

MANAGING FOR HIGH RELIABILITY: THE RELATIONSHIP OF COLLECTIVE
MINDFULNESS AND MANAGERIAL COMMUNICATION WITH SOCIAL-
EXCHANGE PERCEPTIONS, PERFORMANCE, AND CREATIVITY

by

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ABSTRACT

BENJAMIN ERIC BARAN. Managing for high reliability: The relationship of collective mindfulness and managerial communication with social-exchange perceptions, performance, and creativity. (Under the direction of DR. LINDA RHOADES SHANOCK)

The modern world of work presents managers with a business environment marked by increasingly high levels of ambiguity. Succeeding within the face of such ambiguity requires a high degree of effective sensemaking and creativity within teams. High-reliability theory and related frameworks suggest a number of ways in which managers can successfully manage the unexpected, but these propositions have focused primarily on safety outcomes, have not considered the important role of managers as actors in this process, and have yet to be incorporated into the mainstream leadership literature despite their applicability. Addressing that void, this study proposes and finds preliminary evidence for a multilevel theoretical model integrating high-reliability theory and the leadership literature to examine relationships of team collective mindfulness and team manager openness with employee creativity among a sample of 100 employees nested within 20 teams. As such, these findings suggest distinct ways in which the tenets of high-reliability theory may apply in generalized management situations, while extending the theory to involve non-safety-related outcomes such as creativity. Practical implications of this study include the identification of communication styles that managers may use to encourage creative performance.

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CHAPTER 1: INTRODUCTION AND STATEMENT OF PROBLEM

Widespread changes in the business environment have sparked dramatic shifts in the degree and types of challenges faced by managers (Barkema, Baum, & Mannix, 2002; Burke & Ng, 2006). In particular, managers must contend with increasingly high levels of competition while negotiating a shifting business landscape characterized by globalization, rapidly advancing technologies, and increasing interconnectedness—of economies, industries, and businesses themselves (Barkema et al., 2002). Thus, organizations today must contend with higher levels of ambiguity, defined as the existence of multiple, plausible interpretations about environmental phenomena (Baran & Scott, 2010; Scott & Trethewey, 2008), than those of decades past.

In addition to forces in the external environment creating heightened ambiguity for managers, a number of managerial scenarios are inherently ambiguous. For example, managers build financial forecasts based upon sets of assumptions, entrepreneurs attempt to hone their products to meet the needs of future customers, and management teams attempt to develop strategies that will sustain their businesses' competitive advantage within volatile markets. Therefore, a foundational premise in this study is that managers in general are facing unprecedented levels of ambiguity, and that how they deal with such ambiguity relates to the performance of their employees. Given its focus on how organizational actors resolve ambiguity, research on topics such as sensemaking (e.g., Weick, 1995) and high-reliability organizing (e.g., Weick & Sutcliffe, 2007; Weick,

Sutcliffe, & Obstfeld, 2005) begin to address how organizing processes operate within this shifting business environment and its increasing levels of ambiguity.

Middle managers are particularly important actors within organizations in terms of learning from untoward events and regarding strategy formulation and implementation (e.g., Beck & Plowman, 2009). However, issues of leadership are noticeably void from the research to date on high reliability organizing. As well, the vast literature on leadership could benefit from incorporation of concepts from high reliability organizing as they affect the actions of leaders and every day subordinate outcomes such as performance and creativity. In particular, integrating research on high reliability organizing may help address two of the most important areas of focus for leadership research as posed by Hackman and Wageman (2007). Namely, this research will provide insight regarding some key features of leadership in today's ambiguous conditions and how leaders' personal attributes, in this case tolerance for ambiguity, may contribute to success in today's ambiguous business environment.

In this chapter, I describe the present study. First, I provide background material as a means of introduction to seminal themes within this research. Second, I preview the study's primary constructs of interest. Finally, I discuss the purpose of this research and its overarching research questions.

The Present Study

Background. The five principles of high reliability—preoccupation with failure, commitment to resilience, sensitivity to operations, reluctance to simplification, and deference to expertise (Weick & Sutcliffe, 2007)—are central to high reliability theory. The present study integrates aspects of high reliability theory (e.g., Weick & Roberts,

1993; Weick, Sutcliffe, & Obstfeld, 2005; Weick & Sutcliffe, 2007) with literature on management and supervisory relationships (e.g., Erdogan & Enders, 2007; Gerstner & Day, 1997, Shanock & Eisenberger, 2006). This is important because the principles of high reliability certainly have direct implications for managers, but research within the high-reliability domain centers primarily on collective sensemaking (e.g., Weick & Roberts, 1993) or aspects of organizational culture (Weick & Sutcliffe, 2007), rather than on the managers themselves within those sensemaking contexts or organizations.

In addition, much of the research on high-reliability organizations has focused on issues of safety and resilience, with commonly examined outcomes including employee accidents, errors, and injuries. While certainly worthwhile, the negative relationship between levels of safety culture and accident frequency is well-established (e.g., Wallace, Popp, & Mondore, 2006). What remains to be seen, however, is how the principles of high reliability and the predominant characteristics of safety cultures may influence non-safety related outcomes within organizations. Some research (e.g., Michael, Evans, Jansen, & Haight, 2005) has explored non-safety outcomes of management commitment to safety, finding that management commitment to safety (similar to safety culture) positively predicted organizational commitment, job satisfaction, and job-related performance.

As conceptualized, high reliability theory should apply to mainstream management situations—beyond those situations typically cited as high reliability organizations (e.g., nuclear power plants, naval aircraft carriers, etc.). As stated by Weick, Sutcliffe, and Obstfeld (1999):

High reliability organizations (HROs) are harbingers of adaptive organizational forms for an increasingly complex environment. It is this possibility that warrants

an effort to move HROs more centrally into the mainstream of organizational theory ... HROs warrant closer attention because they embody processes of mindfulness that suppress tendencies toward inertia ... HROs are important because they provide a window on a distinct set of processes that foster effectiveness under trying conditions. (p. 82)

Therefore, both empirical findings and theoretical postulations suggest that high-reliability principles may have additional benefits for the organization beyond a reduction in accidents; this study seeks to advance the study of high-reliability out of the safety domain by examining the non-safety outcomes of high-reliability principles.

Finally, research and theorizing within the discipline of strategic management about middle managers suggests that middle managers are central actors in how organizations learn from mistakes and engage in collective sensemaking processes (Beck & Plowman, 2009). In addition, middle managers are key figures in the formulation and implementation of strategic initiatives (Wooldridge & Floyd, 1990). The present study explores specifically how the communication patterns employed by middle managers who lead teams influences social exchange outcomes among employees and the influence of such exchanges on organizationally relevant outcomes such as employee performance, perceived organizational support, and employee creativity.

Constructs of interest. Prior research has typically explored these principles and related constructs through qualitative methods (e.g., Weick & Roberts, 1993). Recently, however, researchers have created and validated survey items that directly correspond to the five high-reliability principles. Vogus and Sutcliffe's (2007) Safety Organizing Scale assesses behavioral aspects of safety culture with a conceptual foundation in the literature on high reliability. Safety culture typically describes the shared perceptions regarding the degree to which employees perceive that team managers expect, support, and reward

safety behaviors (e.g., Zohar, 1980). Central to the maintenance of such a culture are the behaviors assessed in the scale developed and validated by Vogus and Sutcliffe (2007), which provides a way to assess collective mindfulness within teams—a central construct within this study. Collective mindfulness, which is highly related to the notion of heedful interrelating (Weick & Roberts, 1993), deals with the degree to which team members share mental models regarding what is going on (sensemaking) and how much the team ascribes to the five principles of high reliability. As such, collective mindfulness describes the degree to which a team is preoccupied with failure, committed to resilience, sensitive to operations, resists oversimplification of complex issues, and harnesses the unique abilities of team members with the most expertise. Given that it is an attribute of the work group or team, collective mindfulness is a team-level variable. For the purposes of the present study, I follow the conceptualization of a “team” set forth by Cohen and Bailey (1997), and define a team as a collection of interdependent employees with shared responsibility for outcomes and who see themselves and are seen by others as intact social units. In the case of very small businesses (e.g., those with less than 10 employees), the team may be synonymous with the entire organization.

In addition to collective mindfulness, this study investigates two other team- or team-manager-level variables: team members’ perceptions of managerial communication and the team managers’ level of ambiguity tolerance. Organizational life is naturally nested within work groups, which are typically led by managers. As such, research should account for attributes of those work groups or managers regarding lower-level outcomes and relationships (Luke, 2004). Based upon organizational theories within the realms of high reliability and organizational communication, this study explores how two

of those team-level variables—team collective mindfulness and perceptions of managerial communication—influence individual perceptions of team interactions, operationalized as team-member exchange. Whereas collective mindfulness encompasses the five principles of high reliability, managerial communication and perceptions of team interaction deal with communicative and social-exchange-related aspects of behavior. This is an area distinct from but related to high reliability (McKinney, Barker, Davis, & Smith, 2005).

Given that collective mindfulness likely contributes to effective working relationships in which team members know each others' roles and responsibilities (Weick & Roberts, 1993), I expect that collective mindfulness should have a positive relationship with individual perceptions of team interaction quality. Furthermore, research on supervisory communication (e.g., McCroskey & Richmond, 2000) suggests that team managers' communication patterns influence employee behavior, making these patterns another important variable I expect to have a positive relationship with individual perceptions of team interaction quality. Finally, a third work-group or team-manager-level variable is that of the team manager's ambiguity tolerance. Recent meta-analytic findings suggest that the personality characteristic of risk propensity positively influences entrepreneurial intentions (Zhao, Seibert, & Lumpkin, 2010). Regarding one of this study's outcome variables, employee creativity, it is reasonable to expect that having a team manager who is more likely to take chances and make decisions in the face of ambiguity will positively influence employees to exhibit creativity at work, as rated by the team manager. As such, this study focuses on the construct of ambiguity tolerance, which captures both the risk-taking aspects of risk propensity and comfort with ambiguity

at the manager level. As an outcome, creativity is crucial to study because creative employees provide the organization with fuel for innovation, allowing such business organizations to sustain their competitive advantage (e.g., Amabile, 1988; Devanna & Tichy, 1990; Kanter, 1983; Shalley, 1995).

Given that the principles of high reliability have already been widely researched as they relate to safety outcomes (e.g., Vogus & Sutcliffe, 2007), and no research to date to my knowledge has focused on the effects of high reliability principles on everyday non-safety outcomes, the remaining dependent variables of interest within this study are team managers' ratings of employees' in-role and extra-role performance and employees' level of perceived organizational support. A wealth of research (for a review, see Rhoades & Eisenberger, 2002) suggests that positive working conditions will engender more positive perceptions of the organization overall and that such perceived organizational support predicts a number of organizationally relevant outcomes including employee performance and affective commitment to the organization. Furthermore, understanding the mediating role of team interaction quality between the team-level variables of collective mindfulness and managerial communication and employee performance is useful for both theoretical advancement of high-reliability and managerial communication theories.

Purpose of Present Study

To summarize, this study seeks to explore how aspects of teams and their managers influence a number of employee outcomes highly relevant to business success. This research thereby extends a number of concepts and variables outside of the realm of high reliability and occupational safety culture. In a business environment characterized

by ever-increasing ambiguity and ever-competitive landscapes within which to maintain competitive advantage, the study reported and discussed here makes a number of important contributions to the management literature, both theoretically and practically.

This study focuses on teams and their leaders, investigating specifically how collective sensemaking and aspects of managerial behavior influence individual perceptions of social exchange relationships and performance outcomes. The practical justification for such research is relatively clear. Within a dynamic business environment, team managers face new challenges—a trend that some trade literature on managing has begun to address (e.g., Collins, 2009; Heifetz, Grashow, & Linsky, 2009). At the theoretical level, this research both integrates and extends a number of distinct areas of scholarly inquiry. As such, the overarching theoretical research question that I attempt to address in this study is as follows: How does high reliability theory inform and advance the scholarly understanding of leadership, teamwork, and employee performance? At the construct level, my overarching research question is as follows: What are the relationships among the team-level variables of collective mindfulness, team manager openness, and ambiguity tolerance and the individual-level variables of perceptions of team interactions, perceived organizational support, in-role performance, extra-role performance, and employee creativity?

CHAPTER 2: LITERATURE REVIEW AND STATEMENT OF HYPOTHESES

Overview

The research reported here integrates a number of interrelated yet traditionally disparate scholarly literatures. To adequately explicate the theoretical rationale behind each of the study's hypotheses with sufficient integration, therefore, I structured this literature review to explain and support each hypothesis in turn. Figure 1 depicts the overall theoretical model that this research investigates.

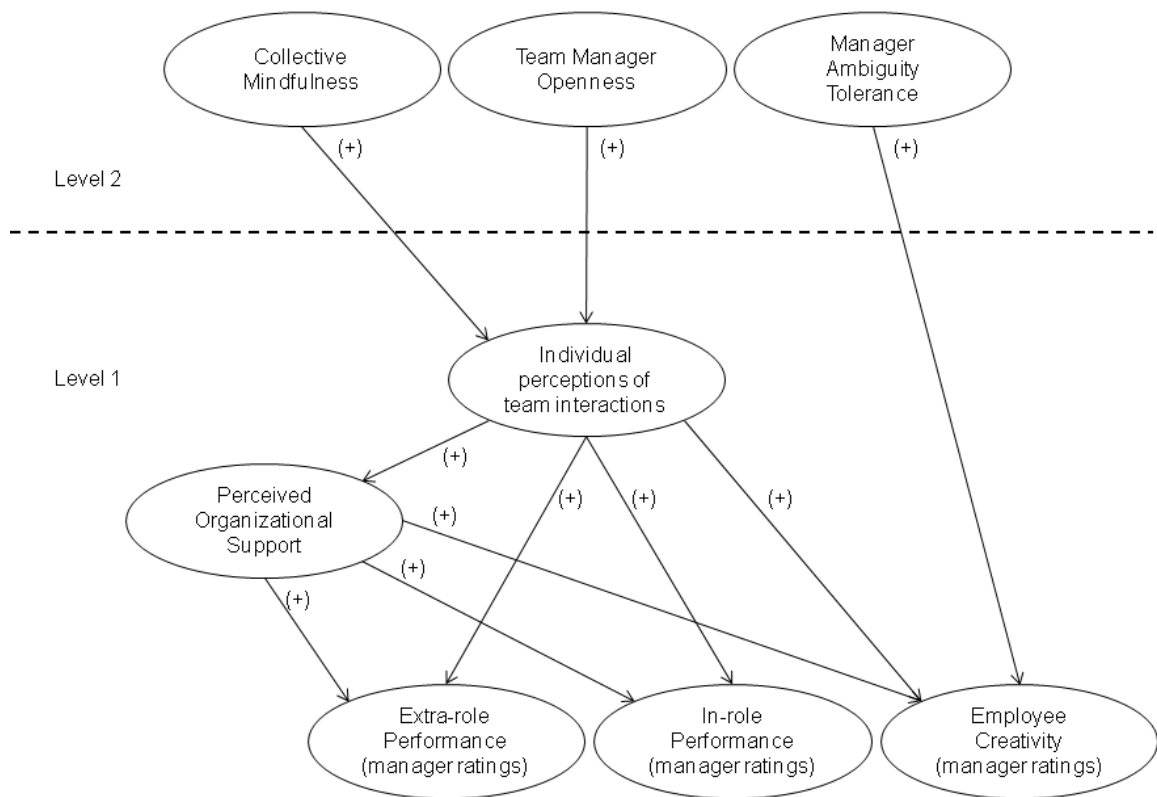


FIGURE 1: Theoretical model of hypothesized relationships.

Figure 1 displays eight distinct constructs at two levels of analysis. At the team or team-manager level of analysis are team collective mindfulness, team manager communication quality, and team manager ambiguity tolerance. Within most organizations, employees are nested within teams or work groups with a specific team manager. Attributes such as those depicted at Level 2 in Figure 1 would likely vary between work groups. At the individual level of analysis, or Level 1, are five constructs that represent individual perceptions and behavior, and thus would likely vary within groups. These constructs of interest in this study are individual perceptions of team interactions, perceived organizational support, extra-role performance, in-role performance, and employee creativity.

In the extended literature review below, I describe how current theorizing within the organizational sciences supports the relationships within Figure 1. In the course of those descriptions, I also explain how testing the relationships within Figure 1 advance theory in a meaningful way by bridging a number of conceptual gaps and extending current theories to new domains. The theoretical traditions upon which I draw primarily are high reliability theory, organizational resilience, supervisor-subordinate communication, personality characteristics related to ambiguity tolerance and creativity, organizational support theory, and literature pertaining to the nature of individual perceptions of team interactions and employee performance. At the conclusion of each section are the relevant hypotheses that this study investigates.

High Reliability Theory, Organizational Resilience, and Team Collective Mindfulness

For a number of recent decades, organizational scholars have investigated aspects of organizations and their members that enable or constrain both individual and

organizational performance in the face of adversity (e.g., Reason, 1997; Weick & Roberts, 1993). Before I describe high reliability theory and its related constructs and theories, it is important to note that some scholars have taken a structural approach toward organizational resilience or reliability, suggesting that factors such as interactive complexity and tight coupling increase the riskiness of specific industries (e.g., nuclear power) to the point that catastrophes are inevitable (Perrow, 1984, 2007). Perrow (1984) discusses these concepts through examples, implying that tight coupling refers to the existence of close relationships between one action or set of actions and another within a system, and that interactive complexity refers to an operational state in which numerous aspects of the system have the potential to interact in unintended ways, resulting in unintended consequences. This view, known as normal accident theory, takes a decidedly critical view of organizations and the potential for grave harm to society posed by organizations that deal with high-risk technologies. In due time, normal accident theory argues, all organizations with unduly high levels of interactive complexity and tight coupling will trigger or host some sort of catastrophe. Interactive complexity and tight coupling are at the center of normal accident theory as structural factors contributing to disaster.

Researchers within the organizational sciences often contrast normal accident theory with high reliability theory. High reliability theory (e.g., Weick et al., 2005; Weick & Sutcliffe, 2007) posits that specific attributes of organizational culture and patterns of communicative behavior among organizational actors create reliable organizations. In contrast to normal accident theory, high reliability theory addresses human aspects of organizations that could potentially be altered to enhance reliability. As such, high

reliability theory is an appropriate framework within which to frame this study, which extends the theory into new domains (i.e., managerial communication, leadership, employee creativity) with implications for different outcomes than are typically studied with high reliability theory (e.g., occupational safety). Below, I outline high reliability theory and discuss its connections with research and theorizing within the domains of leadership, organizational resilience and organizational culture, and sensemaking and team collective mindfulness. High reliability theory and its related concepts are central to this study; therefore, the explanation of them here is more in-depth than some of this study's other important constructs, which are simply more parsimonious theories than high reliability theory and its related frameworks.

Overview of high reliability theory. High reliability organizations are those organizations that operate using risky technologies or in dangerous environments on a continual basis but, due to a variety of social factors, suffer from drastically fewer accidents or disasters than one would expect given their typical work environment (e.g., Weick & Sutcliffe, 2007). Common examples of high reliability organizations include those producing nuclear power, the commercial aviation industry, and the military. In all three of those sectors, the potential for disaster is very high. For example, nuclear fission as a scientific process is not completely understood; its core and supporting technological systems are highly complex, and little room for error exists among numerous interrelated processes. Despite these factors, large-scale nuclear accidents have remained extraordinarily rare. Perrow (1984) argued that disasters were only a matter of time, and that the scarcity of disasters within so-called high reliability organizations is only due to

the fact that they are relatively new; namely, doom is impending. High reliability theory, however, suggests a more positive alternative.

Scholars (e.g., Weick et al. 1999; Weick & Sutcliffe, 2007) have generally accepted that five characteristics of organizations allow them to operate with high reliability despite their many chances for disaster. These five characteristics are (a) preoccupation with failure, (b) reluctance to simplify, (c) sensitivity to operations, (d) commitment to resilience, and (e) deference to expertise (Weick & Sutcliffe, 2007). In contrast to normal accident theory (Perrow, 1984), the level of analysis for these five principles of high reliability resides at the team or work-group level, making them appropriate for this study.

As described by the theory's predominant scholars (e.g., Weick & Sutcliffe, 2007), the five principles of high reliability allow teams to work together within organizations in such a way the individual team members are likely to notice small deviations from the norm and investigate them to ensure that they do not become larger deviations. The first characteristic of high reliability, preoccupation with failure, most specifically deals with this act of noticing weak signals of something going wrong. Being preoccupied with failure involves team members being on the continual watch for any signs that aspects of their environment are signaling what could be the trigger of a catastrophe. Naturally, such vigilance requires team members to be competent in their jobs and around their equipment, but it also forces them to think beyond the realm of the ordinary and hypothesize about what could go wrong in the event of unintended interactions of decisions or equipment configurations.

The second characteristic of high reliability, reluctance to simplify, suggests that managers can work toward maintaining reliability through understanding that complex problems often require multifaceted, complex solutions (Weick & Sutcliffe, 2007). To reach such types of solutions, teams must resist the tendency to accept the first plausible solutions presented, continuing to work toward better solutions that consider the complexity of the original problem. Being reluctant to simplify means that teams should continually search for solutions that preserve both the context and details of whatever triggered the problem-solving process.

Both being preoccupied with failure and being reluctant to simplify require a continual flow of information about the operational environment. To obtain such information, high reliability theory contends, managers must remain sensitive to operations, or to the front lines of their business. Hence, the third characteristic of high reliability, sensitivity to operations (Weick & Sutcliffe, 2007), deals with managers creating structures that allow employees who are likely to be best poised to notice weak signals the ability to report them and have an influence on their resolution. Rather than making decisions and relaying those decisions to their employees, managers attempting to be sensitive to operations should facilitate frequent communication with line workers or those facing customers. Examples of types of workers to whom managers should be sensitive include sales and customer service representatives, equipment technicians, and assembly-line workers. These categories of employees, due to the nature of what they encounter on a daily basis, are most likely to notice subtle signs of change that could indicate bigger problems with products or the organization itself. Therefore, managers who are sensitive to this part of the organization are more likely to receive the types of

information needed to maintain reliability than those who do not pay attention to their organizations' operational sectors. Within small organizations, top leaders need to be sensitive to operations; however, it is likely in larger organizations that middle managers are ideally suited for this purpose given their position in the organization (e.g., Beck & Plowman, 2009).

The fourth characteristic of high reliability, commitment to resilience (e.g., Weick & Sutcliffe, 2007), deals with what people within organizations do when errors, mistakes, accidents, or even disasters occur. It involves the ability to continue to push toward a more manageable state of operations and always seeking ways to keep the situation from devolving into a state of further disarray. Whereas reliability itself has to do with maintaining a consistent level of operational performance, resilience has to do with bouncing back when the unexpected occurs.

Finally, the fifth characteristic of high reliability is that of deference to expertise (e.g., Weick & Sutcliffe, 2007). Deferring to expertise involves not only involving experts in the decision-making process, but also empowering them with the authority to make decisions. For example, consider a malfunctioning electric motor within a power plant. Managers employing this principle would function mostly as facilitators, allowing the technicians and their supervisors to work on the problem and provide potential solutions. It could also involve management giving a degree of decision-making authority to their employees through the issuance of a type of standing order that directs employees to do what they see as best in the event of an emergency. This type of management philosophy naturally involves managers relinquishing some measure of their own authority, but should ultimately result in better decisions because it closely involves

technical experts in the decision-making process. As such, decisions are made by those who are most qualified.

The five principles of high reliability described above provide an introduction into high reliability theory. The theory, however, extends well beyond those characteristics to involve a number of other elements. Relevant to this study are aspects of leadership, organizational resilience, organizational culture, collective mindfulness, and sensemaking. Below, I address each of those in a way that integrates additional literature into the high-reliability domain while more specifically pertaining to the focus of this study. This is beneficial from a scholarly perspective because the literature on high reliability is (a) relatively new and (b) has dramatic implications on other theories in other fields of study.

High reliability theory and leadership. Because this study deals with team managers and team interactions, the literature on leadership is relevant. Leadership has been studied and discussed for literally thousands of years, resulting in numerous different interpretations and definitions of what leadership means and what leaders actually do to be effective. In more recent research traditions, most of the fruitful research on leadership has come from organizational psychology (e.g., Yukl, 2009). These approaches have included the great man or great woman theories, trait approaches, behavioral approaches, investigations of situational and contingency types of leadership, and many other typologies and taxonomies of leadership behavior. One of the more popular approaches toward leadership in recent years has been transformational leadership, which posits that leaders are successful if they exhibit certain behaviors toward followers: individualized consideration, intellectual stimulation, idealized

influence, and inspirational motivation (Bass, 1985; Bass & Avolio, 1994; Yukl, 1999).

While popular and empirically supported regarding team performance (Bass, Avolio, Jung, & Berson, 2003; Schaubroeck, Lam, & Cha, 2007) and other outcomes such as trust in leadership (Dirks & Ferrin, 2002), Yukl (1999) points out a variety of conceptual weaknesses associated with both transformational and charismatic leadership. These weaknesses include ambiguity about processes, behaviors, and a bias toward heroic leadership.

The heroic leadership bias of transformational leadership and the individual, leader-focused nature of other leadership research particularly within organizational psychology highlight how notions of leadership differ between stable operations and situations with high levels of ambiguity. Within most of the theories of leadership discussed above, the standard assumption is that leaders have sufficient time and sufficient information to make decisions that effectively guide the actions of followers. The fundamental differences between leadership under stable circumstances and ambiguous circumstances, such as those faced with increasing frequency by managers in today's business and organizational environment, are three-fold. Specifically, in instances of high ambiguity, leadership (a) is not constrained to one person or job title, (b) leadership must involve high levels of effective sensemaking due to the high levels of ambiguity, and (c) leadership often must occur within a limited scope of time. This notion of leadership is congruent with a more recent conceptualization of leadership as consisting of achieving direction, alignment, and commitment among followers (Drath, McCauley, Palus, Van Velsor, O'Connor, & McGuire, 2008).

My thinking about ambiguity in general has been highly influenced by Eisenberg (1984, 1986, 1990). As such, I define ambiguity as the presence of multiple plausible interpretations within a context of organizational environment. This is notably different from uncertainty, although many scholars use the terms interchangeably. Uncertainty, in contrast to ambiguity, deals with an absence of plausible interpretation, which requires more data collection—so to speak—in order to resolve.

Leadership within high levels of ambiguity, therefore, is about sensemaking (Baran & Scott, 2010; Pye, 2005). As such, leadership within crises has much in common with Weick's (1979) definition of organizing as a "consensually validated grammar for reducing equivocality by means of sensible, interlocked behaviors" (p. 3). It is not constrained to any specific member of a group or organization, and involves the behaviors and processes necessary to negotiate the recovery window, which is the time between when a threat is perceived and disaster either strikes or is averted (Edmondson, Roberto, Bohmer, Ferlins, & Feldman, 2005).

Ambiguity is a key feature of both crises and dangerous environments that require safety because both deal with unseen threats and involve a social construction of risk and safety (Rochlin, 1999). This is why the successful accomplishment of safety and crises response is a non-event (e.g., Reason, 1997). Many threats in the environment and in organizations are unseen. Reason (1997) refers to these unseen threats as "latent pathogens." Ambiguity, however, is likely to be an important characteristic of numerous business environments as well. For example, any strategic decision in a volatile market necessarily involves high levels of ambiguity. Entrepreneurs, furthermore, are likely to face extreme ambiguity as they negotiate the start-up process and attempt to gain a

foothold in the market. Therefore, the theories and processes described here are likely to have widespread business applications.

Organizational actors develop perceptions of these threats through an intersubjective process, which means that they come to understand their relationship with their ambiguous environments by means of “social construction, collective agreement, and socialization” (Simpson, 1996, p. 550). Thus, people determine what is safe or what is acceptable in the environment depending upon how they talk about hazards and how they construct their own identities (e.g., Scott & Trethewey, 2008; Haas, 1978). Further evidence of safety as a socially constructed concept comes from Finucane, Slovic, Mertz, Flynn, and Satterfield (2000) who provided quantitative evidence of between-group differences in the perception of risk. They found that white men overall perceive a wide variety of threats as less risky than people from other racial groups and women. Safety, therefore, is not an objectively determined state of operation. Rather, safety is an intersubjectively produced concept that involves interpretations of what it means to maintain successful operations within a risky, ambiguous environment.

Leading for safety, reliability, resilience, and competitive advantage. Given these close connections between ambiguity and many common business situations, I consider leadership efforts that promote safety to be highly similar to those that promote reliability, achieve resilience in the face of crises, and sustain competitive advantage despite imperfect information about the market or competitive landscape. High-reliability theory (e.g., Weick et al., 1999), while not necessarily addressing the topic of leadership directly, provides a number of ways in which organizations can understand the types of actions required in these efforts. To do this requires leaders to “use ambiguity

strategically to encourage creativity and to guard against the acceptance of one standard way of viewing organizational reality” (Eisenberg, 1984, p. 231). Furthermore, as described by Edmondson et al. (2005) leaders need to exaggerate the threat, direct problem solving, and act with little hesitation.

Finally, it is crucial that leaders find ways to encourage the reporting of errors. The under-reporting of errors (e.g., Probst, Brubaker, & Barsotti, 2008; Zhao & Olivera, 2006) is a common issue within organizations, but knowing what is going wrong and attending to the weak signals of danger is a vital part of leading for high reliability and effective crisis management (e.g., Starbuck, Greve, & Hedberg, 1978). In my reading of these diverse literatures, I have come to the conclusion that both theoretical and empirical support exists regarding the important role of organizational culture (e.g., Reason, 1997; Zohar, 1980), organizational resilience capacity (e.g., Lengnick-Hall & Beck, 2005), and collective mindfulness (e.g., Weick & Roberts, 1993) in the practical execution of the principle of high reliability.

High reliability theory, organizational resilience, and organizational culture. The concept of organizational resilience is becoming increasingly relevant within the study of management and in the practical application of managing because the global landscape is shifting dramatically toward one in which globalization, firm interconnectedness, digitization, and increased competition (e.g., Barkema et al., 2002). These forces serve as both potential sources of competitive advantage and as potential threats from competitors. As such, considering resilience as an indication of a firm’s performance may serve to inform critical stakeholders and management about the firm’s ability to sustain its competitive advantage. The literature on resilience suggests that organizational resilience

as a concept and as a construct has much in common with notions of high-reliability (e.g., Weick et al., 1999) and strategic adaptation (e.g., Chakravarthy, 1982; Meyer, 1982). It involves structural, cultural, and any number of other elements at various levels of analysis that promote flexibility, innovation, and bricolage in the face of adversity.

Organizational resilience, however, is a very broad concept that lacks a universally accepted definition within the literature. Given that a precise measure of organizational resilience has not been promulgated widely within the literature, researchers who have attempted to investigate resilience have kept their research at the theoretical level (e.g., Lengnick-Hall & Beck, 2005) or have spoken in generalities about what constitutes resilience (e.g., Coutu, 2002; Mallak, 1998). These works are highly valuable in moving toward a definition of organizational resilience, but do not shed light on specific relationships that may exist among related constructs.

Two definitions within the literature on organizational resilience assist in clarifying the construct's relationship with other related constructs and theoretical frameworks. The first is a general definition given by Sutcliffe and Vogus (2003), which states that organizational resilience is "the maintenance of positive adjustment under challenging conditions" (p. 95). This definition is sufficiently broad to cover the wide range of viewpoints that one could have regarding organizational resilience. For example, this definition would include cognitive reactions to difficult circumstances, group interactions that foster leadership in adversity, and organizational responses to macro-level environmental changes. The broad nature of this definition, however, is also its downfall. While it may be a helpful way to think about the field of research in general

(and as a way to explain it to those outside of the field), one could argue that virtually any aspect of organizational life is in some way related to organizational resilience.

Lengnick-Hall and Beck (2005) provide a related, but more nuanced, definition of resilience capacity as “A unique blend of cognitive, behavioral, and contextual properties that increases a firm’s ability to understand its current situation and to develop customized responses that reflect that understanding” (p. 750). Of note, this definition is of resilience *capacity*, not of organizational resilience overall. Given my bias toward viewing organizations in the verb form (i.e., *organizing*), I would slightly modify Lengnick-Hall and Beck’s definition to describe the process-oriented nature of maintaining organizational resilience. Thus, I suggest that organizational resilience is the blending of cognitive, behavioral, and contextual properties that facilitate productive sensemaking and bolster organizational agility. This definition specifically brings in notions of sensemaking, which is a critical component to the organizational resilience equation. I discuss sensemaking in more detail in the next section.

The definition of organizational resilience I provided above assists with researchers’ ability to assess the construct because it focuses on three properties (cognitive, behavioral, and contextual) that are pointed toward a specific end (sensemaking and organizational agility, or the ability to quickly change). While this definition is helpful, it by no means solves the measurement issues within organizational resilience as a field. Rather, it provides a way for researchers to collect more data, most likely in a qualitative manner that would ground further construction of quantitative measures. Furthermore, although this definition focuses primarily on organizational resilience at the organizational level, one could use it to focus on resilience at the

business-unit or group level. In my view, individual resilience is a combination of individual factors (e.g., Kobasa, Maddi, Puccetti, & Zola, 1985), which is relatively distinct from organizational resilience and the complex social milieu it implies.

Organizational resilience and the present study. Within the study presented here, organizational resilience serves as an important way to conceptualize aspects of high reliability and their implications. Specifically, of course, organizational resilience directly informs the understanding of one of the principles of high reliability: commitment to resilience. More broadly, however, the literature on organizational resilience suggests a macro-level approach toward change and success within volatile environments. This approach reinforces one of the primary purposes of this study, which is to show how the principles of high reliability extend beyond its traditional industries and holds promise for numerous types of business situations and outcomes other than safety.

The literature on high reliability theory and organizational resilience are both relatively silent to the specific actions of managers that can aid resilience, dealing more with principles and patterns at the group or organizational levels. One area in which both literatures overlap either explicitly or implicitly is through their treatment of organizational culture as guiding forces within organizations that structure human behavior. The notions of climate and culture as they relate to high reliability are highly interconnected and are often used interchangeably across disciplines; this occurs despite their historical differences and different methods of assessment (e.g., Reichers & Schneider, 1990). Regardless, safety culture is widely regarded as an essential way in which an organization can increase its safety or reliability (e.g., Reason, 1997; Weick &

Sutcliffe, 2007). Below, I address first some of the critical factors in developing and maintaining an organizational safety culture.

A wealth of empirical research has investigated organizational safety culture, triggered in part by Zohar's (1980) introduction of a measure of the construct (which he refers to as safety "climate"). Many studies supported Zohar's general notion that safety culture involves (a) employees' perceptions regarding management's attitudes toward safety and (b) employees' perceptions regarding the relevance of safety in general within their workplace environment. For example, DeJoy, Schaffer, Wilson, Vandenberg, & Butts (2004) found that safety policies and programs, communication, and organizational support are key determinants of safety culture. Allen, Baran, and Scott (2010) suggest that the frequency of after-action reviews positively predicts safety culture, and Hofmann and Morgeson's (1999) findings suggest that social-exchange processes such as perceived organizational support and leader-member exchange positively predict safety culture. Thus, it appears that communication and demonstration of support for the welfare of employees increases an organization's safety culture.

In addition to the studies mentioned above, the literature on flight crews provides some insight into what it takes to have a strong culture for safety among small groups and teams. For example, McKinney et al. (2005) show how communication patterns and constructive pre-crisis talk established productive patterns for interaction among a flight crew in crisis. In fact, McKinney et al. suggest that communication patterns could be considered a sixth principle of high reliability, in addition to the five suggested by Weick and Sutcliffe (2007). Additionally, Tjosvold (1990) found that cooperative goals and constructive discussion of opposing viewpoints led to an increase in safety-related

performance within a flight crew. These studies are important because they call our attention to the importance of effective, respectful interpersonal communication in the prevention of unsafe circumstances.

Additional considerations for safety culture come from Reason (1997), who posited that safety cultures are ones that involve four other types of culture. Namely, safety cultures value (a) reporting errors and potential danger, (b) justice or fairness among organizational members, (c) a flexible approach toward work and hazards, and (d) learning from mistakes. These are closely related to the five properties of high-reliability organizations discussed by Weick and Sutcliffe (2007). Furthermore, it is reasonable to hypothesize that these types of cultures have implications beyond the realm of safety or employee errors.

Measuring safety culture—or culture in general—has challenges. Despite widely used measures by Zohar (1980) and others (e.g., safety-oriented group norms, Haines et al., 2001), one of the main problems in assessing safety culture is that for workers in many occupations and industries, being “safe” is a stigmatized label. The social construction of safety is such that how people think about safety is naturally entangled in their sense of self and overall identity (e.g., Scott & Trethewey, 2008). As such people who work in dangerous occupations often must carry out their daily activities and responsibilities under the guise of confidence, as showing any fear or vulnerability may break important bonds of trust with coworkers (Haas, 1978). Coincidentally, therefore, the organizations most in need of safety assessment may be those in which survey methodology—at least as it currently stands—falls short. For a worker in the high-steel ironwork occupation, for example, to admit on a survey that conditions are unsafe may be

seen by the respondent as threatening to their identity as a competent, even “macho,” worker.

At the conceptual level, the characteristics of culture posited by Thompson and Luthans (1990) are helpful in considering research methods to assess culture. They posit that culture (a) is generic, (b) learned, (c) transmitted through interaction, (d) involves multiple reinforcements and reinforcing agents, (e) shaped by individual predispositions, (f) involves a symbolic relationship between reinforcements and targets, and (g) is difficult to change. As these characteristics point out, culture is a very complex aspect of organizational life. One promising methodology for assessing culture, therefore, would involve examining the behaviors associated with the type of culture in question. As I will argue below, Vogus and Sutcliffe’s (2007) measure of collective mindfulness is a promising way to assess the behaviors associated with the principles of high reliability theory in a way that may be less driven by social desirability and more applicable to non-safety outcomes than previously used measures.

High reliability theory, sensemaking, and collective mindfulness. When focusing on the team level of analysis, the heart of high reliability theory deals with the notions of collective mindfulness and sensemaking. The principles of high reliability discussed above serve as ways to facilitate two interrelated processes: collective mindfulness and sensemaking. In conceptualizing both collective mindfulness and sensemaking for this study, I consider both to be processes requiring continual reconstitution through social interaction. Collective mindfulness, however, is both a process and a state of existence or operational mode for teams. It is a goal, but one that must be continuously re-achieved. Below, I discuss both in more detail.

Sensemaking is the process by which people working together come to a shared understanding of what is going on in their environment. Sensemaking occurs among physicians attempting to diagnose a difficult, unusual case. Sensemaking is at work among combat soldiers negotiating uncertain hazards on the battlefield, and it transpires among homicide detectives searching for plausible explanations and suspects. It occurs among entrepreneurs seeking to define their business and exploit market opportunities and among executives deciding how to guide organizations in the face of volatile markets. What is common among these examples is a search for stability, for understanding, and for a reduction in equivocality among people who collectively face ambiguity and uncertainty. Sensemaking deals with how people resolve central questions such as, “What is going on here?,” “How do these circumstances relate to my actions?,” and “How do our actions constitute reality within continuously shifting situations?” It is about acting in a play while simultaneously writing the script, playing a game while making up the rules, and innovating valuable products and services in the face of changing economy.

At its core, sensemaking describes a process. This process occurs through *action*, as actions change the landscape upon which other actions depend. Furthermore, this process occurs through *interaction*, as organizational actors communicate with others to create plausible explanations for occurrences. Sensemaking stems from several traditions of import within organizational theory. Disciplinarily speaking, sensemaking theory draws upon theories most prominently within social psychology (e.g., Weick, 1990; Weick, 1993) and organizational communication (e.g., Eisenberg, 1984; Eisenberg, 1986). Because sensemaking helps to explain phenomena occurring in highly ambiguous

situations, much of the work on high-reliability organizations (e.g., Weick & Sutcliffe, 2007; Weick & Roberts, 1993) deals with notions related to sensemaking. Central also to sensemaking are theoretical traditions regarding the social construction of safety (Rochlin, 1999), which discusses safety as a property continually constructed and re-constructed by organizational actors. Finally, because organizations can be conceptualized as sites for identity formation, sensemaking has much to do with maintaining ontological security about identity, with numerous practical implications within crisis situations. Below, I first discuss some of the relationships among sensemaking and ambiguity, improvisation, and mindfulness within the framework of organizing. Then, I discuss sensemaking as it relates to high-reliability theory, followed by concluding thoughts about sensemaking and social identity.

Because sensemaking assumes an iterative process by which organizational actors relate and construct reality about emerging situations, sensemaking theory necessarily draws upon the common emphasis within organizational communication on *organizing* vis-à-vis the *organization*. Weick (1979) defined organizing as “a consensually validated grammar for reducing equivocality by means of sensible interlocked behaviors” (p. 3). In so doing, Weick suggests that organizing involves interpersonal communication (“consensually validated grammar”) that allows organizational actors to negotiate instances of ambiguity (“for reducing equivocality”) through interaction and structure (“by means of sensible interlocked behaviors”). Regarding the latter portion of this definition, Eisenberg (1990) proposes that such organizing (and, I suggest, sensemaking) may occur through improvisational interaction among organizational actors who relate to each other on the basis of structure and skill, rather than self-disclosure. Regarding

equivocality, sensemaking is a process through which organizational actors attempt to reduce ambiguity about their surroundings. Furthermore, sensemaking relates to improvisation because through improvisational action, people working together can co-create ideas about their environment (Weick, 1998).

Related to how scholars conceptualize organizing is how the nature of communication itself is conceptualized. Thinking about communication as solely information transfer implies bold, suspect assumptions about the nature of meaning. For example, if communication is simply the transfer of information between actors, the assumption is made that language itself can transfer thoughts and feelings, that speakers and writers insert their thoughts and feelings into words, that words themselves contain thoughts and feelings, and that listeners and readers extract the intended thoughts and feelings from words (Axley, 1984). A more sophisticated view of organizational communication, suggested by Eisenberg, Goodall, and Trethewey (2006), suggests that communication is about balancing “creativity and constraint” (p. 36). This view allows a conceptualization that considers communication as the process by which organizational actors deal with and shape their own agency while accounting for constraining organizational structures. Conceptualizing communication as this type of balancing act informs theories about sensemaking because it is through communication that sensemaking takes place.

Sensemaking theory and high-reliability theory have much in common, as high-reliability theory attends in part to the ways in which sensemaking occurs within organizations. For example, Weick and Sutcliffe (2007) suggest that organizations should value mindfulness and encourage a culture in which leadership values recognizing

deviations from normality. In this way, scholarship that has investigated high-reliability organizations provides specific examples of how sensemaking takes place and its importance for organizational survival during adversity.

In his analysis of the Mann Gulch disaster, Weick (1993) describes a particularly insightful moment in which the leader orders the firefighters to discard their firefighting tools as they attempt to escape the rapidly advancing wildfire. In this moment of crisis, an order to discard one's tools—the symbols of one's occupation—would have the potential to seriously threaten one's sense safety and identity. In a crisis situation where one already feels physically threatened and mentally confused, an identity-threatening order may seem even more disturbing because it adds to the situation's ambiguity. As suggested by Tracy, Myers, and Scott (2006), crisis situations are identity-threatening events, because they have the potential to disrupt one's sense of ontological security. In a crisis situation, extreme levels of ambiguity and danger may cause organizational actors to question who they are or their personal abilities. Because organizations are sites for identity formation (i.e., organizational actors discover and define who they are through their organizational involvement), the process of sensemaking is necessarily grounded in identity formation. Some amount of ambiguity exists regarding who we are, but at the same time identity helps us deal with environmental ambiguity. Furthermore, how we think about ourselves (our "preferred sense of self") can shape how we prefer to deal with hazards and crisis situations; in this way, identity influences our sensemaking processes. Because a major way in which we construct our identity is through defining who or that which we are *not*, identity and sensemaking occur relationally.

Like most concepts within organizational theory, sensemaking intends to explain a certain realm of phenomena and understanding that realm of constraint is important because it guides and shapes future theoretical development. As discussed by Weick (1995), sensemaking intends to explain phenomena that involve high levels of ambiguity or implausibility. Sensemaking has to do with how we cope with events that violate our expectations about what should be occurring or about ways in which events should constitute reality. For example, Weick describes how sensemaking explains the process of doctors interpreting and attaching meaning to signals of battered child syndrome. In so doing, Weick suggests that sensemaking, being a retrospective process, is an attempt by people to explain expectancy violations that have occurred in the past. Thus, sensemaking best explains phenomena that occur when situations, options, and the reality about “what is going on here” are ill-defined. In these types of situations, people attempt to construct reality through action, as suggested by Weick’s oft-mentioned phrase, “How can I know what I think till I see what I say?” (p. 12).

Weick (1995) describes seven specific properties of the sensemaking process, such that scholars can characterize sensemaking as being (a) grounded in identity construction, (b) retrospective, (c) enactive of sensible environments, (d) social, (e) ongoing, (f) focused on and by extracted cues, and (g) driven by plausibility rather than accuracy (p. 17). Additionally, Weick defines three notions that are central to the sensemaking process: enactment (e.g., Weick, 1988), selection (e.g., Daft & Weick, 1984), and retention (e.g., Weick & Sutcliffe, 2007; Weick et al., 1999). In this section, I discuss the process of sensemaking and its role in negotiating equivocality through the concepts of enactment, selection, and retention.

Sensemaking is a means for reducing equivocality, grounded in notions of self and reality. It occurs as organizational members, with their own specific identity constructions (preferred senses of self) and perceptions of an ambiguous environment, interact in the social domain as a response to a perceived violation of expected reality. The first part of sensemaking involves enactment (Weick, 1988). As Weick illustrates, enactment describes the precise moment when organizational actors behave, setting into action and legitimating plausible beliefs about one's environment. It involves both the process of behavior and a product, which Weick calls an "enacted environment" (p. 225). Enactment occurs as people observe and focus on an aberration in what they expect and then act within the constraints of that which they observed. Following enactment, the nature of the situation naturally shifts to an enacted environment, or an environment that has become manifest through an action. To illustrate with a simple example, imagine a manager learning about a new competitor that threatens the legitimacy of his or her organization's competitive advantage. She is likely to bracket or focus her environment by limiting her observations to a few key pieces of stimuli, for example, the competitor's target customers or specialized services. By discussing this new competitor with the rest of her team and other top managers, she has set in motion the process of enactment. Likewise, she has now created an enacted environment: The situation has now changed to one in which a new competitive threat exists and the business strategy may need to be re-evaluated.

Closely related to enactment is the process of selection, which pertains to organizational actors retrospectively examining an enacted environment and attempting to construct a story about what is going on and what has occurred. Those stories which

are most plausible survive; that is, they have survived selection. Daft and Weick (1984) closely relate selection to the notion of interpretation, in which organizational actors attempt to translate and apply their knowledge about the environment to reduce equivocality. An important aspect of interpretation that Daft and Weick mention, in addition to equivocality reduction, is that of assembly rules. Assembly rules refer to the structured ways in which organizations manage incoming data such that interpretation occurs. For example, in attempting to formulate a new competitive strategy, top managers will likely follow a pattern of interaction guided by previous interactions to decide upon the most plausible explanation for how their business should counter a new competitive threat. In so doing, they use assembly rules to guide their process of selection.

Finally, retention deals with how enactments and selections embed themselves within organizations, becoming part of organizational routines and maps for future enactments. For example, because the emergency responders at the scene described above enacted the environment and underwent selection in a specific manner, they are likely to retain certain portions of their sensemaking routine for future use. In this way, retention has much in common with organizational learning, and if used wisely, can help in creating organizational cultures that are poised for mindfulness and heedful interrelating.

Sensemaking and collective mindfulness. Related to sensemaking is the notion of collective mindfulness. Most simply, collective mindfulness encompasses the behaviors underlying the five principles of high reliability (Vogus & Sutcliffe, 2007). It describes the degree to which team members share an understanding of how to work together, what types of expertise their teammates have, what they should do if they notice something

that is possible awry, and know what types of threatening situations for which they should be watchful. It is a measureable characteristic of a team but requires continual maintenance to avoid complacency. In their description of operations aboard a naval aircraft carrier, Weick and Roberts (1993) suggest that behavioral processes among front-line employees are central to the organization's ability to maintain reliable, safe operations despite the high levels of risk and danger present in such an environment. As suggested by McPhee, Myers, and Trethewey (2006), achieving collective mindfulness in organizing processes likely takes place through talk—even to include mundane conversations.

Much of the research on collective mindfulness has been qualitative in nature, relying on case studies and interviews to provide evidence for its existence and influence on reliability and team interactions. As such, it does not have a well-established nomological network that situates it among other measureable constructs. It is likely, however, that performing the behaviors of collective mindfulness lead to an enhanced sense of team interaction, manifested in heightened individual perceptions of team member interaction quality.

I discuss the construct of team interactions in more detail in the next section; however, the construct deals with individual employees' perceptions regarding the quality of social interactions within their work group or team. Higher levels of collective mindfulness should lead to perceptions of higher-quality team interactions for several reasons. First, high levels of collective mindfulness are likely to facilitate easier collaboration on interdependent work due to team members knowing each others' areas of expertise. Because teams with high levels of collective mindfulness will inherently be

more preoccupied with failure, committed to resilience, sensitive to operations, and reluctant to simplify complex issues than those with lower levels of collective mindfulness, it is likely that the team members will be much more in tune with each others' roles and responsibilities. Second, teams having high levels of collective mindfulness tend to be better at harnessing the unique expertise of each team member (Weick & Sutcliffe, 2007). As such, team members are likely to perceive that what they contribute and receive from the team is of higher quality when they have higher levels of collective mindfulness. Therefore:

Hypothesis 1. Team collective mindfulness will have a positive relationship with favorable individual perceptions of team interactions.

Managerial Communication and Perceptions of Social Exchange within Teams

In addition to collective mindfulness as a team-level variable having an influence on individual perceptions of team interactions, it is likely that certain team members will have more influence upon those perceptions than others. More specifically, the managers of these teams are likely to behave in certain ways that shape individual perceptions of team-interaction quality. Communication, it has been argued, is an important component of high reliability in addition to the five traditional principles (McKinney et al., 2005). This section describes the potential influence of how team managers' communication patterns may influence such perceptions of social exchange within teams, drawing from literatures on supervisor-subordinate communication and social exchange within organizations, which includes leader-member exchange and team-member exchange.

Supervisor-subordinate communication. The ways in which team managers communicate with their employees has interested scholars for a number of decades. In

this study, I use the phrase “supervisor-subordinate communication” because it appropriately connotes the common status differentials present in organizations. A review of the literature by Jablin (1979) provides a starting place for the brief overview provided here as it relates to this study. Although this review occurred more than 30 years ago, many of its findings are relevant to this study. After discussing Jablin’s review, I discuss important developments within the relevant literature that occurred since 1979.

In defining the types of interactions that occur between people of different formal ranks within organizations, Jablin (1979) uses Katz and Kahn’s (1966) categorizations. Katz and Kahn (1966: 239-241) theorized that downward communication—from a manager to an employee, for example—can take one of five general forms: (a) job instructions, (b) job rationale, (c) organizational procedures and practices, (d) feedback about subordinate performance, and (e) indoctrination of goals. Upward communication—from an employee to his or her manager, for example—generally falls into one of four categories: (a) information about the employee himself or herself, (b) information about coworkers and their problems, (c) information about organizational practices and policies, and (d) information about what needs to be done and how it can be done (Katz & Kahn, 1966: 245). In his review, Jablin divided the research on supervisor-subordinate communication into nine topical domains. These nine categories are: (a) interaction patterns and related attitudes, (b) openness in communication, (c) upward distortion, (d) upward influence, (e) semantic-information distance, (f) effective versus ineffective superiors, (g) personal characteristics, (h) feedback, and (i) systemic variables.

Primary findings from Jablin’s (1979) review in the category of interaction patterns and related attitudes include that supervisor-subordinate interactions tend to be

task-focused, impersonal, and initiated by the supervisor. Additionally, supervisors generally perceive that they communicate with greater frequency than their subordinates report and are more likely to interact face-to-face when they are confident in their leadership abilities. Within the category of openness in communication, Jablin reported that research has investigated both supervisors' openness in sending information and in receiving information. In general, research prior to 1979 suggested that open communication relationships between supervisors and subordinates positively correlate with subordinate job satisfaction. Hinting at the potential pitfalls of focusing too much on openness in communication, however, Jablin (1979: 1204) also notes how "in an open communication relationship between superior and subordinate, both parties perceive the other interactant as a willing and receptive listener and refrain from responses that might be perceived as providing negative relational or disaffirming feedback." These findings highlight the potential tension that can exist between valuing openness in communication and providing accurate feedback to employees, especially in cases where negative feedback is both necessary and warranted.

The third category of supervisor-subordinate communication reported by Jablin (1979) was that of upward distortion, or alterations in communication from the subordinate to the supervisor. In general, research prior to 1979 suggested that upward distortion was more likely in supervisor-subordinate relationships characterized by low levels of trust, high levels of promotion aspiration by the subordinate, and factors related to organizational climate. Specifically, upward distortion is more likely in mechanistic versus organic organizational cultures (Jablin, 1979).

In reviewing research within the category of upward influence, Jablin (1979) focused primarily on the “Pelz effect,” which describes a series of findings that suggest the degree to which a supervisor has upward influence in the organization influences his or her closeness with his or her subordinates. Most notably, however, the Pelz effect suggests that the positive relationship between being an employee-centered supervisor and employee satisfaction only holds when the supervisor has a high level of upward influence in the organization. As discussed in subsequent sections, more recent methodological advances have allowed researchers to investigate quantitatively the influence of managers’ upward relationships on their subordinates (e.g., Shanock & Eisenberger, 2006; Tangirala, Green, & Ramanujam, 2007). Within the category of semantic-information distance, Jablin describes findings suggesting that supervisor-subordinate gaps between information and understanding on specific issues correlate with lower employee morale. Furthermore, supervisors tend to underestimate the magnitude of such gaps.

Relating more directly to the leadership literature, Jablin (1979) summarized findings on supervisor-subordinate communication within the area of effective versus ineffective supervisors. He found that much of the research within this domain suggests that leadership behaviors characterized as “consideration” (e.g., Stogdill, 1974) are largely communicative in nature. Research prior to 1979, however, was relatively inconclusive regarding communication patterns of effective versus ineffective supervisors, and Jablin points to the then-emerging research on vertical dyads (later to become leader-member exchange) as a promising area for future inquiry. Regarding research within the category of personal characteristics, Jablin reported various findings

having to do with personality, gender, and other characteristics but generally suggested that further research was necessary—especially research that built a theoretical foundation for such work.

The final two categories that Jablin (1979) reviewed on supervisor-subordinate communication are what he termed (a) feedback and (b) systemic variables. In the category of feedback, he found that research prior to 1979 was largely conclusive in suggesting that feedback patterns between supervisors and subordinates influences performance and satisfaction, and that performance and satisfaction likely influence feedback patterns. As such, Jablin suggested future research should investigate the reciprocal nature of these relationships and potential mediating variables. Finally, within the category of systemic variables, Jablin reported on research investigating various contextual factors such as technology, control structure, and environment on supervisor-subordinate communication. As he noted, prior to 1979, most of the research within this category was theoretical rather than empirical. Furthermore, it appears from Jablin's review that the body of research within this realm was insufficient at the time to complete a proper review.

To summarize early research on supervisor-subordinate communication, it appears relatively clear from Jablin's (1979) review that feedback is important, attitudes form in conjunction with communication patterns, and that the topic could benefit from a contextual focus that takes into consideration factors such as technology, hierarchy, and organizational culture. Although specifically studying variables such as technology and hierarchy is beyond the scope of this study, such variables are indeed important especially given recent advances in technology (e.g., Barkema et al., 2002) and changes

in the employee-organization relationship (e.g., Kalleberg, 2000). Overall, it is important to note that Jablin's review highlights a number of ways in which supervisor-subordinate communication is not simply interpersonal communication within an organizational context, but rather a much more complex topic requiring organizational scholars to build from and expand upon prior research in the area.

Recent developments regarding supervisor-subordinate communication. Since 1979, the literature on supervisor-subordinate communication has expanded in a number of directions. In particular, research has explored supervisor-subordinate relationships within the framework of leader-member exchange (e.g., Wayne, Liden, & Sparrowe, 1994) while expanding and questioning some of the points forwarded by Jablin (1979). Two points that have received noteworthy attention in expansion of Jablin's review are (a) theories about ambiguity that in some ways take issue with the often-implicit goal of openness within communication and (b) an expansion of research into the area of feedback-giving by supervisors. I review the salient points of both areas below and then provide an overview of leader-member exchange.

Prior to 1984, many organizational scholars took for granted that two fundamental goals of communication were clarity and openness, and those premises still exist today within both scholarly and practitioner circles. Eisenberg (1984), however, argued that ambiguity has a specific purpose within organizational communication and is a vital component of organizational life. Instead of clarity and openness, Eisenberg suggested, theory should treat communicators as strategists who often must negotiate conflicting goals and competing demands—frequently in ways that use ambiguity but are nonetheless effective in terms of achieving communicative goals. As such,

communication is not simply something that takes place within organizations but is rather central to the organizing process itself (Eisenberg, 1984). The three ways in which ambiguity is central to organizing, Eisenberg suggests, are through (a) promoting unified diversity, (b) facilitating organizational change, and (c) amplifying existing source attributions while preserving privileged positions.

Regarding unified diversity, Eisenberg (1984) argued that strategically ambiguous communication allows for consensus and creativity to coexist within organizations. A natural tension exists between individual freedom and organizational constraints, but by using ambiguous communication, managers are able to organize employees around a common theme while simultaneously preserving their ability to innovate and be creative. Regarding supervisor-subordinate communication, then, ambiguity is likely to be a commonly used strategic tool that allows managers to provide general goals without specifying the precise path required for goal accomplishment. Within groups, strategic ambiguity allows for organizing to take place—unifying the collective—while giving freedom for individual thought and action (Eisenberg, 1984).

As a means to facilitate change, Eisenberg (1984) argued that strategic ambiguity functions at both the organizational and interpersonal levels. At the organizational level, strategic ambiguity involves the use of metaphors and symbols used to steer the organization in a desired direction. Within interpersonal relationships, ambiguity allows for the development of such connections through the use of jargon and other communicative codes restricted to the group (Eisenberg, 1984). Ambiguity also allows for organizational members to maintain congeniality within their relationships while providing corrective feedback, for example. Without strategic ambiguity, a manager

would need to resort to brute honesty whenever providing feedback to subordinates—a tactic that would likely result in damaged egos and hostile relationships.

Finally, Eisenberg (1984) suggested that strategic ambiguity amplifies existing source attributions while preserving privileged positions. If managerial communication is too clear, Eisenberg asserts, managers put themselves at the risk of negative evaluation by those under their charge. By remaining ambiguous in their communication patterns, however, managers preserve their power by being less vulnerable and accountable for specific outcomes. Furthermore, ambiguous communication allows for a greater variety of plausible attributions regarding various facets of organizational life. This allows for a dispersion of accountability, preserving the prevailing power structures.

Viewing organizational communication through the lens of strategic ambiguity contrasts with the idea that clarity is the goal of effective communication. The other common notion about communication is that in order for it to be effective, it must be open, such as revealing the details behind decision-making processes or other types of transparency-enhancing measures. Eisenberg and Witten (1987) suggest otherwise, considering how too much of a focus on openness within supervisor-subordinate communication can be problematic. They point out, for example, how mutual self-disclosure within supervisor-subordinate interactions can backfire through complicating those relationships, adding unnecessary burdens to workplace interactions. Furthermore, such disclosure can lead to deep disagreements, which would likely have a negative influence on the quality of relationships and workplace performance. Beyond the realm of personal information, Eisenberg and Witten suggest a number of instances in which disclosure of impersonal information can be problematic within organizations. For

example, during crises providing too many details could complicate or exacerbate a threatening situation. Additionally, sharing technical information in an open way may not only violate confidentiality requirements, but it also may reduce the informal power wielded by technicians at lower levels of the organization—making them even more likely to be exploited by those with legitimate authority over them (Eisenberg & Witten, 1987).

Therefore, one way in which the literature on supervisor-subordinate communication has advanced since Jablin's (1979) review is through a more nuanced approach toward viewing supervisory relationships. Specifically, this is a view that considers the complex role of openness, disclosure, and strategic ambiguity within organizational communication (Eisenberg, 1984; Eisenberg & Witten, 1987). Additional developments come from the literature on feedback-giving (e.g., Earley, 1986), and various conceptualizations of supervisor-subordinate relationships, most notably, leader-member exchange (e.g., Gerstner & Day, 1997).

The roots of leader-member exchange are in vertical-dyad linkage theory, which specifically focused on the different relationships that form between supervisors and their employees (Uhl-Bien, 2006). In most contemporary measurement and theorizing, scholars conceptualize leader-member exchange as index of relationship quality between a supervisor and his or her subordinate. Having a high-quality relationship with one's supervisor has a number of benefits, such as improved in-role job performance (Wayne, Shore, & Liden, 1997; Howell & Hall-Merenda, 1999), creativity (Tierney, Farmer, & Graen, 1999), positive attitudes toward change (Furst & Cable, 2008), organizational citizenship behaviors (Ilies, Nahrgang, & Morgeson, 2007), and positive reactions to

performance-appraisal processes (Elicker, Levy, & Hall, 2006). Furthermore, high levels of supervisor support for employees has been linked to positive employee health and well-being outcomes such as enhanced psychological well-being (Pisarski, Lawrence, Bohle, & Brook, 2008), increased attention to safety (Mearns & Reader, 2008), and reductions in stress, turnover intentions, and work-to-family conflict (Thompson & Prottas, 2006). Low-quality supervisor-employee relationships, in contrast, may have negative outcomes including retaliatory behavior (Townsend, Phillips, & Elkins, 2000).

Leader-member exchange and team manager openness. One communicative aspect of leader-member exchange that is highly relevant to this study involves the communication environment that a supervisor creates surrounding feedback given to employees. Performance appraisals and their associated interviews or feedback sessions have been the focus of research within both organizational behavior (e.g., Earley, 1986) and communication studies (e.g., Gordon & Stewart, 2009). Within her review of leadership research as it relates to communication theory, Fairhurst (2001) describes a shift from focusing solely on feedback messages and responses to feedback environments shaped by managers. The feedback environment describes the set of perceptions surrounding the delivery of feedback from supervisors and coworkers. Of particular value and relevance to this study is an open communication environment, defined as one in which dissent is encouraged and alternative viewpoints are appreciated.

Because one major focus of this study is on aspects of managerial communication that influence individual perceptions of team interaction processes, exploring the feedback environment aspect of team managers' communication patterns appears to be particularly appropriate. As such, the type of managerial communication upon which this

study specifically focuses is the feedback environment, characterized by the degree to which team members view their team manager as being supportive of an open communication environment. Looking specifically at the outcomes of such an environment, one aspect of organizational behavior that a positive feedback environment would likely influence is that of how employees perceive team interactions. The theoretical justification for such an expectation comes largely from the literature on team-member exchange (Ford & Seers, 2006; Seers, 1989), which is an adaptation of the tenets of leader-member exchange to the work group or team.

Team-member exchange is defined as the relationship quality between an individual team member and others on his or her team (Seers, 1989; Tse, Dasborough, & Ashkanasy, 2008). Research suggests that leader-member exchange indirectly influences team-member exchange (Tse et al., 2008), and that outcomes of team-member exchange include performance-related behaviors (Love & Forret, 2008; Seers, 1989). Social exchange theory (e.g., Blau, 1964) informs the relationships between team-member exchange and its antecedents and consequences. Due to the norm of reciprocity (Gouldner, 1960), people feel obligated to reciprocate in kind upon receiving benefits from others. As such, when people perceive higher levels of team-member exchange, they are more likely to reciprocate such behavior to the team by exerting more effort and contributing more to the team.

If a team manager inculcates a positive feedback environment, it is reasonable to assume that he or she monitors and attempts to positively influence collaborative behavior among those under his or her authority. The team manager should be adept at giving feedback, managing performance, resolving interpersonal conflicts, reducing

social loafing, and other types of behavior to enhance team performance. Related to the five principles for high reliability, creating an open communication environment—one in which dissent is encouraged and alternative viewpoints are appreciated—will likely allow for a greater sensitivity to operations and deference to expertise. For those within the team, it is likely, therefore, that they will have an improved perception of team interactions when managerial communication related to feedback environment is positive.

Hypothesis 2. Team manager openness will positively influence favorable individual perceptions of team interactions.

Outcomes of Perceptions of Team Interactions: In-role Performance, Extra-role Performance, and Perceived Organizational Support

Positive perceptions of team interactions are likely to lead to a number of positive outcomes. In particular, this study focuses on in-role and extra-role performance, perceived organizational support, and employee creativity. Individual perceptions of team interactions, or team-member exchange, involve perceptions of both contributions and receipts (Ford & Seers, 2006). It describes a series of reciprocal exchanges, with team members alternating between contributing to the team and receiving rewards or benefits from it. As such it is helpful to theorize about consequences of such perceptions using a social exchange framework.

Social exchange and organizational support theory. Organizational support theory applies the basic tenets of social exchange theory (Blau, 1964) to the workplace. First introduced by Eisenberger, Huntington, Hutchison, and Sowa (1986), organizational support theory describes how employees trade their time and effort for both tangible (pay and fringe benefits) and intangible returns from the organization. Over time, employees

ascribe humanlike characteristics to the organization (Levinson, 1965) and develop global beliefs about the extent to which they perceive that their work organization values their contributions and cares about their well-being (Eisenberger et al., 1986). Due to the norm of reciprocity (Gouldner, 1960), such perceived organizational support engenders among employees a felt obligation to reciprocate to the organization.

A wealth of research has suggested that three groups of antecedents to perceived organizational support exist—job rewards and conditions, fair treatment, and supervisor support—and that perceived organizational support influences a number of outcomes relevant to both the organization and to the employee such as in-role and extra-role performance, job satisfaction, affective commitment to the organization, positive mood, and reduced withdrawal behaviors (Rhoades & Eisenberger, 2002). Perceived organizational support enjoys a complementary, mutually interdependent relationship with the notion of psychological contracts, which refer to the terms and conditions that employees perceive as governing the rewards and obligations in their employment relationship (Aselage & Eisenberger, 2003).

Several seminal empirical works have refined and clarified organizational support theory. For example, Eisenberger, Cummings, and Armeli (1997) found that the relationship between job conditions and perceived organizational support depended upon employee's perceptions of the treatment as discretionary. Highly discretionary displays of support from the organization strengthened the relationship between job conditions and perceived organizational support, but no such moderation was found for the relationship between job conditions and job satisfaction. As such, this study provided evidence

regarding the discriminant validity of perceived organizational support and job satisfaction.

Additionally, a time-lagged study by Eisenberger, Stinglhamber, Vandenberghe, Sucharski, and Rhoades (2002) found that perceived supervisor support influenced temporal changes in perceived organizational support, that perceived organizational support fully mediated the relationship between perceived supervisor support and turnover, and that the relationship between perceived supervisor support and perceived organizational support was stronger when employees viewed their supervisors as having high organizational status. Finally, Rhoades, Eisenberger, and Armeli (2001) found that perceived organizational support at time 1 influenced changes in affective commitment at time 2, suggesting that perceived organizational support leads to affective commitment and not vice versa.

The role of managers in organizational support theory. As mentioned briefly above regarding the study by Eisenberger et al. (2002), supervisors play a crucial role within organizational support theory. As postulated by the theory, supervisors serve as agents of the organization. As such, they are key vehicles through which employees form perceptions of the organization. In my view, three specific situations or circumstances are particularly relevant regarding how supervisors represent the organization. As I speculate below, these three “management moments” are: (a) in early socialization experiences, (b) in the administration of performance appraisal and feedback-giving, and (c) in meetings at work. Given that a part of this study focuses on managerial communication patterns, all three of these situations are important to consider when discussing potential outcomes of such communication. I discuss all three below; however, the scope of this study is

specifically relevant to the role of feedback-giving and performance management. This is because, in contrast to the other two situations, performance management is a supervisor-centered activity that occurs with ongoing frequency at work. Early socialization experiences and meetings, although important, are more specific and temporally situated circumstances than performance management.

Early socialization experiences. Early socialization experiences are crucial times during which the employee learns about the organization, its expectations, its reward structures, and its values. As such the employee begins to form a psychological contract very early in the employment relationship, developing ideas about the terms and conditions under which they should relate to the organization. During this time, supervisors, who often function as the hiring manager, are a key contact for the employee to go to for information and support as he or she is learning about his or her job. As such, the employee is particularly sensitive to demonstrations of fairness, support, and general goodwill from the supervisor during this time period. Additionally, a new employee has had limited exposure to the organization overall, so his or her primary referent when formulating thoughts regarding perceived organizational support is his or her direct supervisor.

Performance appraisal and feedback-giving. During the early socialization experiences, employees begin to develop expectations regarding their performance. The process of performance appraisal and other feedback-giving opportunities are key moments for supervisors to either confirm or violate the employee's psychological contract. Given the formal structural nature of most performance appraisal systems, the employee is likely to attribute expectancy violations or psychological contract breaches

to the organization overall. Therefore, supervisors must be additionally careful during performance feedback sessions because they are (a) dealing with sensitive information about performance that may impact the employee's sense of identity and self-esteem and (b) particularly salient organizational agents during this moment.

Meetings at work. A third moment in which supervisors are particularly salient agents of the organization is when they lead meetings at work. Meetings that supervisors lead—a typical staff meeting, for example—are opportunities for supervisors to function as highly visible intermediaries between the overall organization and the employees' work group or department. As such, what they say, how they say it, and the way in which they portray the organization overall is likely to have a considerable impact on the ways in which the employee views the overall organization.

Supportive management. Although it is rather intuitive, advanced research methodologies (e.g., multilevel modeling) have only recently enabled researchers to examine the nested nature of supervisors within organizations. That is, supervisors do not operate in a vacuum. They have their own supervisors, form their own perceived organizational support, and have varying degrees of control over different aspects of how they lead. Multilevel modeling is an approach that appreciates and incorporates the inherently nested nature of organizational research (Kozlowski & Klein, 2000), allowing researchers to explore research questions in ways that better match the reality of organizational life. The potential for examination of multilevel issues leaves open the possibility of new insights for organizational support theory. Three particular studies provide insight on this issue. These are Shanock and Eisenberger (2006), Erdogan and Enders (2007), and Tangirala, Green, and Ramanujam (2007).

Shanock and Eisenberger (2006) first tackled the issue of what happens when supervisors themselves feel supported by the organization. In their multilevel analysis, they found that supervisors' perceived organizational support positively predicted their subordinates' perceived supervisor support, which in turn positively influenced the subordinates' perceived organizational support and performance. While the mediational chain described above is relatively straightforward, its implications are powerful. Supervisors are "caught in the middle," so to speak, between the organization and their employees. This research suggests that supervisors who feel supported may pass on that support to those under their charge. This may occur for socioemotional reasons; for example, support from above may help supervisors' mood and they may pass that on to employees. It may also occur through the provision of resources from the organization in that they are feeling the benefits of support from the organization, which better equips them in terms of tangible resources (e.g., budgets for special projects) that may enable them to better lead their departments.

Similarly, Erdogan and Enders (2007) found that supervisors' perceived organizational support moderated the relationship between leader-member exchange and job satisfaction and between leader-member exchange and performance. Expectedly, the relationship between leader-member exchange and job satisfaction was found to be stronger when the supervisors had high levels of perceived organizational support. Curiously, the relationship between leader-member exchange and performance was only existent when the supervisor had high levels of perceived organizational support. This suggests that a supervisors' perceived organizational support may typically influence an affective type of outcome (in terms of the relationship between leader-member exchange

and job satisfaction) but that the resources that come with supervisors' perceived organizational support are so critical to employee performance that they only perform well when it is present.

Finally, Tangirala, Green, & Ramanujam (2007) explored a similar notion to supervisors' perceived organizational support with their investigation of leader-leader exchange. In essence, they found that high levels of leader-leader exchange strengthened the relationship between subordinates' leader-member exchange and their attitudes toward the organization. As such, this study supports both Shanock and Eisenberger (2006) and Erdogan and Enders (2007) by highlighting the importance of supervisors' upward relationships and perceptions of the organization regarding their ability and desire to lead others.

Finally, the construction of meaning within an organization is a topic that is widely studied within organizational communication. Not surprisingly, this area of research highlights the importance of talk as a way in which supervisors break down status barriers and construct productive norms (e.g., McKinney, Barker, Davis, & Smith, 2005). Another area of organizational communication scholarship that could add a tremendous amount of richness to the study of leadership and supervision is that of strategic ambiguity, as Eisenberg (1984) suggests that "Effective leaders use ambiguity strategically to encourage creativity and to guard against the acceptance of one standard way of viewing organizational reality" (p. 231).

To integrate conceptual frameworks from organizational communication and leadership, it is important to recognize the importance of talk and symbol use within leadership and general management functions. The reason that communication is so

important to leadership is that it sets in motion patterns of behavior and structures based upon interpretations of reality. As Eisenberg (1986) stated, “Over time, interpretations guide actions and actions shape interpretations, all within the framework of talk” (p. 28). Finally, Eisenberg highlights in his 1990 follow-up to his 1984 work the importance of identity construction within the process of organizing. Indeed, his theorizing regarding the inevitable tensions between social and individual identity in groups and between autonomy and interdependence within organizing provide a fascinating framework within which one could potentially greatly advance the study of supervision, leadership, meaning construction, and organizational support.

As such, it is reasonable to expect a number of outcomes of employees’ perceptions of team interactions, which functions in the hypothesized model as a key mediator of several relationships. Much of the theory regarding the outcomes of having positive perceptions of team interactions stem from the norm of reciprocity (Gouldner, 1960) and social exchange theory (Blau, 1964). According to such theories, people will feel obligated to reciprocate in kind when they are treated in a particular way. For example, when team managers exhibit supportive behaviors toward their employees, their employees are likely to exert more effort and perform at a higher level (e.g., Rhoades & Eisenberger, 2002). Regarding teams, perceiving high levels of team-interaction quality has been linked to a variety of performance-related outcomes including organizational citizenship behavior (Love & Forret, 2008) and production efficiency (Seers, Petty, & Cashman, 1995). As argued by Love and Forret, employee’s experiences within teams are central to how they define their occupational roles, determine expectations, and direct

their efforts. If they receive help from the team, they are then likely to reciprocate by contributing to the team (Love & Forret, 2008).

Given that teams, including the team manager, are likely to be a reflection of the overall organization for employees what happens in the team context will likely influence how team members view the organization. Employees tend to anthropomorphize their work organization, ascribing characteristics to it based upon what they perceive in the organization's agents (Levinson, 1965). Teams and team managers, being proximal reference points for organizational experiences, are likely to be perceived as agents of the organization by employees. Therefore, it follows that employees who perceive high levels of team-interaction quality will perform at higher levels and that they will have better perceptions of the organization overall. Earlier, I argued that team collective mindfulness and team manager communication quality would relate positively to individual perceptions of team interactions because team members have a better understanding of each others' expertise supported by a constructive, manager-led feedback environment. As well, perceptions of high-quality team interactions are likely to result in better in-role and extra-role performance as well as higher perceived organizational support for the reasons discussed above. Therefore, team interaction quality is likely a mechanism through which team collective mindfulness and team manager communication quality leads to positive outcomes.

Hypothesis 3a. Individual perceptions of team interactions will mediate the positive relationship between team collective mindfulness and managers' ratings of in-role performance, managers' ratings of extra-role performance, and perceived organizational support.

Hypothesis 3b. Individual perceptions of team interactions will mediate the positive relationship between manager communication quality and managers' ratings of in-role performance, managers' ratings of extra-role performance, and perceived organizational support.

Employee Creativity: An Important Outcome Predicted by Managers' Ambiguity Tolerance and Perceptions of Team Interactions

In addition to the feedback environment created by team managers, individual characteristics of team managers themselves are likely to influence employee behavior. One key objective of this study is to investigate the non-safety related outcomes of high-reliability principles and managers' behavior. Given the increasingly competitive nature of the business landscape (e.g., Barkema et al., 2002), one of the key employee-level outcomes for organizations—in addition to in-role performance—is creativity. Below, I outline specifically why creativity is important in business organizations and how a team managers' willingness to take chances in the face of ambiguity may influence the creative output of his or her employees.

The case for creativity. Organizational creativity—defined as the “creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system” (Woodman, Sawyer, & Griffin, 1993: 293)—is important at the conceptual or theoretical level because it provides insight into how organizations change, succeed, and survive (Woodman et al., 1993). Naturally, creativity at the organizational level overlaps with concepts related to creativity at the individual level and with organizational research on innovation (Woodman et al., 1993).

As such, creativity is an important topic within the organizational sciences, both in general and specifically within conditions of high competition when creative output is at a premium. Furthermore, many theorists have asserted that individual employee creativity is important for business organizations to sustain their competitive advantage (e.g., Amabile, 1988; Devanna & Tichy, 1990; Kanter, 1983; Shalley, 1995), as creative employees provide organizations with novel insights that may be applied to the business. Therefore, investigating the antecedents and consequences of employee creativity is an important topic for both theoretical and practical reasons.

Antecedents of employee creativity. Scholars from a range of academic traditions have investigated creativity in general and employee creativity in particular, with a great deal of that research focusing on the antecedents of creativity. Given the focus of this study on employee creativity within organizational contexts, the literature reviewed here is primarily from the field of management and organizational behavior. The literature on antecedents to employee creativity fall largely into three categories: factors related to the individual employee, factors related to the context or work environment, and factors related to management and supervision.

Within the realm of individual-employee-related factors, research exploring antecedents to employee creativity include employees' personal characteristics such as personality, interests, and other attributes. For example, research by Singh (1986) suggests an interaction effect between personality and biographical factors as a predictor of creativity. In terms of general antecedent conditions, Woodman et al. (1993) categorize extant research on predictors of individual creativity as involving factors related to the employee's personality, cognitive patterns, intrinsic motivation, and

knowledge. Overall, research suggest that people who are open to new experiences, curious, self-confident, capable of divergent knowledge production, intrinsically motivated, and have relevant knowledge are more likely to be creative than those who are lower on these types of factors (Woodman et al., 1993).

In addition to the individually oriented factors discussed above, Woodman et al. (1993) propose that individual creativity as a whole is best conceptualized as an interaction between such factors and situational conditions. Furthermore, reciprocal relationships likely exist among creativity at the employee, group, and organizational levels (Woodman et al., 1993). Therefore, the degree to which an employee is creative may not only depend upon who the employee is in terms of personal characteristics and background, but also upon the resources, support, and environment within which he or she is nested.

Studies conducted on employee creativity since Woodman et al.'s (1993) review replicate many of the findings included within Woodman et al.'s model while providing additional nuances to understanding individual-level variance in employee creativity. For example, subsequent research suggests that employee characteristics interact with both the complexity level of the job and supervisory style, such that employees are more likely to be creative when they have challenging, complex jobs and supervisors who managed them in a supportive manner while allowing them to have a measure of job autonomy (Oldham & Cummings, 1996). The positive influence of supportive management on employee creativity was corroborated by findings from George and Zhou (2007), whose findings suggest that three aspects of supportive supervision—trust, interactional justice,

and developmental feedback—are interrelated ways in which team managers can encourage creative behavior among employees.

In order for creativity to have meaningful implications for the organization, one could argue that it needs to have a positive relationship with job performance. Recent research (Gong, Huang, & Farh, 2009) suggests such a relationship. Furthermore, transformational leadership appears to be positively related to employee creativity (Gong et al., 2009). As such, it appears that team managers who are both supportive and exhibit characteristics of transformational leadership will be more likely to engender creativity among their employees than those who are less supportive or less transformational in their managerial styles. In addition, research suggests that team learning behavior (Hirst, Van Knippenberg, & Zhou, 2009) and employees' growth need strength (Shalley, Gilson, & Blum, 2009) positively influence reports of employee creativity. These findings add to both the contextual and individual characteristics that lead to creativity by employees.

Finally, additional research provides insight regarding the relationship between leadership styles and employee creativity. Zhang and Bartol (2010) found that empowering leadership positively influenced employee creativity through a number of intervening variables, including psychological empowerment and intrinsic motivation. Thus, it appears that leaders can—and do—influence the degree to which their employees exhibit creativity. Managers who are supportive, transformational, and empowering toward their subordinates are more likely to have creative employees—findings that support the situational or contextual nature of employee creativity. In summary, workers likely bring a number of factors to the workplace that makes them more or less likely to be creative; however, the managers who supervise them on a daily basis also have the

ability to bring such creativity out to a greater degree. Research has not, to the best of my knowledge, investigated more deeply into aspects of leaders that make them more likely to allow for creative solutions to emerge from their employees, specifically in the face of ambiguity. As such, this study seeks to investigate a specific personality characteristic of leaders that may encourage them to be more likely to entertain novel solutions, even when the consequences of such decisions are critical and the information needed to make them is scarce. Specifically, as discussed below, leaders' typical approach toward risk may have a particular influence on employee creativity.

Manager personality and creativity. One of the approaches toward studying leadership has been to explore systematic trait differences between leaders and non-leaders, and between successful leaders and unsuccessful leaders (Yukl, 2009). Although the trait approach to leadership has fallen somewhat out of popularity in recent years due to the emergence of approaches such as leader-member exchange and transformational leadership, personality traits do matter in terms of leader behavior (Judge, Bono, Ilies, & Gerhardt, 2002). In particular, Judge et al.'s (2002) meta-analysis revealed positive, moderate relationships between leadership effectiveness and the personality traits of conscientiousness ($r = .28$), extraversion ($r = .31$), and openness to experience ($r = .24$), and a negative, moderate relationship between neuroticism and leadership ($r = -.24$) from 73 samples. In the years following Judge et al.'s study, a number of other researchers have investigated aspects of leaders' personality and leadership performance.

For example, research suggests that low levels of neuroticism (or high levels of emotional stability) and high levels of education predicts centrality within social networks (Klein, Lim, Saltz, & Mayer, 2004) and that personality traits influence

perceptions of psychological contract type and sensitivity to equity within such relationships (Raja, Johns, & Ntalianis, 2004). These studies advance theory about leadership and are relevant to this study because they suggest that personality traits influence relational aspects of behavior. Furthermore, personality dimensions have been found to be predictive of transformational leadership behavior (Rubin, Munz, & Bommer, 2005), which suggests a theoretical link between the trait and transformational approaches to leadership theory and practice.

Additional nuance has been added recently to the trait approach toward leadership research. For example, the perceptions by leaders that they have the necessary capabilities to perform within their leadership roles (leadership self-efficacy), helps to explain why specific personality traits influence leader effectiveness (Ng, Ang, & Chan, 2008). Additionally, findings by Oh and Berry (2009) suggest that measuring performance through multi-rater feedback instruments bolsters the relationship between personality dimensions and managerial performance. Therefore, the trait approach toward leadership appears to be facing a re-emergence of some sort, as the studies discussed above suggest important relationships between personality traits and managerial performance.

Relating more specifically to the topic of this study are two meta-analyses that investigated the relationships between personality dimensions and entrepreneurial status (Zhao & Seibert, 2006) and between personality dimensions and entrepreneurial intentions (Zhao, Seibert, & Lumpkin, 2010). These studies are relevant to the present study because they deal with entrepreneurial situations, which are necessarily characterized by higher levels of risk and ambiguity. Other studies that investigated the

relationships between personality and leadership performance have focused on managerial performance in general, not within situations of high ambiguity and risk—where the principles of high reliability should be most relevant. As stated above, managers across all industries are likely to face increasing amounts of ambiguity in their jobs, making what used to be special cases more ordinary. Therefore, research on risk and ambiguity are likely to apply to more managerial positions today than in previous decades when slower-paced work and a dearth of technological interconnectivity made managing a more straight-forward task.

Furthermore, most research has focused exclusively on the traditional Big Five personality traits of conscientiousness, agreeableness, neuroticism, openness to experience, and extraversion. Entrepreneurs, for example, are more likely to be higher in conscientiousness and openness to experience but lower in agreeableness than traditional managers (Zhao & Seibert, 2006). Beyond the Big Five personality traits—conscientiousness, agreeableness, openness to experience, neuroticism or emotional stability, and extraversion—meta-analytic findings from Zhao et al. (2010) suggest that risk propensity, or the willingness to take chances in the face of ambiguity, predicts entrepreneurial intentions (Zhao et al., 2010).

A personality characteristic beyond the Big Five that is likely even more relevant for leaders in uncertain business contexts—entrepreneurial or not—is that of ambiguity tolerance. Ambiguity tolerance, which is sometimes referred to as tolerance of ambiguity or in the negative as ambiguity intolerance, consists of being comfortable in the face of insufficient or unclear information regarding both what is going on in the present and

what could happen in the future (McLain, 2009). Some people find such ambiguity to be highly uncomfortable, but others find it intriguing or at least tolerable.

Managers who are high in ambiguity tolerance (McLain, 2009) are likely to be far more comfortable with ambiguity in business situations. They are also likely to be more open to different interpretations of reality, relating to the principles of high reliability. Therefore, it is reasonable to expect that a personality trait such as ambiguity tolerance will not only influence how managers make decisions for themselves, but also how they interact with and lead their employees. For example, Lewin and Stephens (1994) argue that ambiguity tolerance is a personality trait that not only describes the comfort that top managers have in ambiguous contexts, but also that its presence influences top managers' decisions regarding strategy and organizational design.

Such an inference is the basis of the trait theories of leadership. Namely, relatively stable characteristics of leaders influence how they choose to influence others. Given the importance of employee creativity and the lack of research on the relationship between a leader's personality and the creativity of his or her employees, investigating how a leader's ambiguity tolerance influences employee creativity is both timely and relevant. Managers who are high in ambiguity tolerance, because of their comfort with ambiguity and taking chances, are more likely to have employees who feel free to act upon their own creativity. As such, I expect the following:

Hypothesis 4. Manager ambiguity tolerance will positively relate to employee creativity.

Additionally, levels of team-interaction quality are likely to have a positive relationship with employee creativity for a number of reasons. First, being creative may

be another way in which employees can contribute to the team. Given social exchange theory (Blau, 1964), people in teams with high-interaction quality may feel obligated to reciprocate such favorable treatment and working conditions. They may do so by offering creative suggestions or putting increased effort into innovative projects. Second, teams with high-interaction quality are likely to be ones that value its members' contributions while providing an open forum for new ideas. In these situations, team members are likely to feel more encouraged to discuss their ideas (relating to the high-reliability principle of deference to expertise) than in teams in which offering new ideas is discouraged.

Hypothesis 5a. Favorable individual perceptions of team interactions will positively relate to employee creativity.

Additionally, the relationships between favorable individual perceptions of team interactions and three of its outcomes hypothesized above—in-role performance, extra-role performance, and creativity—are likely to be mediated by perceived organizational support. It is well-substantiated in literature on organizational support theory that proximal indicators of support (e.g., supervisor support, Eisenberger, Stinglhamber, Vandenberghe, Sucharski, & Rhoades, 2002) predict higher levels of more distal indicators of support (e.g., perceived organizational support) and not vice versa. This is due largely to the notion that supervisors function as agents of the organization (Levinson, 1965). Likewise, it is reasonable to expect that perceptions of exchange quality within one's team would likely influence perceptions of the organization in which the team is embedded.

Hypothesis 5b. Perceived organizational support will mediate the relationship

between individual perceptions of team interactions and manager's ratings of in-role performance, extra-role performance, and creativity.

In conclusion, this study will provide valuable insight into the non-safety related outcomes of the principles of high-reliability, managerial communication practices, and managers' personality. The current business environment is highly dynamic and competitive, creating an even greater need for team managers to be able to deal with ambiguity and risk effectively. As such, this study will have substantial practical applications for managers and their teams. Additionally, this study influences theories of high reliability and leadership by exploring the role of specific factors on outcomes that have not been previously investigated. This study will advance theory on manager-subordinate relationships and the theorizing about high reliability by integrating these two perspectives and showing how they apply in organizations not typically studied within a high-reliability context.

CHAPTER 3: METHOD

Sample and Procedure

The participants sought in this study were small teams from a variety of for-profit businesses. This was an appropriate sample given this study's research questions for both structural and contextual reasons. For structural reasons, small teams were appropriate because I sought to explore the influence of team- or manager-level variables (collective mindfulness, team manager openness, and team manager ambiguity tolerance) on individual-level variables (e.g., employee performance and related attitudes and perceptions). For contextual reasons, it was important to include teams from for-profit businesses given the competitive pressures added by a profit motive. Such pressures likely increase the time pressure for decision making in ambiguous contexts, relating appropriately to the focus of this study. Industries represented included financial services, engineering, management consulting, software development, advertising, and business development. All teams were structured such that they had a designated team leader or manager.

Participants were recruited through a wide variety of personal contacts and local business groups. In many cases, business leaders (at my request) publicized the study to small firms they felt fit the study criteria with directions to contact the study author, who then followed up with each manager to assess whether the manager and his or her team fit the study criteria. If the team did fit the criteria, each manager was sent an Internet link to

an online survey. In that survey, the manager provided input regarding each team members' in-role performance, organizational citizenship behavior, and creativity. Additionally, the manager provided input regarding his or her own ambiguity tolerance. As part of the survey, the manager also provided e-mail addresses that could be used to contact each team member. The study author then used those e-mail addresses to send separate links to online surveys to each team member, which allowed them the opportunity to respond to other items relevant to the study's variables.

Out of the 27 managers who responded to the survey, 7 had teams that did not subsequently have at least 3 team members respond. As such, teams that provided usable data ($N = 20$) ranged in size from 4 to 7 team members (including the team manager) with a mean team size of five. As such the data include responses from 20 team managers and 80 team members. Team managers were mostly male (70%), while non-managers were relatively evenly split in terms of sex (51% female). Given that nearly all of the businesses represented in the sample were small businesses, all of the team managers held relatively senior titles (e.g., founder/CEO, owner, senior vice president, director, etc.). The participants had an average age of 40.31 years ($SD = 10.73$), had an average tenure within their company of 46.26 months ($SD = 45.83$), had an average tenure within their work groups of 36.13 months ($SD = 32.25$), and had an average tenure with their supervisor of 36.93 months ($SD = 29.69$).

To explore alternate explanations for the hypothesized findings, differences of tenure, task interdependence and team-based work, and sex were investigated by team. Teams did differ in terms of company tenure, $F(19,54) = 4.48, p < .001$; work-group tenure, $F(19,53) = 3.71, p < .001$; or supervisor, $F(19,52) = 2.51, p < .01$. There were

also significant differences with respect to sex, $F(19,53) = 2.98, p < .01$. Additional analyses, however, showed that all correlations between sex and all study variables and between all types of tenure and all study variables were small and statistically non-significant.

Teams indicated a similarly high level of interdependence and team-based work. First, all differences were statistically non-significant across the teams on responses to a single item with a 7-point response scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), which read “At work, I perform my job within a team or work group,” $M = 4.81, SD = 1.71, F(19,57) = 1.08, ns$. Therefore, all respondents in the sample appeared to work in team contexts. Second, all differences were statistically non-significant across the teams on responses to a 5-item measure of task interdependence (Van der Vegt & Janssen, 2003), which had a 7-point response scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), $M = 5.10, SD = 1.08, F(19,57) = 1.21, ns$. A sample item from this scale includes, “I need to collaborate with my colleagues to perform my job well.” As such, the data suggest that all teams had a similarly high level of task interdependence. This provides sufficient evidence to suggest that neither tenure nor task interdependence nor sex would be important omitted variables in our main analyses.

Measures

The surveys included measures of the study’s focal constructs as listed below. Appendix A lists all items and response scales for these measures within the survey.

Collective mindfulness. To assess collective mindfulness, subordinates were asked to respond to Vogus and Sutcliffe’s (2007) 9-item Safety Organizing Scale. The

item wordings were adapted to a non-nursing context, as the original scale was designed for use among nurses within hospitals. The measure uses a 7-point response scale ranging from 1 (*not at all*) to 7 (*to a very great extent*).” These nine items correspond directly to the five principles of high reliability, with each principle aligning with one or two items. For example, the item “When giving a report to coworkers regarding a new situation, we usually discuss what to look out for” pertains to the principle of preoccupation with failure and “We have a good ‘map’ of each other’s talents and skills” pertains to sensitivity to operations. Vogus and Sutcliffe (2007, p. 48) provide a full description of how each item aligns with the five principles of high reliability.

Team manager openness. To assess employee perceptions of their manager’s openness, subordinates were asked to respond to six items from Ashford, Rothbard, Piderit, and Dutton’s (1998) top-management openness scale, which was adapted from items created originally by House and Rizzo (1972). The items were adapted to focus on supervisors. The scale uses a 7-point response scale ranging from 1 (*very untrue*) to 7 (*very true*). Sample items include “My supervisor cares about my opinions” and “My supervisor is interested in my ideas and suggestions.”

Aggregation of group-level variables. This study theorizes the two constructs described above, collective mindfulness and top management communication openness, as being shared perceptions held by the work group or team. Therefore, the items focused on the appropriate analytic level (e.g., the supervisor and the team), following traditional recommendations in multilevel research (e.g., Chan, 1998; Klein, Dansereau, & Hall, 1994; Morgeson & Hofmann, 1999). Statistics of within-group agreement ($r_{wg(j)}$) with a uniform distribution for both collective mindfulness ($M = .88$) and top management

communication openness ($M = .96$) were acceptable (Bliese, 2000; Hofmann, 2002; James, Demaree, & Wolf, 1993). Additionally, intraclass correlations (ICCs) were as follows: for collective mindfulness, ICC(1) was .42 and ICC(2) was .81; for top management communication openness, ICC(1) was .65 and ICC(2) was .79. Furthermore, an analysis of variance revealed significant between-group variance for collective mindfulness, $F(19,80) = 8.48, p < .001$, and for top management communication openness, $F(19,80) = 4.48, p < .001$. These analyses suggest acceptable within-group agreement ($r_{wg(j)}$ and ICC[1]) and reliability of the mean scores (ICC[2]), following the guidelines of LeBreton and Senter (2008). As such, I aggregated scores for collective mindfulness and top management communication openness to the group level, forming single scores for each variable that were the average scores for each of the 20 groups.

Manager ambiguity tolerance. To measure manager ambiguity tolerance, managers responded to 13 survey items from McLain's (2009) Multiple Stimulus Types Ambiguity Tolerance Scale-II. With the self-reported response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), sample items include "I generally prefer novelty over familiarity" and "I try to avoid problems that don't seem to have only one 'best' solution" (reverse scored).

Perceptions of team interactions. The 12-item team-member exchange scale (Ford & Seers, 2006) assessed subordinates' individual perceptions of team interactions using a 7-point response scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Responses were collected from subordinates. Sample items include "When other members of my team are busy I often volunteer to help them out" and "When I am busy, other members of my team often volunteer to help me out."

Perceived organizational support. Subordinates responded to the six highest-loading items of the Survey of Perceived Organizational Support (Eisenberger et al., 1986) as used by Roch and Shanock (2006). The measure uses a 5-point response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items include “My work organization is willing to help me when I need a special favor” and “My work organization shows little concern for me” (reversed wording).

Extra-role performance. Scholars have assessed extra-role performance, or organizational citizenship behavior, using a number of different measures. Meta-analytic findings regarding the predictors of organizational citizenship behavior suggest that its measurement should consider organizational citizenship behavior as a latent construct of sorts, given that empirically it does not appear to have multiple dimensions or that its dimensions are very highly correlated (LePine, Erez, & Johnson, 2002). Recent research (Walumbwa, Hartnell, & Oke, 2010) appears to follow this trend when studying organizational citizenship behavior as a global concept, combining the two facets of Lee and Allen’s (2002) 16-item measure of organizational citizenship behavior to create an overall index of extra-role performance. As such, this study’s survey directed managers to rate their employees’ organizational citizenship behavior by responding to Lee and Allen’s (2002) measure. Using a 7-point response scale ranging from 1 (*never*) to 7 (*always*), managers rated each employee regarding how often each employee “engaged in the following behaviors.” Sample items include “Help others who have been absent” and “Keep up with developments in the organization.”

In-role performance. In-role performance was assessed using the four items from Eisenberger et al. (2001). Managers will provide these ratings for their employees. With a

5-point response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), sample items include “This employee meets formal performance requirements of the job” and “This employee fulfills responsibilities specified in job description.”

Employee creativity. To assess creativity of employees, supervisors rated employees according to Oldham and Cummings (1996) 3-item measure. With a 7-point response scale ranging from 1 (*not at all*) to 7 (*to a very great extent*), the items are as follows: “How ORIGINAL and PRACTICAL is this person's work? Original and practical work refers to developing ideas, methods, or products that are both totally unique and especially useful to the organization,” “How ADAPTIVE and PRACTICAL is this person's work? Adaptive and practical work refers to using existing information or materials to develop ideas, methods, or products that are useful to the organization,” and “How CREATIVE is this person's work? Creativity refers to the extent to which the employee develops ideas, methods, or products that are both original and useful to the organization.”

CHAPTER 4: ANALYSIS AND RESULTS

This study analyzed the relationships among focal variables using multilevel modeling (e.g., Luke, 2004). The study represents a nested design, with subordinates nested in work groups, each having a particular manager. Variables measured at the individual employee (subordinate) level—perceptions of team interactions, in-role performance, extra-role performance, perceived organizational support, and employee creativity—are level-one variables. Three variables—team collective mindfulness, team manager communication openness, and manager ambiguity tolerance—are level-two (team manager) variables. Thus, all level-one variables represent constructs that vary by each subordinate. All level-two variables represent constructs that vary across teams and managers, an approach that is consistent with current research (Chen, Kirkman, Kanfer, Allen, & Rosen, 2007; Wendt, Euwema, & van Emmerik, 2009). As discussed previously, team collective mindfulness and team manager communication openness are considered to be shared perceptions and were aggregated into one overall (shared) score for each work group, and manager ambiguity tolerance was reported for each team manager. As such, these three variables are likely to vary by manager or work group, while the level-one variables are likely to vary by the individual employee.

Because the rest of the data were nested within those level-two variables (e.g., by team or team manager), the remaining variables were at the individual level of analysis. Because the hypothesized relationships across levels include only main effects and no

cross-level interactions, the statistics of primary interest were those from what is referred to as the “intercepts-as-outcomes” equation within the multilevel analyses wherein the mean of the level 1 variables for each group are used as the dependent variables with level 2 variables as predictors. Finally, the mediation of the relationship between level-two variables and the outcomes by team member interactions were tested using the methods outlined by Mathieu and Taylor (2007), Zhang, Zyphur, and Preacher (2009); and Kenny, Korchmaros, and Bolger (2003); and those which represent the typical steps for testing mediation (Kenny, Kashy, & Bolger, 1998) as applicable to multilevel modeling.

Descriptive Statistics and Correlations

Table 1 displays the means, standard deviations, inter-correlations, and estimates of internal reliability for all study variables. All measures demonstrated a high level of internal reliability, ranging from .82 to .97. The means for all variables were above their respective mid-points, indicating relatively high ratings of all variables across the sample. The pattern of correlations revealed several expected relationships. These include moderately strong positive relationships between collective mindfulness and both perceived organizational support and creativity; and between manager openness and ambiguity tolerance, perceived organizational support, and creativity.

TABLE 1: Means, Standard Deviations, Reliabilities, and Inter-Correlations for Study Variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Collective mindfulness	4.86	.55	(.91)							
2. Manager openness	5.97	.36	.50 ^c	(.95)						
3. Ambiguity tolerance	5.17	.74	-.04	.29 ^b	(.82)					
4. TMX	5.27	.91	.08	-.06	-.04	(.92)				
5. POS	5.62	1.04	.29 ^b	.37 ^b	.06	.43 ^c	(.90)			
6. In-role performance	6.20	1.05	.02	-.03	-.04	-.06	.07	(.97)		
7. Extra-role performance	5.89	.88	.11	.21	.18	.18	.25 ^b	.33 ^b	(.91)	
8. Creativity	5.25	1.21	.28 ^a	.34 ^b	.21	.13	.21	.38 ^c	.67 ^c	(.92)

Note. $N = 80$. Alpha reliabilities are listed in parentheses. All correlations were computed using $N = 80$; thus, this table displays scores for collective mindfulness, manager openness, and ambiguity tolerance ($N = 20$) that were assigned to each of the individual employees within each manager's team. POS = perceived organizational support; TMX = team-member exchange, measuring individual perceptions of team interactions. ^a $p < .05$, ^b $p < .01$, ^c $p < .001$.

Relationships of Group-Level Variables with POS and Performance

Given the multilevel structure of these data, I used HLM (Version 6.0.8; Raudenbush, Bryk, Cheong, & Congdon, 2005) to analyze the relationships between the study's group-level variables—collective mindfulness, team manager openness, and the team manager's ambiguity tolerance—and the study's individual-level outcomes—in-role and extra-role performance, creativity, and perceived organizational support. Additionally, I sought to analyze the mediating role of individual perceptions of team interactions between the group-level predictors and individual-level outcomes listed above.

The HLM models used to test the study's hypotheses are listed in Table 2.

Consistent with prior multilevel research (e.g., Hofmann, Morgeson, & Gerrass, 2003; Shanock & Eisenberger, 2006), I followed Baron and Kenny's (1986) recommendations for testing mediation as adapted to a multilevel model. The first step was to test the relationship of collective mindfulness and team manager openness with the proposed mediator, individual perceptions of team interactions.

To begin, however, this study hypothesized four outcome variables—in-role performance, extra-role performance, creativity, and perceived organizational support—which are included in the models testing the remaining hypotheses. Prior to conducting these analyses, I evaluated whether enough between-group variance existed in the data for these four outcomes. Only outcomes with sufficient variance available to explain would then be included in the subsequent analyses. This step, repeated for each outcome variable, involves calculating interclass correlation coefficients (ICC[1]) for the null model with no predictors to assess the amount of between-group variance. The ICC(1) values = .00, .00, .23, and .11 for perceived organizational support, in-role performance, extra-role performance, and creativity, respectively. The variance component was significant for extra-role performance ($p < .01$). The variance component was statistically non-significant for creativity ($p = .06$), but I chose to include it in my subsequent analyses given that it was near the traditional $p < .05$ cutoff point. Therefore, extra-role performance and creativity both explained enough variance (23% and 11%, respectively) in the model that could potentially be explained by between-groups factors to warrant continued analyses. As such, the next models tested exclude perceived organizational support and in-role performance as outcome variables and focus on the outcomes of

extra-role performance and creativity. Level 1 predictors were grand-mean centered within their respective models.

As displayed in Table 2, Model 1 showed statistically non-significant relationships between both collective mindfulness and team manager openness and individual perceptions of team interactions, as indicated by parameters γ_{01} and γ_{02} , respectively. Hypotheses 1 and 2, therefore, were not supported. As such, there was a lack of support for Hypotheses 3a and 3b because they depended in part upon Hypotheses 1 and 2. This is because Hypotheses 3a and 3b proposed individual perceptions of team interactions as a mediating variable, which would require significant relationships between the predictors and the mediator (i.e., support of Hypotheses 1 and 2). Furthermore, statistically non-significant parameters γ_{01} and γ_{02} in Model 2 suggest that neither collective mindfulness nor team manager openness predicted extra-role performance with individual perceptions of team interactions included in the model. This is further lack of support for Hypothesis 3a. In Model 3, parameter γ_{01} was statistically non-significant, suggesting a lack of a relationship between collective mindfulness and creativity with individual perceptions of team interactions included in the model. Model 3 does show a significant relationship between team manager openness and creativity with individual perceptions included in the model, $\gamma_{02} = .96, p < .05$. As such, Hypothesis 3b was not supported.

Hypothesis 4 was not supported at the $p < .05$ level, as indicated by the statistically non-significant parameter γ_{01} in Model 4. Regarding Hypothesis 5a, the statistically non-significant γ_{10} parameter in Model 3 suggests that individual perceptions

of team interactions do not significantly predict employee creativity. Finally, Hypotheses 5b proposed that perceived organizational support may function as level-one mediator between individual perceptions of team interactions and the study outcomes. All of the coefficients in Model 5 or Model 6, however, were statistically non-significant. As such, neither Hypothesis 5a nor 5b was supported.

Although none of the hypotheses were supported, supplemental analyses provide some support for the concepts these hypotheses embody. A discussion of these analyses, including results from additional Models 7 through 13 in Table 2, follows in the discussion section. Figure 2 displays the coefficients for each hypothesized relationship.

TABLE 2. Hierarchical Linear Models and Results

Model	Coefficient					Variance component		
	γ_{00}	γ_{01}	γ_{02}	γ_{10}	γ_{20}	σ^2	τ_{00}	τ_{11} τ_{22}
Model 1 (Hypotheses 1 and 2): Relationship of CM and TMO with TMX								
L1: $\text{TMX}_{ij} = \beta_{0j} + r_{ij}$								
L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CM}_j) + \gamma_{02}(\text{TMO}_j) + U_0$	6.19 ^b	0.23	-.33			.81	.00	
Model 2 (Hypothesis 3a): Mediation of CM and TMO to EXP relationships by TMX								
L1: $\text{EXP}_{ij} = \beta_{0j} + \beta_{1j}(\text{TMX}_{ij}) + r_{ij}$								
L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CM}_j) + \gamma_{02}(\text{TMO}_j) + U_0$	2.85	-.14	.62			.56	.18 ^b	
L2: $\beta_{1j} = \gamma_{10} + U_{1j}$.20				.00
Model 3 (Hypotheses 3b and 5a): Mediation of CM and TMO to CRE relationships by TMX								
L1: $\text{CRE}_{ij} = \beta_{0j} + \beta_{1j}(\text{TMX}_{ij}) + r_{ij}$								
L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CM}_j) + \gamma_{02}(\text{TMO}_j) + U_0$	-1.94	.30	.96 ^a			1.23	.03	
L2: $\beta_{1j} = \gamma_{10} + U_{1j}$.17				.06
Model 4 (Hypothesis 4): Relationship of AMBTOL with CRE								
L1: $\text{CRE}_{ij} = \beta_{0j} + r_{ij}$								
L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{AMBTOL}_j) + U_0$	3.36 ^b	.37				1.30	.15	

TABLE 2 (continued)

Model	Coefficient					Variance component			
	γ_{00}	γ_{01}	γ_{02}	γ_{10}	γ_{20}	σ^2	τ_{00}	τ_{11}	τ_{22}
Model 5 (Hypothesis 5b): Relationship of CM and TMO to EXP mediated by both TMX and POS									
L1: $\text{EXP}_{ij} = \beta_{0j} + \beta_{1j}(\text{TMX}_{ij}) + \beta_{2j}(\text{POS}_{ij}) + r_{ij}$									
L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CM}_j) + \gamma_{02}(\text{TMO}_j) + U_0$	4.30	-.23	.45			.50	.23 ^b		
L2: $\beta_{1j} = \gamma_{10} + U_{1j}$.12				.03	
L2: $\beta_{2j} = \gamma_{20} + U_{2j}$.15				.06
Model 6 (Hypothesis 5b): Relationship of CM and TMO to CRE mediated by both TMX and POS									
L1: $\text{CRE}_{ij} = \beta_{0j} + \beta_{1j}(\text{TMX}_{ij}) + \beta_{2j}(\text{POS}_{ij}) + r_{ij}$									
L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CM}_j) + \gamma_{02}(\text{TMO}_j) + U_0$	-2.13	.30	.99			1.13	.10		
L2: $\beta_{1j} = \gamma_{10} + U_{1j}$.18				.01	
L2: $\beta_{2j} = \gamma_{20} + U_{2j}$					-.02				.08
Model 7*: Relationship between TMX and CRE									
L1: $\text{CRE}_{ij} = \beta_{0j} + \beta_{1j}(\text{TMX}_{ij}) + r_{ij}$									
L2: $\beta_{0j} = \gamma_{00} + U_0$	5.24 ^c					1.30	.16 ^a		
L2: $\beta_{1j} = \gamma_{10} + U_1$.16				.02	
Model 8*: Relationship between TMX and EXP									
L1: $\text{EXP}_{ij} = \beta_{0j} + \beta_{1j}(\text{TMX}_{ij}) + r_{ij}$									
L2: $\beta_{0j} = \gamma_{00} + U_0$	5.87 ^c					.75	.44 ^b		
L2: $\beta_{1j} = \gamma_{10} + U_1$.19				.00	
Model 9*: Relationship between TMX and POS									
L1: $\text{POS}_{ij} = \beta_{0j} + \beta_{1j}(\text{TMX}_{ij}) + r_{ij}$									
L2: $\beta_{0j} = \gamma_{00} + U_0$	5.60 ^c					.72	.10		
L2: $\beta_{1j} = \gamma_{10} + U_1$.53 ^b				.05	

TABLE 2 (continued)

Model	Coefficient					Variance component		
	γ_{00}	γ_{01}	γ_{02}	γ_{10}	γ_{20}	σ^2	τ_{00}	τ_{11} τ_{22}
Model 10*: Relationship between POS and CRE								
L1: CRE _{ij} = $\beta_{0j} + \beta_{1j}(\text{POS}_{ij}) + r_{ij}$								
L2: $\beta_{0j} = \gamma_{00} + U_0$	5.22 ^c					1.27	.10	
L2: $\beta_{1j} = \gamma_{10} + U_1$.23				.08
Model 11*: Relationship between POS and EXP								
L1: EXP _{ij} = $\beta_{0j} + \beta_{1j}(\text{POS}_{ij}) + r_{ij}$								
L2: $\beta_{0j} = \gamma_{00} + U_0$	5.87 ^c					.53	.21 ^b	
L2: $\beta_{1j} = \gamma_{10} + U_1$.21 ^a				.01
Model 12*: Relationship of CM and TMO with EXP								
L1: EXP _{ij} = $\beta_{0j} + r_{ij}$								
L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CM}_j) + \gamma_{02}(\text{TMO}_j) + U_0$	2.89	-.03	.52			.59	.18 ^b	
Model 13*: Relationship of CM and TMO with CRE								
L1: CRE _{ij} = $\beta_{0j} + r_{ij}$								
L2: $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{CM}_j) + \gamma_{02}(\text{TMO}_j) + U_0$	-1.74	.34	.89 ^a			1.31	.00	

Note. For Level 2, $N = 20$; for Level 1, $N = 80$. TMX = individual perceptions of team interactions (operationalized as team-member exchange); CM = collective mindfulness; TMO = team manager openness; AMBTOL = ambiguity tolerance; POS = perceived organizational support; EXP = extra-role performance; INP = in-role performance; CRE = creativity. γ_{00} = intercept of the Level 2 regression predicting β_{0j} ; γ_{01} = slope of Level 2 regression predicting β_{0j} ; γ_{02} = slope of Level 2 regression predicting β_{0j} ; γ_{03} = slope of Level 2 regression predicting β_{0j} ; γ_{10} = Intercept of Level 2 regression predicting β_{1j} (pooled Level 1 slopes); γ_{20} = Intercept of Level 2 regression predicting β_{1j} (pooled Level 1 slopes); σ^2 = Variance in Level 1 residual (i.e., variance in r_{ij}); τ_{00} = Variance in Level 2 residual for models predicting β_{0j} (i.e., variance in U_0); τ_{11} = Variance in Level 2 residual for models predicting β_{1j} (i.e., variance in U_1); τ_{22} = Variance in Level 2 residual for models predicting β_{2j} (i.e., variance in U_2). ^a $p < .05$, ^b $p < .01$, ^c $p < .001$. The significance test for variance components uses a chi-square distribution. * indicates supplemental analyses.

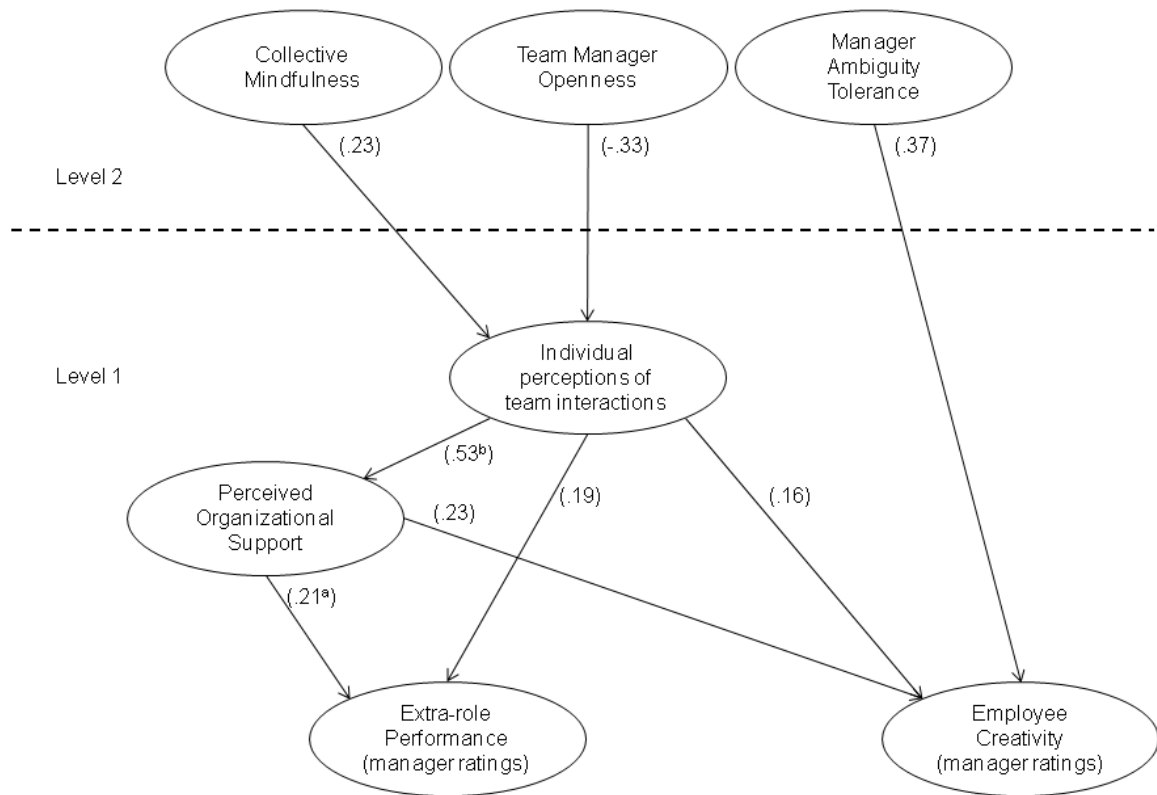


FIGURE 2: Model of results.

Note. ^a $p < .05$, ^b $p < .01$.

CHAPTER 5: DISCUSSION

This study sought to provide insight regarding a timely topic with both scholarly and practical relevance. Namely, I investigated how the concepts from high reliability theory might be applied within mainstream management situations and how those high reliability principles relate to non-safety-related outcomes such as in-role performance, extra-role performance, and creativity at the individual-employee level. This topic is timely given the changing nature of the world of work and the associated increasingly ambiguous nature of business decisions (Barkema et al., 2002; Burke & Ng, 2006).

Building upon the principles of high reliability (Weick & Sutcliffe, 2007), research on leadership and sensemaking (e.g., Baran & Scott, 2010; Pye, 2005); team and supervisor-subordinate communication (e.g., Jablin, 1979; McKinney et al., 2005); organizational support theory (Rhoades & Eisenberger, 2002), and related theoretical frameworks, I proposed and tested a series of hypotheses using data from 100 employees (80 team members and 20 team managers) within 20 teams. Specifically, I proposed a multilevel model with positive relationships between three team-level variables—collective mindfulness, team manager openness, and team manager ambiguity tolerance—and five individual-level variables—individual perceptions of team interactions, perceived organizational support, in-role performance, extra-role performance, and creativity. Although the data did not support the hypotheses, some

preliminary evidence for the model did emerge. Below, I discuss those elements that support the model based on supplemental analyses.

A number of coefficients reported in Table 2 were in the direction specified in the model and of moderate magnitude (e.g., equal to or greater than .15, Cohen, 1992), but failed to meet the conventional $p < .05$ threshold. One potential reason for this is the study's relatively small sample, which could have increased the possibility of a Type II error (e.g., Scherbaum & Ferreter, 2009). Numerous scholars have discussed the issue of statistical power as it pertains to multilevel models (e.g., Hofmann, 1997; Scherbaum & Ferreter, 2009). One general conclusion is that increasing the number of level 2 units is more beneficial for statistical power than increasing the number of observations within each unit (level 1). Another common suggestion is to seek 30 groups with 30 observations within each (Hofmann, 1997). Given that I specifically sought to study small teams, having 30 members in each team was unrealistic and would have been contrary to what I was attempting to study. As such, I sought a similar sample to that used by Hofmann, Morgeson, and Gerrass (2003). In that study, the data came from 25 teams (94 individuals), or on average between 3 and 4 members per team.

Therefore, it is worth examining a number of this study's statistics in more detail. First, in Model 2, the coefficient $\gamma_{10} = .20$, $p = .06$, indicating a positive relationship between favorable individual perceptions of team interactions on extra-role performance that was just outside the conventional cutoff for statistical significance. Two other coefficients were statistically non-significant yet were of notable magnitude: in Model 4, the coefficient $\gamma_{01} = .37$, $p = .10$, indicating a positive relationship between team manager

ambiguity tolerance on creativity; and, in Model 6, the coefficient $\gamma_{02} = .99, p = .05$, indicating a positive relationship between team manager openness and creativity.

Additionally, I conducted a number of supplemental analyses shown in Models 7 through 13. In these models, I focused primarily on direct relationships between focal antecedents and outcomes. In Models 7 and 8, I tested the relationships between individual perceptions of team interactions and creativity and extra-role performance, respectively. Both models failed to produce significant results, however, in Model 8, the coefficient $\gamma_{10} = .19, p = .07$, indicated a positive relationship between favorable individual perceptions of team interactions and extra-role performance just outside of the $p < .05$ threshold. Model 9 revealed a strong, positive relationship between individual perceptions of team interactions and perceived organizational support, $\gamma_{10} = .53, p < .01$.

In Models 10 and 11, I investigated the relationships between perceived organizational support and both creativity and extra-role performance, respectively. Model 11 revealed a positive direct relationship between perceived organizational support and extra-role performance, $\gamma_{10} = .21, p < .05$. Model 10, however, revealed a statistically non-significant coefficient $\gamma_{10} = .23, p = .13$. Although statistically non-significant, the magnitude of this coefficient suggests that a larger sample may have yielded significant results regarding the relationship between perceived organizational support and creativity.

I conducted two final analyses to test the direct relationships among the team-level variables of collective mindfulness and team manager openness and the individual-level variables of creativity and extra-role performance. These multilevel models are listed in Table 2 as Model 12 and Model 13; the model with its resultant coefficients is

displayed in Figure 3. As displayed, the most prominent result is the coefficient $\gamma_{02} = .89$, $p < .05$, indicating a significant relationship between team manager openness and employee creativity. Although statistically non-significant, the magnitude of the relationship between collective mindfulness and creativity is noteworthy, $\gamma_{02} = .34$. As such, it does appear that creativity—a highly valuable individual-level outcome in business organizations—may have the potential to be influenced by the openness of team managers' communication and potentially by the collective mindfulness experienced within the team and by the ambiguity tolerance of its manager.

Given the direct relationship depicted in Figure 3 between team manager openness and creativity, it is possible that individual perceptions of team interactions was not an essential part of this study's theoretical model. As operationalized using Ford and Seers' (2006) team-member exchange measure, the construct has much in common with extra-role performance for any team member. That is, the measure's items pertain either to what team members contribute or to what they receive from the team. As such, the construct most likely does not add considerable explanatory power or theoretical clarity to the study's area of investigation. Future research should investigate the potential role of other variables as mediating the relationships between both collective mindfulness and team manager openness and performance outcomes. In particular, the construct of organizational identification (Mael & Ashforth, 1992) may hold particular promise. Teams that embody high levels of collective mindfulness are likely to have strong cultural norms around the principles of high reliability (Weick & Sutcliffe, 2007), which likely would lead to these teams having higher levels of identification with the work group or organization. Such identification, then, should encourage increased effort by

employees given that they see their own success as closely intertwined with that of the work group.

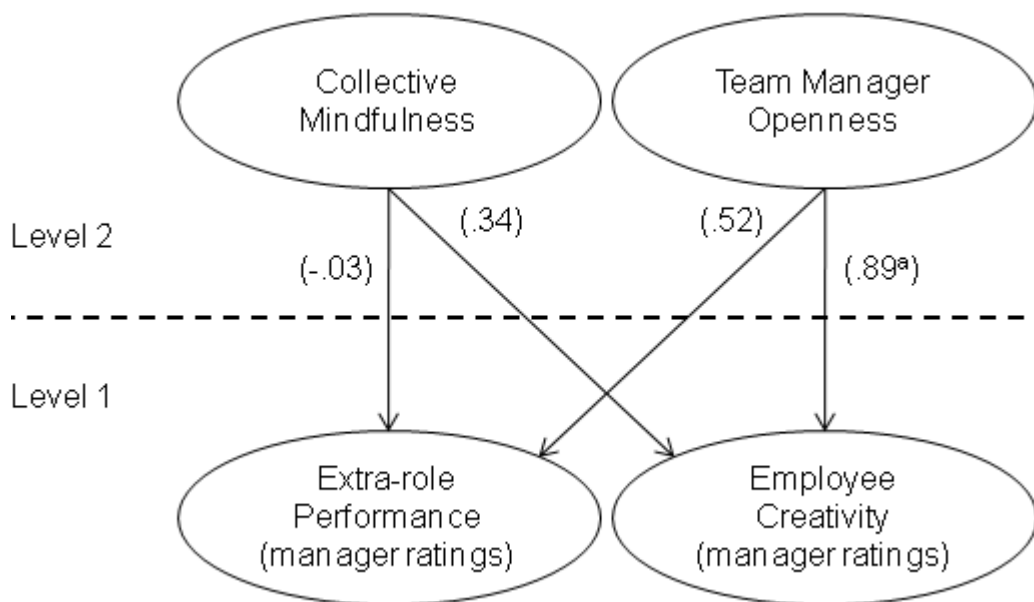


FIGURE 3: Model of Results for Supplemental Analyses of Relationships among Collective Mindfulness, Team Manager Openness, and Study Outcomes.

Note. ^a $p < .05$.

Theoretical Implications

Despite the lack of direct support for this study's hypotheses, a number of findings show considerable promise for advancing the theoretical development of high reliability and team leadership theories. First, the magnitude of the relationships in the predicted direction provide preliminary evidence regarding the extension of the principles of high reliability theory to mainstream managerial situations. Second, the data suggest potential relationships among three team-level variables—collective mindfulness, team manager openness, and team manager ambiguity tolerance—and the individual employee outcome of creativity. I discuss the relevant implications of these findings below.

Research on high reliability organizing and high reliability theory has long had the goal of applying the principles that engender reliable performance within a subset of organizational types to mainstream management (Weick et al., 1999). Despite this goal, most research attempting to further explicate high reliability theory has occurred within so-called high reliability organizations (e.g., naval aircraft carriers, Weick & Roberts, 1993). One could argue that high reliability organizations are outliers. For instance, they typically deal with highly risky technologies or hazards (e.g., nuclear power, Perrow, 1984) and often have strong, unique organizational cultures (e.g., the fire service, Scott & Trethewey, 2008). The principles of high reliability, however, should have broader applicability and allow managers across organizational types to manage the unexpected (Weick & Sutcliffe, 2007).

This study investigated how these principles might apply in small businesses. In particular, the construct of collective mindfulness encompasses the five principles of high reliability as outlined by Weick and Sutcliffe (2007): preoccupation with failure, commitment to resilience, resistance to oversimplification, sensitivity to operations, and deference to expertise. Related to these principles are the two other team-level predictors investigated in this study: team manager openness and team manager ambiguity tolerance. Both of these other constructs relate to the principles of high reliability in that an open communication environment must exist for idea generation in ambiguous contexts (e.g., McKinney et al., 2005) and organizing ambiguity is a key feature of leadership in ambiguous situations (Baran & Scott, 2010).

The additional multilevel analyses discussed above suggest that team manager openness matters for employee creativity. That is, team managers who were rated as

encouraging a higher degree of open communication tended to have employees who were rated as more creative than managers who were rated as having a lower degree of open communication. Additionally, two inter-correlations listed in Table 1 are noteworthy. First, a significant relationship emerged between collective mindfulness and creativity, $r = .28, p < .01$. Second, the relationship between ambiguity tolerance and creativity, while statistically non-significant, $r = .21, p = .07$, would likely be significant with a slightly larger sample size. As such, this finding warrants future investigation. Regarding relationships among the three predictors, the data suggest moderately positive relationships between collective mindfulness and team manager openness and between team manager openness and ambiguity tolerance.

What these findings suggest for high reliability theory and related theories is twofold. First, they suggest that in addition to the principles of high reliability represented by the construct of collective mindfulness, the constructs of team manager openness and manager ambiguity tolerance should be examined further with regard to employee outcomes. Namely, team manager openness and manager ambiguity tolerance may be important constructs that have been excluded from high reliability theorizing given the prevalence of Weick and Sutcliffe's (2007) five high reliability principles at the exclusion of the role of middle managers as crucial actors in the sensemaking process. These findings suggest broadening high reliability theory to include these other variables. Second, these findings suggest that creativity—a non-safety-related outcome—may be an important individual-level outcome of practices related to high reliability.

These findings also accomplish the novel goal of extending high reliability research to more mainstream business situations. The teams involved in this study were

small businesses, not organizations scholars would typically characterize as high reliability organizations. Despite not fitting the broad criteria of being a high reliability organization (such as dealing with high levels of physical danger and risky technology), this study provides preliminary evidence regarding how the principles that allow high reliability organizations to have less than their fair share of accidents may allow small businesses to have more creative employees. This contribution to the literature and theory is noteworthy.

Furthermore, these findings highlight how the environments faced by many small business owners and their teams contain features that make the principles of high reliability relevant to the way they operate. Specifically, the principles of high reliability should apply most to situations in which a high degree of ambiguity exists (Weick et al., 1999; Weick & Sutcliffe, 2007). Namely, managers and employees within small businesses likely face a high degree of ambiguity in their work and are most effective in making sense of that ambiguity when they engage in the behaviors characteristic of collective mindfulness. If the teams investigated in this study did not face high levels of ambiguity in their work, it is unlikely that the principles of high reliability would apply to them as much as it appears they did apply.

Such inferences about the current business environment complement what many scholars have suggested about managing organizations in the twenty-first century. That is, competition is increasing while technological advancements are creating both new opportunities and new competitive threats for business organizations (e.g., Barkema et al., 2002). The business case for creativity, as discussed previously, is one that involves individual-level creativity being vital for firm innovation, survival, and competitive

advantage. This study provides useful insight into some of the group- or supervisor-level antecedents of such creativity.

Additionally, this study is important for the development of high reliability theory. In particular, high reliability theory does not clearly define the individual-level mechanisms through which its principles influence effective sensemaking. Given the relationships found in this study, it appears that employee creativity may be one of those mechanisms. This is consistent with Weick's (1993) observation that in ambiguous situations "The collapse of role systems need not result in disaster if people develop skills in improvisation and bricolage" (p. 639). That is, if team members are creative, they are more likely to sense weak signals of danger and produce novel solutions to unexpected problems.

Creativity, furthermore, may be a theoretical link between the types of sensemaking that occurs in highly dangerous work characteristic of high reliability organizations and the sensemaking needed in ambiguous business contexts. That is, both types of situations—dangerous crises and ambiguous business situations—require creativity for teams within both situations to make effective decisions and succeed. Future research should continue to investigate the role of creativity in sensemaking as a way to further advance high reliability theory.

An additional consideration raised by this study regarding high reliability theory is the role of team managers, leaders, or supervisors. Most research on high reliability organizations (e.g., Weick & Sutcliffe, 2007) privileges the role of organizational culture and team-member interaction. Although such elements are crucial to consider in any discussion of sensemaking in organizations, the role of leadership in sensemaking has

been less discussed by organizational scholars. This study provides preliminary evidence to suggest that leaders or supervisors play an important part in the sensemaking process. For example, the relationship found between team manager openness and employee creativity suggests that leaders who welcome divergent thinking among their employees are more likely to encourage creativity than those who do not. Congruent with Baran and Scott (2010), leaders in many ways frame the ambiguity present in the environment and initiate the social process of organizing ambiguity. As such, future research should look at how mainstream leadership theories such as leader-member exchange and transformational leadership inform our understanding of the sensemaking process and vice versa.

Finally, one potential reason for the null findings described here could be that the study's quantitative approach fails to adequately capture the complexity of sensemaking, ambiguity reduction, and leadership in small businesses. Therefore, future research could investigate this study's constructs qualitatively. For example, such qualitative research could include interviews with employees and managers, observation of business meetings, and analysis of written documents such as business plans. Using this type of approach could better inform a quantitative study that could then follow a procedure similar to the one reported here.

Practical Implications

For managers, the findings of this study have a number of practical implications. Given that the study's significant findings centered primarily on the outcome of creativity, these implications are particularly relevant for managers within businesses that need creative performance by their employees to remain competitive. Some businesses

may not want or need high levels of creativity from their employees, but those who do—specifically small firms attempting to achieve high levels of growth through innovation—should find this study to be relevant.

Focusing, then, on the outcome of creativity, the construct of most relevance for practical purposes is that of team manager openness. Managers who solicit input, even bad news, from their employees appear to be encouraging a higher level of creativity. Team manager openness also involves showing interest in and appreciation for novel insights from employees. As such, exhibiting the characteristics of team manager openness appears to be an important quality that managers who want their employees to be creative should embrace.

Prior research on creativity has suggested a few leadership-related variables related to creativity such as trust, interactional justice, and developmental feedback (George & Zhou, 2007) and empowering leadership styles that encourage psychological empowerment of employees (Zhang & Bartol, 2010). The present study adds to these findings by suggesting specific aspects of the feedback environment created by managers that influences creativity. This suggests a particular way in which managers could be trained on how they could better encourage the creation and disclosure of novel solutions by employees. Specifically, managers could hold one-on-one and group meetings with their employees in which they could solicit ideas and gain employees' insight on ways to improve processes or solve strategic issues.

Additionally, training and ongoing evaluation within the area of collective mindfulness may be a way for managers to evaluate an aspect of their team's health and readiness for managing unexpected events and developing creative solutions. Using, for

example, the organizational audits provided by Weick and Sutcliffe (2007) regarding the five principles of high reliability may empower managers with the insight needed to find ways to augment the collective mindfulness of their teams. This study suggests that higher levels of collective mindfulness may be important for the non-safety-related outcome of creativity, which allows for these findings to apply across a wide range of business and organizational types. Furthermore, future qualitative research could focus on the specific behaviors needed to promote creativity within these types of business teams. Managers could then consider incorporating such behaviors into their selection, socialization, performance appraisal, and training programs.

This study also provided preliminary insight into the personality characteristic of ambiguity tolerance and its relationship with creativity. While managers are unlikely to be able to change their own personalities, ambiguity tolerance may be a characteristic worth evaluating when making personnel decisions related to the management of small firms. For example, managers who have high levels of ambiguity tolerance may be able to better lead teams in highly ambiguous business contexts than those with lower levels of ambiguity tolerance. Therefore, future research should investigate the potential role of ambiguity tolerance in selecting managers seeking employment in high-ambiguity environments. Additional research could consider studying current managers to determine how to develop ways to build the principles of collective mindfulness and managerial openness, which could encourage creativity.

Taken together, a final practical implication of this research is that it provides a springboard for future research into what makes a successful management team and team leader within a small firm. A common saying among those who evaluate the potential of

small firms (e.g., angel investors and venture capitalists) is that they would prefer an excellent management team with a good idea over a good management team with an excellent idea. These findings provide some insight into what makes an excellent management team, and future research should explore this more deeply. For example, future research could involve working directly with venture capitalists and angel investors by studying the ways in which they make decisions about which businesses to fund. Then, those decisions could be compared with the businesses' future profitability to provide evidence-based insight into what constitutes a well-poised entrepreneurial management team.

Limitations and Future Research

This study had a number of strengths. First, it used manager ratings of employee performance and team ratings of manager performance and team attributes. Second, the sample consisted almost exclusively of managers of small teams within small businesses, which allowed the theories under investigation to be extended to novel (yet more mainstream) organizational types. Most research involving the principles of high reliability and related organizing theories has been constrained to industries that have traditionally exhibited high reliability, for example, nuclear power plants, aviation, and military contexts. While providing valuable insights about high reliability organizing (e.g., Weick & Sutcliffe, 2007), such research has not extended the tenets of high reliability to mainstream management situations, which has long been a goal of high reliability theory (Weick et al., 1999). This study provides a crucial, albeit preliminary, step in that necessary direction. Third, the study used a multilevel modeling approach to explore the data, maintaining consistency with the conceptual multilevel nature of the

study's constructs. Using a multilevel modeling approach was appropriate, but it necessitated an arduous data-collection process. Collecting both manager and individual levels of data required separate surveys from both team managers and their employees. Practically speaking, many small businesses are extraordinarily busy—stemming, perhaps, from the very ambiguity and competition mentioned above. As such, collecting these data involved no less than hundreds of e-mails and dozens of phone conversations or face-to-face meetings in order to (a) find teams that met the study's general criteria and (b) obtain voluntary involvement from a subset of those eligible to participate.

Like all research, this study has its limitations. Most of the relationships hypothesized in the theoretical model were not statistically significant. First, the study's sample size limited the statistical power available to test the study's theoretical model. Namely, because the sample was relatively small, many of the statistically non-significant findings may have been due to low statistical power given that the sample size for the level-two variables ($N = 20$) is less than the recommended size of 30 (Hofmann, 1997) for multilevel modeling. A larger sample size would have increased the statistical power available for the multilevel analyses, increasing the potential for finding the hypothesized relationships, but again, these data are very difficult to obtain and required an extensive search effort to obtain the amount in the present study. Despite their lack of significance, many of the relationships had coefficients that were of moderate magnitude, indicating that with additional power much more of the hypothesized model may have been directly supported.

Additionally, the difficulty in finding significant results within this study may have been due in part to the lack of variability in the predictor variables. The standard

deviations, for example, for collective mindfulness, team manager openness, and ambiguity tolerance were .55, .36, and .74, respectively. This could have been due to the fact that many of the firms were small organizations in which the team comprised most if not all of the organization. In those types of organizations, team managers may simply tend to be more tolerant of ambiguity and enact an open communication style out of necessity. Additionally, given the high level of interdependence reported by the teams regarding their tasks, collective mindfulness may be more common or at least develop more frequently than in teams with lower levels of interdependence. As such, a recommendation for future research is to include a wider variety of team types from a variety of organization types and sizes. This may increase the variance in the predictors and allow for more robust analyses that better inform the hypotheses presented in this study.

This study used two surveys, one for managers that assessed employees' in-role performance, extra-role performance, creativity, and the manager's self-reported ambiguity tolerance. The second survey asked team members to respond to items regarding collective mindfulness, team manager openness, perceived organizational support, and individual perceptions of team interactions. The cross-level relationships involving collective mindfulness, team manager openness, and creativity, therefore, involved ratings on separate instruments from different sources. This is a strength of the study; however, the relationships hypothesized between ambiguity tolerance and creativity, and between individual perceptions of team interactions and perceived organizational support could have been influenced by common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The study design did include the recommendation

suggested by Podsakoff et al. of ensuring confidentiality of all responses; furthermore, as mentioned above, most of the predictors and criteria were separated by both rater and instrument.

Finally, the study design does not support causal inferences. First, both surveys were administered within close temporal proximity to one another. Additionally, the presence of omitted variables cannot be eliminated given the design of the study. These factors limit the ability to infer causation from the study's findings. Future research should design a study that involves a cross-lagged panel format to reduce some of these concerns and provide more insight regarding the directionality of the hypothesized relationships.

Future research opportunities regarding this study's constructs abound. First, given the small sample size of this study, the statistically non-significant relationships in these data should be reexamined using a larger sample of teams. Namely, the presence of statistical non-significance in this study should not eliminate the relationships tested from future investigation. Second, future research should investigate the nature of these relationships with regard to macro-level variables such as industry type and organizational size. Such research could provide valuable insight regarding the influence, for example, of industry volatility on the necessity of collective mindfulness within small teams. Furthermore, including teams from organizations of different sizes would introduce meaningful structural variables, such as centralization and formalization, into the theoretical model. It stands to reason that high levels of centralization and formalization may enable and constrain the influence of the principles of high reliability on employee behavior and performance. For example, in a highly formalized

organization, employees may not have the ability to propose creative solutions to problems even if they have them. As such, the model proposed and tested here may vary in organizations of different size. For example, in very large, hierarchical organizations the sheer volume of policies and procedures may prohibit employees from feeling as though their creative solutions would ever take hold. This may discourage them from even voicing those ideas. In large organizations, therefore, interventions aimed at bolstering creativity likely need to take a holistic approach that considers organizational structure and culture in addition to aspects of leaders and teams. In addition, it would be useful for both theory and practice to investigate the role of the variables in this study as they relate to firm performance.

A final recommendation for future research is to explore the influence of different variables at the individual level. For example, the role of individual perceptions of team interactions remains unclear at best given this study. Perhaps future research should investigate variables such as team identity, organizational identification, or leader-member exchange as meaningful mediating variables. Although not included in the hypothesized model, I collected employees' perceptions of leader-member exchange (Scandura & Graen, 1984) and found significant relationships with both creativity, $r = .35, p < .01$, and extra-role performance, $r = .38, p < .01$. Therefore, it appears that leader-member exchange is an important variable to consider in the model proposed and should be considered in future research. Conceptually, leader-member exchange may serve as an alternative mediator in the model proposed and tested here (instead of individual perceptions of team interactions). Including these other relevant variables into

the research may provide additional insight and theoretical clarity regarding the topic of managing for high reliability.

Conclusions

This study provides a first look into how the principles of high reliability may translate into the mainstream business arena and how those same principles may influence important employee-level variables such as employee creativity. Although the study's findings leave a number of questions unresolved, it provides a solid case for continuing the investigation of how managers can positively influence employee behavior in ways that are critical for success within the modern world of work. Management and leadership theories need to reflect the changing nature of work, and this study provides a glimpse of how managing for high reliability may promote effectiveness in the face of ambiguity.

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APPENDIX A: SCALE ITEMS MEASURING FOCAL STUDY VARIABLES

I. Collective mindfulness (adapted from Vogus & Sutcliffe, 2007); 7-point response scale ranging from 1 (*not at all*) to 7 (*to a very great extent*). With regard to your primary work group:

1. When giving reports to coworkers regarding a new situation, we usually discuss what to look out for
2. We have a good “map” of each other’s talents and skills
3. We talk about mistakes and ways to learn from them
4. We discuss our unique skills with each other so we knew who in the group has relevant specialized skills and knowledge
5. We discuss alternatives as to how to go about our activities
6. When attempting to resolve a problem, we take advantage of the unique skills of our colleagues
7. We spend time identifying activities we do not want to go wrong
8. When errors happen, we discuss how we could have prevented them
9. When a crisis occurs, we rapidly pool our collective expertise to attempt to resolve critical tasks

II. Top-management openness (adapted from House & Rizzo, 1972; and Ashford, Rothbard, Piderit, & Dutton, 1998). Please rate the degree to which you agree or disagree with the following statements:

1. My supervisor cares about my opinions
2. My supervisor is interested in my ideas and suggestions
3. Good ideas get serious consideration from my supervisor

4. When suggestions are made to my supervisor, they receive fair evaluation
5. My supervisor is interested in ideas and suggestions from people at my level in the organization
6. I feel free to make recommendations to my supervisor to change existing practices

III. Ambiguity tolerance (from McLain, 2009). Please indicate the degree to which disagree or agree with the following:

1. I don't tolerate ambiguous situations well. (R)
2. I would rather avoid solving a problem that must be viewed from several different perspectives. (R)
3. I try to avoid situations that are ambiguous. (R)
4. I prefer familiar situations to new ones. (R)
5. Problems that cannot be considered from just one point of view are a little threatening. (R)
6. I avoid situations that are too complicated for me to easily understand. (R)
7. I am tolerant of ambiguous situations.
8. I enjoy tackling problems that are complex enough to be ambiguous.
9. I try to avoid problems that don't seem to have only one "best" solution. (R)
10. I generally prefer novelty over familiarity.
11. I dislike ambiguous situations. (R)
12. I find it hard to make a choice when the outcome is uncertain. (R)
13. I prefer a situation in which there is some ambiguity.

IV. Team membership and structure

1. Please indicate the degree to agree or disagree with the following statement: At work, I perform my job within a team or work group. (Strongly disagree to Strongly agree)
2. In my work organization, my primary supervisor is the same person as the company's CEO/founder/owner. (Y/N)

V. Task interdependence (from Van der Vegt & Janssen, 2003). Please indicate your level of agreement with the following statements as they pertain to your primary work group (Strongly disagree to Strongly agree):

1. I need information and advice from my colleagues to perform my job well
2. I have a one-person job; it is not necessary for me to coordinate or cooperate with others (reverse coded)
3. I need to collaborate with my colleagues to perform my job well
4. My colleagues need information and advice from me to perform their jobs well
5. I regularly have to communicate with colleagues about work-related issues

VI. Individual perceptions of team interactions (items from team-member exchange scale from Ford & Seers, 2006); 7-point response scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

1. When other members of my team are busy I often volunteer to help them out.
2. When I am busy, other members of my team often volunteer to help me out.
3. I frequently take actions that make things easier for other members of my team.
4. Other members of my team frequently take actions that make things easier for me.
5. I frequently recognize the efforts of other members of my team.
6. Other members of my team frequently recognize my efforts.

7. I communicate openly with other members of my team about what I expect from them.
8. Other members of my team communicate openly with me about what they expect from me.
9. I frequently provide support and encouragement to other members of my team.
10. Other members of my team frequently provide support and encouragement to me.
11. I frequently suggest ideas that other members of my team can use.
12. Other members of my team frequently suggest ideas that I can use.

VII. Perceived organizational support (six highest-loading items from Eisenberger et al., 1986, as used by Roch & Shanock, 2006); 5-point response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

1. My work organization is willing to help me when I need a special favor.
2. My work organization shows little concern for me.
3. My work organization takes pride in my accomplishments at work.
4. My work organization values my contributions to its well-being.
5. My work organization strongly considers my goals and values.
6. My work organization really cares about my well-being.

VIII. In-role performance (items used by Eisenberger et al., 2001); 5-point response scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

1. This employee meets formal performance requirements of the job.
2. This employee fulfills responsibilities specified in job description.
3. This employee performs tasks that are expected of him or her.
4. This employee adequately completes assigned duties.

IX. Extra-role performance (Lee & Allen, 2002); 7-point response scale ranging from 1 (*never*) to 7 (*always*). Introductory statement: Please rate how often this employee engaged in the following behaviors.

1. Help others who have been absent.
2. Willingly give his or her time to help others who have work-related problems.
3. Adjust his or her work schedule to accommodate other employees' requests for time off.
4. Go out of the way to make newer employees feel welcome in the work group.
5. Show genuine concern and courtesy toward coworkers, even under the most trying business or personal situations.
6. Give up time to help others who have work or nonwork problems.
7. Assist others with their duties.
8. Share personal property with others to help their work.
9. Attend functions that are not required but that help the organizational image.
10. Keep up with developments in the organization.
11. Defend the organization when other employees criticize it.
12. Show pride when representing the organization in public.
13. Offer ideas to improve the functioning of the organization.
14. Express loyalty toward the organization.
15. Take action to protect the organization from potential problems.
16. Demonstrate concern about the image of the organization.

X. Employee creativity (Oldham & Cummings, 1996); 7-point response scale ranging from 1 (*not at all*) to 7 (*to a very great extent*).

1. How ORIGINAL and PRACTICAL is this person's work? Original and practical work refers to developing ideas, methods, or products that are both totally unique and especially useful to the organization.
2. How ADAPTIVE and PRACTICAL is this person's work? Adaptive and practical work refers to using existing information or materials to develop ideas, methods, or products that are useful to the organization.
3. How CREATIVE is this person's work? Creativity refers to the extent to which the employee develops ideas, methods, or products that are both original and useful to the organization.

XI. Demographics

1. What is your sex? (M) (F)
2. What is your age, in years?
3. How many months have you worked for this organization?
4. How many months have you worked for your current supervisor?
5. How many months have you worked with your current primary work group?