



Linking leader inclusiveness to work unit performance: The importance of psychological safety and learning from failures

Reuven Hirak^{a,1}, Ann Chunyan Peng^{b,2}, Abraham Carmeli^{c,*}, John M. Schaubroeck^{b,d,3}

^a Department of Political Studies, Ashkelon Academic College, and Bar-Ilan University, Ashkelon 78109, Israel

^b The Eli Broad Graduate School of Management, Michigan State University, East Lansing, MI 48824-1117, USA

^c Faculty of Management, Tel-Aviv University, Ramat-Aviv, Tel-Aviv 69978, Israel

^d Department of Psychology, Michigan State University, East Lansing, MI 48824-1117, USA

ARTICLE INFO

Available online 23 November 2011

Keywords:

Psychological safety
Learning from failures
Leader inclusiveness
Work unit performance

ABSTRACT

Despite burgeoning interest in how groups and organizations learn from failures, little is known about how leader behavior influences these learning processes. We analyzed longitudinal data collected at a large hospital and found that leader inclusiveness was positively associated with members' perceptions of psychological safety at Time 1, and that this relationship was stronger for members in low-performing units. Unit psychological safety climate appeared to facilitate learning from failures within the work unit (Time 2), which was positively associated with subsequent unit performance (Time 3).

© 2011 Elsevier Inc. All rights reserved.

1. Introduction

In an attempt to better cope with volatile and uncertain environmental conditions, many organizations have reorganized their structures around work groups (Ilgen, 1999; Kozlowski & Bell, 2003, 2008). Researchers have responded by making substantial strides toward understanding group leadership, composition, and processes in field settings (Mathieu, Maynard, Rapp, & Gilson, 2008). Accumulating evidence points to the importance of group learning for enhancing work group performance (e.g., Edmondson, 1999). In particular, theory concerning high reliability organizations (i.e., organizations that operate in trying conditions yet manage to avoid catastrophes) underscores the role of learning from past failures to ensure more reliable and effective systems (Weick & Sutcliffe, 2001). Learning from failures is essential because feedback from failure can catalyze change toward more adaptive practices (Carmeli & Sheaffer, 2008), as well as for improving strategic decisions (Carmeli, Edmondson, & Tishler, 2012). Failures are embedded in the processes through which organizations search and adapt to the changing environment (Lant & Mezias, 1990). The insights from past experiences of failure help to develop more reliable and crisis-prepared organizational systems (Carmeli & Schaubroeck, 2008; Tucker & Edmondson, 2003; Weick & Sutcliffe, 2001).

The present research was conducted in a conventional hospital environment. Hospitals are organized around clinical units or departments (e.g., Anesthesia, Critical Care, and Dermatology). They operate under demanding and unforgiving conditions, and thus learning from the failures they encounter can be a vital source of new knowledge needed to improve their practices. Nembhard and Edmondson's (2006) review of the literature suggests that we know relatively little about ways by which leaders facilitate learning in these work units. In particular, research is needed to understand how leaders encourage unit members to learn from failures (Cannon & Edmondson, 2005).

* Corresponding author. Tel.: +972 3 640 6335 (Office); fax: +972 3 640 9983.

E-mail addresses: hiraks@013.net (R. Hirak), peng@bus.msu.edu (A.C. Peng), avic@post.tau.ac.il (A. Carmeli), schaubroeck@bus.msu.edu (J.M. Schaubroeck).

¹ Tel.: +972 8 6789253; fax: +972 8 6789254.

² Tel.: +1 215 301 0008.

³ Tel.: +1 517 432 9943.

This study extends this line of research by examining whether leader inclusiveness, defined as leaders' modeling openness and exhibiting accessibility in their interactions with followers (Nembhard & Edmondson, 2006), facilitates learning from failures in their work units and, in turn, is associated with better unit performance. Our study contributes to the literature in three basic ways. First, findings on learning from failures at the organizational level do not necessarily apply to work groups, and there is significant variation across work groups within the same organization (Cannon & Edmondson, 2005; Edmondson, 1996). Our study thus contributes to the organizational learning literature by providing a more granular perspective on the dynamics of collective learning. While researchers have called for deeper study of learning from failures (Baumard & Starbuck, 2005; Carmeli & Gittell, 2009; Tucker & Edmondson, 2003), this topic is still in a nascent stage and there is relatively little research on this phenomenon in work groups (Carmeli, 2007). Second, we examine learning from failures as an important mechanism that connects work unit psychological safety to unit performance. Although there is evidence supporting the linkages between psychological safety and learning from failures (e.g., Carmeli & Zisu, 2009; Edmondson, 2004), and learning from failures with unit performance (e.g., Cannon & Edmondson, 2005), whether learning from failures mediates this effect remains unclear. Third, by examining leader inclusiveness we follow recent research call to investigate leader behaviors that are specific to a particular work process or outcome (Schneider, Ehrhart, Mayer, Saltz, & Miles-Jolly, 2005). Whereas the linkage between leader inclusiveness and psychological safety has been examined previously (Nembhard & Edmondson, 2006), we also examine unit performance as a moderator, thus exploring a boundary condition under which a specific type of leader behavior – leader inclusiveness – is more or less associated with member's perceived psychological safety. Thus our study uses an interactionist perspective wherein group performance shapes leader behavior (Farris & Lim, 1969), as well as constraining the effect of leadership behavior on group outcomes (Hackman & Wageman, 2007; Piccolo & Colquitt, 2006; Smircich & Morgan, 1982). Thus, a primary contribution of the present study lies in illuminating boundary conditions of leadership influences and the manner by which the leadership behavior pattern of inclusiveness facilitates learning from failures and thereby influences work unit performance.

2. Theory and hypotheses

2.1. Learning from failures and work unit performance

To improve work processes and enhance outcomes it is critical to learn from experience (Argyris & Schön, 1978; Edmondson & Moingeon, 1999; Reagans, Argote, & Brooks, 2005). Theory and research suggest that learning from experience involves detecting patterns of resemblance between past and current situations (Turner & Toft, 2006). For example, many organizations have adopted military evaluation practices aimed at routinely using after-action review sessions to gain insights from particular experiences in an institutionalized way (Morrison & Meliza, 1999). The use of this system of inquiry enables teams to better understand changes that are needed in future initiatives (Kawalek, 2004). Recent experimental research has found that the performance of individuals who participated in after-event reviews improved significantly compared to those who did not participate in such reviews (Ellis, Ganzach, Castle, & Sekely, 2010).

By confronting problems (Cyert & March, 1963), reflecting on previous failures (Weick & Sutcliffe, 2001), and training employees in error management (Keith & Frese, 2005), work systems can decrease subsequent accident rates (Haunschild & Sullivan, 2002) and risks of serious and/or catastrophic failures (Baum & Ingram, 1998; Weick & Sutcliffe, 2001). Error-based learning systems also cultivate crisis-preparedness (Carmeli & Schaubroeck, 2008) and may improve performance outcomes such as service quality, adaptability, innovation, and productivity (Baumard & Starbuck, 2005; Cannon & Edmondson, 2005; Sitkin, 1992).

Despite its importance, research directed toward understanding the effect of learning from failures on the performance of work groups has been slow to accumulate. There has been much research on learning in organizations but little is known about learning from failures (Baumard & Starbuck, 2005). Scholars have noted that organizations do not learn all they can from experiences of failure (Tucker & Edmondson, 2003), thus raising the additional question of what conditions best facilitate learning from failures.

Learning from failures occurs when unit members reflect on a failed experience, openly discuss why it occurred, and identify the work patterns that need to be modified or changed in order to eliminate the root causes of the problem. We argue that this mode of learning is more likely to emerge when members perceive a psychologically safe unit environment. Psychological safety refers to members' perceptions of an interpersonal context in which they "are comfortable being themselves" (Edmondson, 1999, p. 354). In a psychologically safe environment, unit members feel free to express concerns, self-doubts, and their needs for learning in order to perform effectively (cf. Kahn, 1990, p. 708). Members believe that they can speak up and inquire about a failure without repercussions from other unit members or the leader, and this is essential for units to learn from their failures.

Research evidence provides some support for linking psychological safety and learning from failures in groups. For example, Edmondson (1996) found that some teams of nurses reported more errors than other teams because they felt more comfortable speaking up. Tucker and Edmondson (2003) conducted an in-depth qualitative study of 26 nurses at nine hospitals. They concluded that "to learn from failures, people need to be able to talk about them without fear of ridicule or punishment" (p. 67). Thus, when group members perceive higher levels of psychological safety they may be more likely to engage in the processes associated with learning from past failure events and thereby improve their performance.

Learning from failures may be an important mediating mechanism through which unit psychological safety influences future unit performance. Effective work groups coordinate and combine members' skills and resources to enable better coping and adaptation to organizational and task demands (Kozlowski, Gully, Nason, & Smith, 1999). It ensures consistently good performance not only by rectifying the problem or error, but also by attending to its causes, identifying practices in need of improvement, and then determining how to improve (Argyris & Schön, 1978; Tucker & Edmondson, 2003). By taking advantage of a psychologically

safe work environment to learn from failures, units are more likely to modify work processes in a way that steadily addresses malfunctions and their underlying causes. Thus a psychologically safe climate enables groups to learn from their experiences of failure in a way that more fully utilizes their capabilities. This leads us to the following hypothesis:

Hypothesis 1. *Learning from failures mediates the relationship between unit psychological safety climate and subsequent unit performance.*

2.2. Leader inclusiveness and psychological safety among high- and low-performing units

Research on psychological safety has attracted increased attention primarily because it facilitates an interpersonal work context that is essential for effective learning (Edmondson, 1999, 2004). Yet research is needed to identify factors that drive psychological safety perceptions in groups. The behavior of leaders may play a critical role in promoting psychological safety. Researchers have noted that a supportive management and context is a key antecedent of psychological safety (Carmeli & Zisu, 2009; Edmondson, 1996, 1999). Specific leader behaviors such as being available and accessible, inviting input, and modeling openness and fallibility, are seen to directly shape followers' perceptions of psychological safety (Edmondson, 2004; Nembhard & Edmondson, 2006). Likewise, servant leadership, which refers to pattern of behavior which serves to nurture the development of individuals and groups, promote their well-being, and provide support (Greenleaf, 1977), has been linked to work team psychological safety through the mediating influence of members affective trust in the leader (Schaubroeck, Lam, & Peng, 2011).

Building on this rationale, we examine leader inclusiveness, defined as behaviors through which leaders are open, accessible and available to their unit members (Edmondson, 2004; Nembhard & Edmondson, 2006). When leaders display a high level of openness to inputs from members and they make themselves accessible and available to them both physically and psychologically, the members may develop a sense that it is psychologically safe to express and share their thoughts and views. Members who recognize that their views and opinions are encouraged may be more comfortable in speaking up by pointing out problems and potential failures, and by actively engaging in initiatives that are aimed to change a status quo even when they recognize others may be resistant to change.

Hypothesis 2. *Leader inclusiveness is positively related to individual psychological safety.*

We further argue that leader inclusiveness is more influential in promoting member perceptions of psychological safety when work units are not performing effectively. Research on organizational decline (Cameron, Sutton, & Whetten, 1988; Weitzel & Jonsson, 1989; Whetten, 1988) suggests that when an organizational system is dysfunctional, members become disorientated and uncertain about the work environment. Members of low-performing units may also lack understanding of cause and effect in the work environment and accordingly develop a less favorable self-image as a worker. This may in turn make them more sensitive to the cues provided by their leaders, as within Brockner's plasticity hypothesis (Brockner, 1983). Therefore inclusive leader behavior may be an especially vital source of psychological comfort for members in less effective units.

To encourage members in poor-performing units to express their opinions, leaders must convey that they unconditionally invite them to provide their inputs, discuss openly what is not working well, and solicit their ideas for improving the unit's practices. Even members of high-performing units require leader inclusiveness in order to build or maintain psychological safety to maintain their effectiveness. However, high-performing work units are already appreciated for the outcomes they have achieved and, thus their members may readily feel psychologically safe to express their opinions regardless of the inclusive behavior of their leader. To illustrate, Nembhard and Edmondson (2006) found that when leaders invited and appreciated others' contributions, lower status members were more likely to perceive that their leaders saw them as valuable contributors to the group, and as a result they reported high psychological safety. This relative inclusiveness fostered by leader behaviors appeared to maintain psychological safety among low-status members at levels that were closer to that of their high-status group members. Similarly, we suggest that leader inclusiveness is likely to reduce the disparity in psychological safety between members of strong and weak performing work units by augmenting psychological safety beliefs in the weaker performing units.

Hypothesis 3. *Work unit performance moderates the relationship between leader inclusiveness and individual psychological safety, such that leader inclusiveness is more strongly related to psychological safety among work units with lower levels of performance.*

To summarize, we predict a positive association of leader inclusiveness with member psychological safety perceptions. Unit psychological safety climate, in turn, affects unit performance via the mediating effects of learning from failures. Fig. 1 summarizes the research model and the hypothesized relationships.

3. Methods

3.1. Sample and procedure

We surveyed employees from clinical units in a large hospital in Israel. To maximize the representativeness of the sample, we used a three-stage sampling approach. First, 11 divisions were randomly selected from a total of 19 divisions in the hospital. Each division contains 8 to 13 work units that are composed of medical doctors and nurses responsible for providing health care services on different shifts to patients hospitalized in their divisions. Second, we randomly selected about six work units (plus or

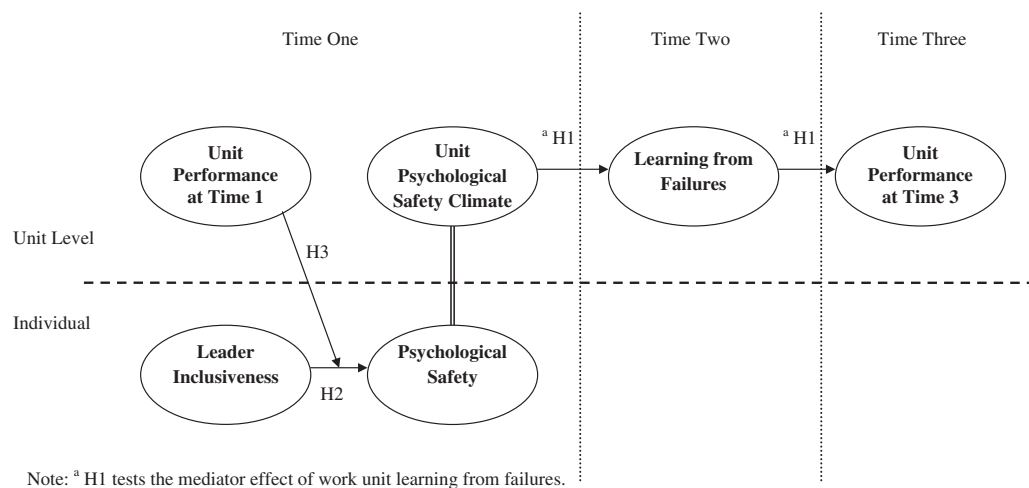


Fig. 1. The hypothesized model.

minus one) within each of the 11 divisions. Unit size varied according to specialized functions, with an average of about 20 employees per unit. We received the list of members in each unit from the HR Department, and then visited different work shifts and asked members on the shift to participate in the study. Participants were informed of the purpose and procedure of the study before they volunteered to participate. We surveyed the unit leaders separately to obtain performance data.

Surveys were collected at three points of time. At Time 1, participants were asked to report on the extent to which the leader of their work unit displayed inclusiveness (i.e., being open-minded, accessible and available). In addition, they reported on psychological safety experienced while working in their unit. Further, the unit leader was asked to rate unit performance. At Time 2, four months later, the same employees were surveyed about learning from failures. At Time 3, two months later, we asked the senior managers of the 11 divisions to assess the performance of the units in their divisions. These performance ratings were used strictly for research purposes. Although each of these senior managers headed a different division, they followed a set of standardized criteria in evaluating the performance of the work units. This was done to ensure an equitable performance assessment that has implications for various HR practices in the hospital (e.g., promotion of the unit leader).

A total of 277 unit members from 67 work units were surveyed. In the analyses we excluded units whose leaders did not provide responses on unit performance, as well as units in which fewer than three members completed the surveys at either Time 1 or Time 2. This yielded a final analysis sample of 55 work unit leaders and a total of 224 unit members. We examined the correlations between unit size and the inter-rater agreement indexes for leader inclusiveness, psychological safety, and learning from failure ($r = -.09, .04$, and $-.15$, respectively). In conjunction with randomly sampling members within each clinical unit, this result alleviates the concern that there may be an under-representation of member responses for the larger work units.

3.2. Measures

To reduce common method bias in the focal relationships while at the same time selecting sources that can most suitably rate the constructs, we asked unit members (excluding the unit leader) to report on leader inclusiveness and psychological safety (Time 1) and learning from failures (Time 2; after four months from Time 1). Unit leaders assessed prior unit performance (Time 1), and the senior managers of the organization provided an independent assessment of subsequent unit performance (Time 3; after six months from Time 1).

3.2.1. Leader inclusiveness

We used a nine-item inclusive leadership scale developed by Carmeli, Reiter-Palmon, and Ziv (2010) to assess the extent to which the leader exhibits inclusiveness. Based on Edmondson's (2004) work, leader inclusiveness refers to the leader's openness to new ideas, accessibility and availability to members. Sample items are: "The unit leader is open to hearing new ideas", "The unit leader is available for consultation on problems" and "The unit leader is an ongoing 'presence' in this unit—someone who is readily available". Unit members' responses (excluding the unit leader) were made on a five-point scale ranging from 1 = not at all to 5 = to a large extent. The coefficient alpha reliability of this scale is .93.

3.2.2. Psychological safety

Psychological safety refers to "an environment which is perceived as interpersonally non-threatening" (West, 1990, p. 311). We used the eight-item scale developed by Anderson and West (1994; see also Edmondson, 2004; Kivimäki et al., 1997). Sample items are: "Everyone's view is listened to, even if it is the minority" and "There are real attempts to share information throughout the unit." Unit members' rated on a five-point scale ranging from 1 = not at all to 5 = to a large extent. Cronbach's alpha for this measure was .90. An additional measure was obtained by aggregating individual member ratings were to unit-level, thereby

measuring *unit psychological safety climate*. In addition, we computed the standard deviation score of the individual psychological safety scores for each unit, yielding an index of *unit psychological safety climate strength* (Schneider, Salvaggio, & Subirats, 2002).

3.2.3. Learning from failures

Learning from failures refers to the extent to which units, when facing a problem, not only solve it so the task will be completed successfully, but also take steps to address the underlying causes of the problem (Tucker & Edmondson, 2003). To measure learning from failures, we administered a five-item measure used in previous studies (Carmeli, 2007; Carmeli & Schaubroeck, 2008) drawing on the example provided in Tucker and Edmondson's (2003) qualitative study. Items are shown in Appendix A. A sample item is: "When unit members make a mistake, they inform the relevant manager to enable others to learn from it." Unit members' responses were made on a five-point scale ranging from 1 = not at all to 5 = to a large extent. Cronbach's alpha for this measure was .80.

3.2.4. Unit performance

A nine-item measure was developed and used by the hospital to evaluate the performance of work units. This measure assessed the extent to which the units accomplish work-related tasks and contribute to the organization. Sample items are: "The overall unit performance is good," "There is a high level of satisfaction from the performance of the unit in the organization," and "The quality of products/services provided by the unit is good." Unit leaders (Time 1, $N = 55$) and senior managers (Time 3, $N = 11$) rated each of the work units on a five-point Likert scale with responses ranging from 1 = not at all to 5 = to a large extent. Cronbach's alpha for this measure was .74 for unit leaders, and .91 for senior managers.

3.2.5. Control variables

We controlled for age, gender, tenure in the organization, and work unit size in the analyses. Tenure reflects work domain expertise (Oldham & Cummings, 1996). In addition, fostering psychological safety in larger units may be more complex compared to smaller units. Age and gender were control because these variables may account for variation in unit psychological safety (Edmondson, 2004).

4. Analysis procedure

The hypotheses were tested in two separate models. First, hierarchical regressions were used to examine Hypothesis 1, which involves only unit-level processes. Because the hierarchical regression analysis testing Hypothesis 1 involves aggregating individual ratings to unit level, we first assessed the agreement of responses within a work unit. The average $R_{wg(j)}$ (James, Demaree, & Wolfe, 1984) values for psychological safety and learning from failures were .76 and .89, respectively. The values of $R_{wg(j)}$ exceed conventional standards for aggregating individual questionnaire responses in field research (see Bliese, 2000).

Hierarchical linear modeling (HLM 6; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004) was used to test the main effect of leader inclusiveness on individual psychological safety (Hypothesis 2) and the cross-level moderating effect of unit performance (Hypothesis 3). HLM is considered more appropriate than linear regressions when the data has a nested structure (Bryk & Raudenbush, 1992; Tate & Wongbundhit, 1983). The $ICC_{(1)}$ value of .17 which we observed when testing the null model indicates substantial variability both within and across units for the dependent variable of psychological safety.

Examining leader inclusiveness at the individual level in our model is based on our theoretical assumption that the leader establishes and maintains relationships of different quality with different members (Graen & Scandura, 1987), and, thus, members vary in their perceptions of leader inclusive behavior. This assumption was supported by our data in that agreement among the unit members on leader inclusiveness was moderately high but not uniform ($ICC_{(2)} = .58$).

5. Results

Table 1 presents descriptive statistics and correlations among the study variables. Leader inclusiveness was positively associated with psychological safety at the individual level ($r = .62, p < .01$). Unit psychological safety climate was positively associated with unit learning from failure at Time 2 ($r = .67, p < .01$) and the senior manager's ratings on unit performance at Time 3 ($r = .33, p < .05$).

Hypothesis 1 predicted that unit learning from failures mediates the effect of unit psychological safety climate on subsequent unit performance. We tested this hypothesis using hierarchical regression analysis. In this model individual-level psychological safety and learning from failures were aggregated to unit level to index unit psychological safety climate and unit learning from failures. The results indicated that unit psychological safety climate measured at Time 1 was positively associated with learning from failures assessed at Time 2 ($\beta = .61, p < .01$; denoted as path X–M), and subsequent unit performance as rated by the senior manager at Time 3 ($\beta = .47, p < .05$). However, when learning from failures was entered into the equation in predicting unit performance ($\beta = .69, p < .01$; denoted as path M–Y), psychological safety was no longer related to unit performance ($\beta = .05, ns$). We further performed a significance test for the mediation effect using PRODCLIN, a program that allows a more accurate estimate of confidence limits for the indirect effect based on distributions of both of the variables that contribute to the product term (MacKinnon, Fritz, Williams, & Lockwood, 2007). The 95% confidence interval for the mediation effect indexed by the product term of path coefficients of X–M and M–Y did not include zero [.06, .77], and therefore we infer that the mediating effect is significant, supporting H1.

Hypothesis 2 proposed a positive association between leader inclusiveness and individual psychological safety, and in Hypothesis 3 we posited that unit performance moderated this positive association. Table 2 presents the HLM results testing Hypothesis 2 and 3. In Model 1, we entered the demographic variables (age, gender, and tenure in the organization) and leader

Table 1

Correlations, means and standard deviations.

Variables	Mean	SD	1	2	3	4	5	6
Individual-level								
1. Leader inclusiveness (Time 1)	4.13	.76	(.93)					
2. Psychological safety (Time 1)	3.60	.75	.62**	(.90)				
3. Learning from failure (Time 2)	3.78	.58	.49**	.52**	(.80)			
4. Gender	1.19	.39	-.06	.02	-.05	–		
5. Age	46.62	9.50	-.10	.05	-.08	.07	–	
6. Job tenure	13.07	9.36	-.08	-.03	-.07	-.15*	.53**	–
Unit-level								
1. Leader inclusiveness (Time 1)	4.13	.52	–					
2. Unit psychological safety climate (Time 1)	3.60	.46	.67**	–				
3. Unit performance (Time 1)	4.10	.36	.06	.35**	(.74)			
4. Learning from failure (Time 2)	3.78	.42	.66**	.67**	.29	–		
5. Unit Performance (Time 3)	3.94	.70	.42**	.33*	.38**	.43**	(.91)	
6. Unit size	20.62	11.78	-.03	-.15	.13	-.09	.08	–

Note. For individual-level measures, N = 224; for unit-level measures, N = 55. Numbers in parentheses are alpha reliability estimates.

* $p < .05$.

** $p < .01$.

inclusiveness in the Level 1 equation. Unit size and unit performance (rated by unit leaders) were entered in the Level 2 intercept-as-outcome equation. Because none of the demographic variables was associated with the dependent variable, we removed them from the models for the purpose of model parsimony. Notably, the results did not differ notably depending on whether these three demographic variables were included in the analysis. Leader inclusiveness was positively associated with reported levels of psychological safety ($\gamma_{40} = .61, p < .01$), and therefore **Hypothesis 2** was supported. In Model 2, unit performance was further entered in the Level 2 slope-as-outcome equation to test the cross-level interaction between leader inclusiveness and unit performance in predicting individual psychological safety. The interaction between pre-existing (Time 1) unit performance and leader inclusiveness was significant ($\gamma_{41} = -.41, p < .05$).

To determine the shape of the interaction revealed in Table 2, we plotted it using the procedure described by Aiken and West (1991). Fig. 2 shows the interaction pattern which indicates a stronger positive association between leader inclusiveness and psychological safety when unit performance is lower. Thus **Hypothesis 3** was supported.

Supplementary analyses explored the interactive effects between psychological safety climate level and psychological safety climate strength in predicting unit-level outcomes. Results showed that psychological safety climate strength moderated the positive associations of psychological safety climate with senior manager's ratings of unit performance ($\beta = -.25, p < .05$), and with unit learning from failure ($\beta = -.17, p < .10$). The patterns of the two interactions are very similar and therefore we present only one of them. As shown in Fig. 3, psychological safety climate is more positively related to subsequent unit performance when the strength of the climate is also high (i.e., less variation of members' reports on psychological safety within the work unit).

6. Discussion

In this paper, we sought to shed light on the role that leader inclusiveness plays in facilitating psychological safety, thereby potentially enabling the unit to better learn from its failures and, in turn, enhance its performance. The results indicate that leader

Table 2

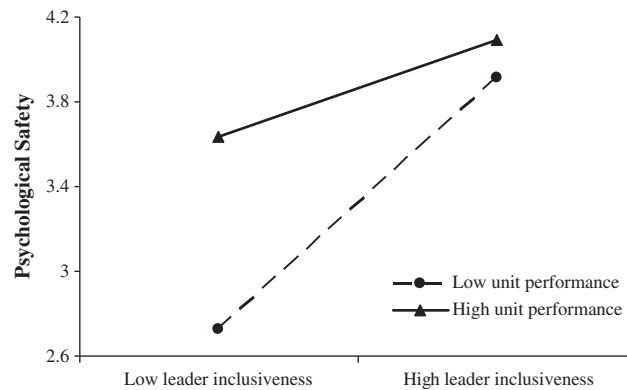
HLM results in testing interaction between unit performance and leader inclusiveness in predicting psychological safety.

Variables	DV = individual perception of psychological safety					
	Model 1			Model 2		
	Coefficient	SE	t ratio	Coefficient	SE	t ratio
Level 1						
Intercept (γ_{00})	3.59	.04	87.30**	3.60	.04	87.43**
Leader inclusiveness (γ_{10})	.61	.06	9.61**	.63	.06	9.79**
Level 2						
Unit size (γ_{01})	-.01	.00	-1.83	-.01	.00	-1.91
Unit performance (γ_{02} , Perf)	.39	.12	3.37**	.41	.12	3.53**
Cross-level interaction						
Leader inclusiveness \times Perf (γ_{12})				-.41	.19	-2.14*
R ² -total	.47			.48		

Note. N = 224 (Level 1), N = 55 (Level 2). R²-total is a proximal index of the variance in the DV explained by the model. It was computed based on the proportion of reduced within-group variance and between-group variance (see, Bryk & Raudenbush, 1992, for details).

* $p < .05$.

** $p < .01$.



Note: For graphing the low (or high) condition we used cut points at 1 standard deviation below (or above) the sample mean. For unit performance, the level-2 standard deviation was used, whereas the level-1 standard deviation was used for leader inclusiveness.

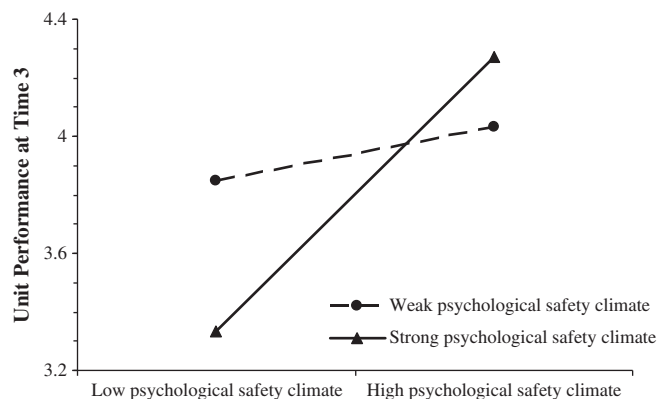
Fig. 2. The interactive effect of leader inclusiveness and unit performance on psychological safety.

inclusiveness promotes higher psychological safety in the work unit, particularly among units with lower pre-existing performance levels. Unit psychological safety influences unit performance through the unit's learning from its failures. We discuss the implications of these findings below.

Our findings contribute to understanding how leadership affects unit learning processes and outcomes. Although leadership scholars have noted the importance of leader behaviors for facilitating individual and organizational performance, they tend to be presented as generally applicable across people, settings and levels of analysis, and “not explicitly on team settings” (Kozlowski & Ilgen, 2006, p. 107). We sought to extend this literature by examining a process model of the relationship between a specific kind of leader behavior, leader inclusiveness, and unit performance. This model posits that leaders who maintain a focus on developing members may enhance psychological safety, which is conducive to unit learning processes which enhance unit performance. Thus, our study contributes to the developing literature about how leaders influence unit performance (Kozlowski, Gully, McHugh, Salas, & Cannon-Bowers, 1996; Morgeson, DeRue, & Karam, 2010; Schaubroeck, Lam, & Cha, 2007).

The findings extend an emerging line of research concerning leadership that creates positive relational dynamics within work units, thereby enabling improvement in organizational practices (Fletcher, 2004, 2007). We found that such leadership plays an especially important role in shaping perceptions of psychological safety among members in low-performing units, thus bridging the potential disparity between their perceptions and those of members in higher performing units. Our study suggests that by inviting and appreciating others' contributions, leaders give members a sense that their work is important and their ideas for improving are appreciated even though current performance is not favorable. Thus leaders who exhibit openness, accessibility and availability for unit members encourage voice, which aids unit members in learning from failures and thereby potentially enhancing their future group-level performance.

Supplementary analyses indicated that psychological safety climate strength, as indexed by a relative lack of within-unit variability in psychological safety perceptions, enhanced the positive effect of unit psychological safety climate on subsequent unit performance.



Note: For graphing the low (or high) condition we used cut points at 1 standard deviation below (or above) the sample mean.

Fig. 3. The interactive effect of psychological safety climate level and psychological safety climate strength on subsequent unit performance.

Consistent with previous findings (Colquitt, Noe, & Jackson, 2002; González-Romá, Peiró, & Tordera, 2002; Schneider et al., 2002), this highlights the important role of unit climate strength, in addition to climate level, in determining unit performance outcomes. Among units with stronger psychological safety climate, climate level was more positively associated with learning from failures, which, in turn contributed to subsequent unit performance.

These findings have several practical implications. Medical errors cause tens of thousands of deaths each year and impose large economic costs on healthcare systems and the society at large (Kohn, Corrigan, & Donaldson, 2000). While people tend to believe that one cannot control and prevent every error, policy-makers seek ways to reduce them dramatically. For example, the U.S. Congress set the target of reducing medical errors by 50% in the years after the 2000 IOM report. This study suggests that the performance of healthcare systems may be enhanced if work groups, around which much of hospital work is organized, learn better from their failures. Previous research indicates that in many organizations learning from failures is a difficult process to facilitate (Baumard & Starbuck, 2005). It also documented that healthcare organizations do not learn all they can from their failed experiences (e.g., Tucker & Edmondson, 2003) and that better means to improve these activities are needed (Cannon & Edmondson, 2005). Our study suggests that unit leadership plays a key role in how work units learn from failures. Through the process of learning from failures, unit members “simplify less and see more” (Weick & Sutcliffe, 2001, p. 11) and cultivate a shared situation awareness (Roth, Multer, & Raslear, 2006). Such processes allow work units to confront complex issues, better understand and interpret what has been done, and plan for improvement. Future research could profitably take a more nuanced approach by seeking to identify the precise types of learning processes that are facilitated by leader inclusiveness and psychological safety.

Leader inclusiveness appears to be most critical when units are not performing well. Perhaps a vicious cycle occurs among poorly performing units that are not led by inclusive leaders; namely, poor unit performance leads to negative repercussions which reduce psychological safety, and in turn low psychological safety makes members less likely to voice their concerns and share their ideas in ways that enable the unit to learn from its failures. This results in more failures in the future and even poorer performance. Leadership that is inviting and appreciative of members' contributions might be an effective means to break this vicious cycle. This would suggest that members of low-performing units have some understanding of what they are doing wrong, although that understanding may not be shared among members. Research on the sharing of information in groups using the hidden profile paradigm suggests that members tend to focus on shared information whereas unique information that is vital for making better decisions tends to be suppressed because the members who hold unique information are reluctant to share it (Lam & Schaubroeck, 2000; Stasser & Titus, 1985). To the extent that all members of a unit share high perceptions of psychological safety they may develop more fully shared understandings of tasks and problems. This has been linked to the sharing of distinct information among group members (van Ginkel & van Knippenberg, 2008). Leader inclusiveness, then, may be seen as a vehicle to liberate the group in such a way as to allow unshared information to surface.

Psychological safety has additional implications for performance when considered through the lens of learning from failure. It highlights the critical role of an environment that facilitates learning from mistakes. Many organizations establish a system that rewards success and punishes failures. The typical punishment-oriented system may induce undesirable behaviors such as hiding mistakes or making false reports that inflate performance. Fostering a learning orientation toward failures or mistakes minimizes costs from failures and maximizes the learning experiences that can potentially improve practices. To achieve this learning orientation, managers need to promote a culture that is more tolerant of speaking up about mistakes and circumstances that have potential to create problems or crises. This can be facilitated by leaders' cultivating a sense that there is a collective effort to discover deficiencies in the current work system, to manage the costs of failure, and to build up knowledge for future practice.

6.1. Limitations and future research directions

Our study has a number of limitations that need to be kept in mind when interpreting its results. The study is correlational in nature, and inferences about causality cannot be made conclusively on evidence of covariation alone. However, the measures were separated in time and the sources of the measures were distinct. For example, it is clear that unit psychological safety climate measured at Time 1 is related to learning from failures at Time 2. However, it would be helpful if relatively well controlled interventions concerning leader inclusiveness and/or psychological safety were to be conducted in field settings, as this would eliminate the alternative interpretation that unmeasured variables might better account for the effects of leader inclusiveness and/or psychological safety.

The results also indicate a relatively weak correlation between prior unit performance (i.e., assessment of weak/strong units) at Time 1 (rated by unit leader) with subsequent unit performance at Time 3 (rated by the senior manager of the division). This may suggest that a unit leader's rating at Time 1 might be more of a “subjective” evaluation depending on each manager's own standard and his or her proximity to the unit he or she leads. Indeed the relatively high mean and small variation (Mean = 4.10 and SD = .36) of unit leaders' ratings of their units' performance may to some extent reflect self-serving biases of the latter which make them less inclined to rate their teams as performing more poorly. Senior managers' ratings, however, may be a more disinterested assessment because they observe and assess many units and, thus, are better able to make a reliable comparison of their relative performance.

Like most research in organizational behavior, we cannot make confident claims about the generalizability of our findings. Future research might find that the cultural context or nature of the tasks has important implications for how inclusive leadership influences unit-level processes and performance. In addition, we did not include other leadership behavior constructs that may potentially influence psychological safety perceptions, although we expect that the effect of leader inclusiveness should be still observed when the other leadership constructs are controlled. Future research is needed to investigate whether leader inclusiveness effect is robust even after other leadership behaviors have been included in the analysis.

The present study had a relatively small number of work units to test the hypotheses. This is a common issue in group research. We nevertheless detected the effects we hypothesized, so the issue is therefore not one of statistical power. Further tests of these relationships in other settings are needed to be more confident that the effects are reliable as well as to determine the boundaries of the contexts in which these effects may be expected to replicate.

6.2. Conclusions

We predicted and found that leaders who display a high level of inclusiveness play a major role in cultivating psychological safety and facilitating learning from failures, thereby enhancing subsequent unit performance. Our study further highlights the importance of relational leadership for promoting a psychologically safe environment that is conducive to learning. This inquiry helps to open up meaningful synergies between the literatures of leadership and group learning.

Acknowledgments

We would like to thank the editor and three anonymous reviewers of this journal for their very helpful comments and suggestions. We also thank Marcy Schafer and Esther Singer for their editorial comments on previous drafts of this manuscript. We are thankful to the hospital directors and all the participants in this research. All remaining errors are our own.

Appendix A

Measurement items for learning from failures

(Adapted from: Carmeli, 2007)

When a problem concerning a lack of required resources for completing a task is being raised, our unit members provide an immediate solution, but also inform the management and the relevant department about the problem

When a unit member makes a mistake, her co-members in the workplace talk to her, not for the purpose of blaming her, but rather for the value of learning

When unit members make a mistake, they inform the relevant manager to enable others to learn from it

A question such as “Why do we do the things as such?” is fully appreciated in our unit

In our unit, all members are encouraged to ask questions such as “Is there a better way to address problems associated with how we provide the health services.”

References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage Publications.
- Anderson, N., & West, M. (1994). *The Team Climate Inventory*. Windsor, UK: Berks ASE.
- Argyris, C., & Schön, D. (1978). *Organizational learning: A theory of action perspective*. Reading, MA: Addison-Wesley.
- Baum, J. A. C., & Ingram, P. (1998). Survival-enhancing learning in the Manhattan hotel industry, 1898–1980. *Management Science*, 44, 996–1016.
- Baumard, P., & Starbuck, W. H. (2005). Learning from failures: Why it may not happen. *Long Range Planning*, 38, 281–298.
- Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analyses. In K. J. Klein, & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 349–381). San Francisco: Jossey-Bass.
- Brockner, J. (1983). Low self-esteem and behavioral plasticity: Some implications. *Review of Personality and Social Psychology*, 4, 237–271.
- Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models*. Newbury Park, CA: Sage.
- Cameron, K. S., Sutton, R. I., & Whetten, D. A. (1988). Issues in organizational decline. In K. S. Cameron, R. I. Sutton, & D. A. Whetten (Eds.), *Readings in organizational decline: Frameworks, research, and prescriptions* (pp. 3–19). Cambridge, MA: Ballinger Press.
- Cannon, M. D., & Edmondson, A. C. (2005). Failing to learn and learning to fail (intelligently): How great organizations put failure to work to innovate and improve. *Long Range Planning*, 38, 299–319.
- Carmeli, A. (2007). Social capital, psychological safety and learning behaviours from failure in organisations. *Long Range Planning*, 40, 30–44.
- Carmeli, A., Edmondson, A. C., & Tishler, A. (2012). CEO Relational Leadership and Strategic Decision Quality in Top Management Teams: The Role of Team Trust and Learning from Failures. *Strategic Organization*, Conditional acceptance.
- Carmeli, A., & Gittell, J. H. (2009). High quality relationships, psychological safety and learning from failures in work organizations. *Journal of Organizational Behavior*, 30, 709–729.
- Carmeli, A., Reiter-Palmon, R., & Ziv, E. (2010). Inclusive leadership and employee involvement in creative tasks in the workplace: The mediating role of psychological safety. *Creativity Research Journal*, 22, 250–260.
- Carmeli, A., & Schaubroeck, J. (2008). Organisational crisis-preparedness: The importance of learning from failures. *Long Range Planning*, 41, 177–196.
- Carmeli, A., & Sheaffer, Z. (2008). How learning leadership and organizational learning from failures enhance perceived organizational capacity to adapt to the task environment. *The Journal of Applied Behavioral Science*, 44, 468–489.
- Carmeli, A., & Zisu, M. (2009). The relational underpinnings of quality internal auditing in medical clinics in Israel. *Social Science & Medicine*, 68, 894–902.
- Colquitt, J. A., Noe, R. A., & Jackson, C. L. (2002). Justice in teams: Antecedents and consequences of procedural justice climate. *Personnel Psychology*, 55, 83–109.
- Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice-Hall.
- Edmondson, A. C. (1996). Learning from mistakes is easier said than done: Group and organizational influences on the detection and correction of human error. *The Journal of Applied Behavioral Science*, 32, 5–28.
- Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, 44, 350–383.
- Edmondson, A. C. (2004). Psychological safety, trust, and learning in organizations: A group-level lens. In R. M. Kramer, & K. S. Cook (Eds.), *Trust and distrust in organizations: Dilemmas and approaches* (pp. 239–272). New York: Russell Sage.
- Edmondson, A. C., & Moingeon, B. (1999). Learning, trust and organizational change: Contrasting models of intervention research in organizational behavior. In M. Easterby-Smith, L. Araujo, & J. Burgoyne (Eds.), *Organizational learning and the learning organization* (pp. 157–175). London: Sage.
- Ellis, S., Ganzach, Y., Castle, E., & Sekely, G. (2010). The effect of filmed versus personal after-event reviews on task performance: The mediating and moderating role of self-efficacy. *Journal of Applied Psychology*, 95, 122–131.

- Farris, G. F., & Lim, F. G., Jr. (1969). Effects of performance on leadership cohesiveness, influence, satisfaction, and subsequent performance. *Journal of Applied Psychology*, 53, 490–497.
- Fletcher, J. K. (2004). The paradox of postheroic leadership: An essay on gender, power, and transformational change. *The Leadership Quarterly*, 15, 647–661.
- Fletcher, J. K. (2007). Leadership, power, and positive relationships. In J. E. Dutton, & B. R. Ragins (Eds.), *Exploring positive relationships at work: Building a theoretical and research foundation* (pp. 347–371). Mahwah, NJ: Lawrence Erlbaum Associates.
- González-Romá, V., Peiró, J. M., & Tordera, N. (2002). An examination of the antecedents and moderator influences of climate strength. *Journal of Applied Psychology*, 87, 465–473.
- Graen, G. B., & Scandura, T. A. (1987). Toward psychology of dyadic organizing. In B. M. Staw, & L. L. Cummings (Eds.), *Research in organizational behavior*, Vol. 9. (pp. 175–208) Greenwich, CT: JAI Press.
- Greenleaf, R. K. (1977). *Servant leadership: A journey into the nature of legitimate power and greatness*. New York, NY: Paulist Press.
- Hackman, J. R., & Wageman, R. (2007). Asking the right questions about leadership: Discussion and conclusions. *American Psychologist*, 62(1), 43–47.
- Haunschild, P. R., & Sullivan, B. N. (2002). Learning from complexity: Effects of prior accidents and incidents on airlines' learning. *Administrative Science Quarterly*, 47, 609–643.
- Ilgén, D. (1999). Teams embedded in organizations: Some implications. *American Psychologist*, 54, 129–139.
- James, L. R., Demaree, R. G., & Wolfe, G. (1984). Estimating within-group inter-rater reliability with and without response bias. *Journal of Applied Psychology*, 69, 85–98.
- Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal*, 33, 692–724.
- Kawalek, J. (2004). Systems thinking and knowledge management: Positional assertions and preliminary observations. *Systems Research and Behavioral Science*, 21, 17–36.
- Keith, N., & Frese, M. (2005). Self-regulation in error management training: Emotion control and metacognition as mediators of performance effects. *Journal of Applied Psychology*, 90, 677–691.
- Kivimäki, M., Kuk, G., Elovainio, M., Thomson, L., Kalliomäki-Levanto, T., & Heikkilä, A. (1997). The Team Climate Inventory (TCI)—four or five factors? Testing the structure of TCI in samples of low and high complexity jobs. *Journal of Occupational and Organizational Psychology*, 70, 375–389.
- Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (Eds.). (2000). *Institute of Medicine report: To err is human: Building a safer health system*. Washington, DC: National Academy Press.
- Kozlowski, S. W. J., & Bell, B. S. (2003). Work groups and teams in organizations. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Industrial and organizational psychology. Handbook of psychology*, Vol. 12. (pp. 333–375) New York: Wiley.
- Kozlowski, S. W. J., & Bell, B. S. (2008). Team learning, development, and adaptation. In V. I. Sessa, & M. London (Eds.), *Work group learning* (pp. 15–44). Mahwah, NJ: Lawrence Erlbaum Associates.
- Kozlowski, S. W. J., Gully, S. M., McHugh, P. P., Salas, E., & Cannon-Bowers, J. A. (1996). A dynamic theory of leadership and team effectiveness: Developmental and task contingent leader roles. In G. R. Ferris (Ed.), *Research in personnel and human resources management*, Vol. 15. (pp. 253–305) Greenwich, CT: JAI Press.
- Kozlowski, S. W. J., Gully, S. M., Nason, E. R., & Smith, E. M. (1999). Developing adaptive teams: A theory of compilation and performance across levels and time. In D. R. Ilgen, & E. D. Pulakos (Eds.), *The changing nature of performance: Implications for staffing, motivation, and development* (pp. 240–292). San Francisco: Jossey-Bass.
- Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest*, 7, 77–124.
- Lam, S. S. K., & Schaubroeck, J. (2000). Improving group decisions by better pooling information: A comparative advantage of group decision support systems. *Journal of Applied Psychology*, 85, 565–573.
- Lant, T. K., & Mezias, S. J. (1990). Managing discontinuous change: A simulation study of organizational learning and entrepreneurship. *Strategic Management Journal*, 11, 147–179.
- MacKinnon, D. P., Fritz, M. S., Williams, J., & Lockwood, C. M. (2007). Distribution of the product confidence limits for the indirect effect: Program PRODCLIN. *Behavior Research Methods*, 39, 384–389.
- Mathieu, J. E., Maynard, M. T., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997–2007: A review of recent advancements and a glimpse into the future. *Journal of Management*, 34, 410–476.
- Morgeson, F. P., DeRue, D. S., & Karam, E. (2010). Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management*, 36, 5–39.
- Morrison, J. E., & Meliza, L. L. (1999). Foundations of the after action review process. *United States Army Research Institute for the Behavioral and Social Science, Special Report* 42.
- Nembhard, I. M., & Edmondson, A. C. (2006). Making it safe: The effects of leader inclusiveness and professional status on psychological safety and improvement efforts in health care teams. *Journal of Organizational Behavior*, 27, 941–966.
- Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Journal*, 39, 607–634.
- Piccolo, R. F., & Colquitt, J. A. (2006). Transformational leadership and job behaviors: The mediating role of core job characteristics. *Academy of Management Journal*, 49, 327–340.
- Raudenbush, S., Bryk, A., Cheong, Y. F., Congdon, R., & du Toit, M. (2004). *HLM 6: Hierarchical linear and nonlinear modeling*. Lincolnwood, IL: SSI Scientific Software International.
- Reagans, R., Argote, L., & Brooks, D. (2005). Individual experience and experience working together: Predicting learning rates from knowing who knows what and knowing how to work together. *Management Science*, 51, 869–881.
- Roth, E. M., Multer, J., & Raslear, T. (2006). Shared situation awareness as a contributor to high reliability performance in railroad operations. *Organization Studies*, 27, 967–987.
- Schaubroeck, J., Lam, S. S. K., & Cha, S. E. (2007). Embracing transformational leadership: Team values and the impact of leader behavior on team performance. *Journal of Applied Psychology*, 92, 1020–1030.
- Schaubroeck, J., Lam, S. S., & Peng, A. C. (2011). Cognition-based and affect-based trust as mediators of leader behavior influences on team performance. *Journal of Applied Psychology*, 96, 863–871, doi:10.1037/a0022625.
- Schneider, B., Ehrhart, M. G., Mayer, D. M., Saltz, J. L., & Miles-Jolly, K. (2005). Understanding organization–customer links in service settings. *Academy of Management Journal*, 48, 1017–1032.
- Schneider, B., Salvaggio, A. N., & Subirats, M. (2002). Service climate: A new direction for climate research. *Journal of Applied Psychology*, 87, 220–229.
- Sitkin, S. B. (1992). Learning through failure: The strategy of small losses. In B. M. Staw, & L. L. Cummings (Eds.), *Research in organizational behavior*, Vol. 14. (pp. 231–266) Greenwich, CT: JAI Press.
- Smircich, L., & Morgan, G. (1982). Leadership: The management of meaning. *The Journal of Applied Behavioral Science*, 18, 257–273.
- Stasser, G., & Titus, W. (1985). Pooling of unshared information in group decision making: Biased information sampling during discussion. *Journal of Personality and Social Psychology*, 48, 467–478.
- Tate, R. L., & Wongbunhit, Y. (1983). Random versus nonrandom coefficient models for multilevel analysis. *Journal of Educational Statistics*, 8, 103–120.
- Tucker, A. L., & Edmondson, A. C. (2003). Why hospitals don't learn from failure: Organizational and psychological dynamics that inhibit system change. *California Management Review*, 45, 55–72.
- Turner, B. A., & Toft, B. (2006). Organizational learning from disasters. In D. Smith, & D. Elliot (Eds.), *Key readings in crisis management: Systems and structures for prevention and recovery* (pp. 191–204). London: Routledge.
- van Ginkel, W. P., & van Knippenberg, D. (2008). Group information elaboration and group decision making: The role of shared task representations. *Organizational Behavior and Human Decision Processes*, 105, 82–97.
- Weick, K. E., & Sutcliffe, K. M. (2001). *Managing the unexpected: Assuring high performance in an age of complexity*. San Francisco: Jossey-Bass.
- Weitzel, W., & Jonsson, E. (1989). Decline in organizations: A literature integration and extension. *Administrative Science Quarterly*, 34, 91–109.
- West, M. A. (1990). The social psychology of innovation in groups. In M. A. West, & J. L. Farr (Eds.), *Innovation and creativity at work: Psychological and organizational strategies* (pp. 309–333). Chichester, England: John Wiley & Sons.

Whetten, D. A. (1988). Sources, responses, and effects of organizational decline. In K. S. Cameron, R. I. Sutton, & D. A. Whetten (Eds.), *Readings in organizational decline: Frameworks, research, and prescriptions* (pp. 151–174). Cambridge, MA: Ballinger Press.

Reuven Hirak is a faculty member at the Ashkelon Academic College and Bar-Ilan University. He received his Ph.D. from Bar-Ilan University. His current research interests include leadership, learning in work teams.

Ann Chunyan Peng is a doctoral student at the Department of Management, Eli Broad College of Business, Michigan State University. She received a research master degree (Mphil, Master in Philosophy) from Lingnan University of Hong Kong. Her current research interests include stress and well-being, self-identity, and leadership.

Abraham Carmeli is a professor of strategy and management at the Faculty of Management—Recanati Graduate School of Business. He received his Ph.D. from the University of Haifa. His current research interests include leadership and top management teams, relational dynamics, learning from failures, and creativity and innovation in the workplace.

John Schaubroeck is John A. Hannah Professor of Psychology and Management at Michigan State University. He received his PhD from Purdue University. His research interests relate primarily to psychological issues associated with leadership, work related stress, and employee health.