teams can confront and work with design and other constraints to improve their situation, while low-learning teams are far more likely to get stuck and be unable to alter their situation without intervention.

An integrative perspective that mirrors and reinforces the results of the quantitative data can be articulated from the seven cases; in this, team psychological safety is a mechanism that mediates between effective team design and learning behavior. Effective team leader coaching and context support, such as access to information and resources, appear to contribute to, but not to fully shape, an environment in which team members can develop shared beliefs that well-intentioned interpersonal risks will not be punished, and these beliefs enable team members to take proactive learning-oriented action, which in turn fosters effective performance. Quantitative results also suggest that team psychological safety mediates between team structures (context support and coaching) and the behavioral outcome of team learning. These findings have important implications for theo-

ries of team effectiveness. They suggest an explanation for *how* effective team design and leadership enables effective team performance.

Study Limitations and Model Applicability

The results of this study represent a first step in establishing team psychological safety as a construct, but additional conceptual and empirical work is needed to refine and extend the implications of the construct before firm conclusions can be drawn. The qualitative data, although consistent with the proposed construct, did not map onto it precisely. Similarly, survey items used to capture the experience of team psychological safety also have conceptual relationships with other interpersonal constructs, especially trust. Thus, the empirical data were supportive of the existence of team psychological safety as a construct but could not conclusively differentiate it from related constructs. Further research is needed to establish construct validity.

The relationship between psychological safety and learning could be detected across the four types of teams in the study; for example, whether a team was a self-managed team producing chairs or a management team designing transportation strategy, team psychological safety generally was associated with team learning behavior. Although I cannot generalize from this study about the relationship between team learning and team performance for all types of teams, it is likely that under certain conditions, team learning behavior will not control much variance in team performance, such as for team tasks that are highly constrained with tightly specified criteria for success. For example, a team working to assemble a product on a machine-paced assembly line is less likely to benefit from learning behavior than a team with few inherent task constraints and uncertain criteria for success, such as a cross-functional product development team designing a new product. Highly constrained tasks leave little opportunity for information seeking to be helpful in improving team performance, and feedback tends to be built into the task, such that asking others for feedback becomes redundant. Unconstrained tasks such as designing a new product, in contrast, create ample opportunity for the team's output to benefit from new information and feedback. The utility of learning behavior across team types thus deserves further research.

This study provides a limited exploration of factors that managers can influence in their efforts to promote team learning. It focused on two antecedent conditions with clear conceptual relationships to team psychological safety but did not examine a wide range of managerial factors that might also affect team learning. For example, team leader coaching was included in the study, but the data do not specify leader behaviors precisely. Furthermore, analyses testing predictors of team psychological safety had to rely on variables from within the same survey. Although the team survey was not subject to excessive common-method variance, this is still a concern and suggests that findings on the antecedents of team psychological safety should be considered tentative. Thus, further research is needed to explore factors that promote team psychological safety.

The cross-sectional survey design prevented a demonstration of causality and also limited my ability to explore dynamic issues. The theoretical model also leaves out the dynamic interaction that is likely to take place in which team psychological safety facilitates taking the risks of learning behavior, which, when unpunished by the team, further reinforces team psychological safety. A team's history includes events that demonstrate to members that interpersonal risk is or is not worthwhile, and thus both psychological safety and learning may be influenced as much or more by the cumulative effects of interpreting these events as by initial design features. Some evidence of the effects of history could be seen in the Stain Team, where informants contrasted present conditions with those under an earlier leader. Nonetheless, how shared beliefs are created gradually in teams over time as a consequence of minor events and subtle interactions cannot be assessed in this study, nor can whether self-reinforcing cycles or spirals exist. Given the inherently dynamic nature of learning, this snapshot approach provides an incomplete picture. Issues of how team psychological safety develops over time and how team learning behavior might alter undesirable structural factors warrant careful consideration and future research.

Finally, conducting the study in a single company imposed limitations, suggesting caution in drawing conclusions for teams in other organizations. Although there was considerable diversity across teams in work context, organization level, education, and tenure, the sample may not be representative of the full spectrum of possible teams in work organizations. Moreover, with 51 teams, the sample size is small for multivariate analyses. The inclusion of four team types is both a strength and a weakness of the study. On one hand, unlike studies that include only one type of team, such as sales teams or production teams, the findings cannot be said to be merely a function of the nature of the team task. On the other hand, this inclusion also brought in more variables than could be thoroughly tested with only 51 teams. Larger studies could strengthen the validity of the findings.

CONCLUSION

Structural and interpersonal factors have been viewed in the literature as alternative explanations for team effectiveness. This study supported, instead, an integrative perspective, in which structural and interpersonal characteristics both influence learning and performance in teams. In particular, the results showed that psychological safety is a mechanism that helps explain how previously studied structural factors, such as context support and team leader coaching, influence behavioral and performance outcomes. Future team research has much to gain by investigating how structural and interpersonal factors are interrelated rather than which is more important. To do this, it is essential to study real work teams. There was some evidence in this study that a team's history matters in shaping psychological safety. Shared beliefs about how others will react are established over time; these cannot take shape in the laboratory in a meaningful way. Moreover, for the risks of learning to be salient, the

interpersonal consequences must matter—as they do in ongoing work relationships. Studying learning in laboratory groups is therefore likely to miss an essential source of variance. Beyond the need to study real groups, longitudinal research could help to develop an understanding of how psychological safety develops or erodes with changes in membership, leadership, or context.

In this study, my focus on learning behavior and its accompanying risk made the interpersonal context especially salient; however, the need for learning in work teams is likely to become increasingly critical as organizational change and complexity intensify. Fast-paced work environments require learning behavior to make sense of what is happening as well as to take action. With the promise of more uncertainty, more change, and less job security in future organizations, teams are in a position to provide an important source of psychological safety for individuals at work. The need to ask questions, seek help, and tolerate mistakes in the face of uncertainty—while team members and other colleagues watch—is probably more prevalent in companies today than in those in which earlier team studies were conducted. This may partially account for the empirical support I found for the role of psychological safety in promoting performance in these work teams; however, it also suggests that psychological safety and ways to promote it will be increasingly relevant for future research on work teams.

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APPENDIX: Survey Scales and Item Correlations

Team survey item*	Pearson *R* correlations					
Supportiveness of organization context		2	3	4	5	
1. This team gets all the information it needs to do our work and plan our schedule.		.43	.29	.26	.22	
2. It is easy for this team to obtain expert assistance when something comes up that we don't know how to handle.			.26	.30	.24	
3. This team is kept in the dark about current developments and future plans that may affect its work.				.26	.29	
4. This team lacks access to useful training on the job.					.15	
5. Excellent work pays off in this company.						
Task design				2	3	
1. The work that this team does makes a difference for the people who receive or use it.				.23	.27	
2. The work we do on this team *itself* provides us with plenty of feedback about how well the team is performing.					.25	
3. Those who receive or use this team's output rarely give us feedback about how well our work meets their needs.						
Clear direction				2	3	
1. It is clear what this team is supposed to accomplish.				.41	.38	
2. This team spent time making sure every team member understands the team objectives.					.65	
3. The team has invested plenty of time to clarify our goals.						
Team composition				2	3	
1. Most people in this team have the ability to solve the problems that come up in our work.				.26	.34	
2. All members of this team have more than enough training and experience for the kind of work they have to do.					.27	
3. Certain individuals in this team lack the special skills needed for good team work.						
Team efficacy				2	3	
1. Achieving this team's goals is well within our reach.				.37	.43	
2. This team can achieve its task without requiring us to put in unreasonable time or effort.					.28	
3. With focus and effort, this team can do anything we set out to accomplish.						
Team psychological safety*	2	3	4	5	6	7
1. If you make a mistake on this team, it is often held against you.	.36	.38	.49	.41	.34	.43
2. Members of this team are able to bring up problems and tough issues.		.28	.56	.35	.34	.37
3. People on this team sometimes reject others for being different.			.32	.45	.45	.33
4. It is safe to take a risk on this team.				.37	.37	.48
5. It is difficult to ask other members of this team for help.					.42	.41
6. No one on this team would deliberately act in a way that undermines my efforts.						.39
7. Working with members of this team, my unique skills and talents are valued and utilized.						
Team leader coaching†					2	3
The team leader . . .						
1. . . . initiates meetings to discuss the team's progress.					.38	.47
2. . . . is available for consultation on problems.						.70
3. . . . is an ongoing "presence" in this team—someone who is readily available.						

APPENDIX *(continued)*

Team learning behavior*	2	3	4	5	6	7
1. We regularly take time to figure out ways to improve our team's work processes.	.23	.28	.35	.41	.30	.23
2. This team tends to handle differences of opinion privately or off-line, rather than addressing them directly as a group.		.26	.31	.27	.29	.22
3. Team members go out and get all the information they possibly can from others—such as customers, or other parts of the organization.			.38	.35	.37	.37
4. This team frequently seeks new information that leads us to make important changes. . . .				.41	.47	.37
5. In this team, someone always makes sure that we stop to reflect on the team's work process.					.47	.25
6. People in this team often speak up to test assumptions about issues under discussion.						.43
7. We invite people from outside the team to present information or have discussions with us.						

Team performance*		2	3	4	5
1. Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.		.38	.41	.44	.40
2. Those who receive or use the work this team does often have complaints about our work.			.26	.42	.47
3. The quality of work provided by this team is improving over time.				.36	.26
4. Critical quality errors occur frequently in this team.					.51
5. Others in the company who interact with this team often complain about how it functions.					

Internal motivation*		2	3
1. My opinion of myself goes up when I do my job well.		.33	.48
2. I feel bad and unhappy when I discover that I have performed less well than I should have in my job.			.30
3. I feel a great sense of personal satisfaction when I do my job well.			

Job Involvement*
1. I live, eat, and breathe my job.

Observer Survey Items

Team learning behaviors†	2	3	4	5	6	7
This team . . .						
1. . . . asks its internal customers (those who receive or use its work) for feedback on its performance.	.24	.55	.39	.52	.37	.30
2. . . . relies on outdated information or ideas. (Reverse scored)		.46	.37	.36	.47	.36
3. . . . actively reviews its own progress and performance.			.47	.61	.38	.51
4. . . . does its work without stopping to consider all the information team members have. (Reverse scored)				.36	.44	.22
5. . . . regularly takes time to figure out ways to improve its work performance.					.49	.44
6. . . . ignores feedback from others in the company. (Reverse scored)						.30
7. . . . asks for help from others in the company when something comes up that team members don't know how to handle.						

Team performance*		2	3	4
1. This team meets or exceeds its customers' expectations.		.77	.62	.64
2. This team does superb work.			.57	.71
3. Critical quality errors occur frequently in this team's work. (Reverse scored)				.53
4. This team keeps getting better and better.				

* 7-point scale from "very inaccurate" to "very accurate."
† 5-point scale from "never" to "always."