



Contents lists available at ScienceDirect

## Organizational Behavior and Human Decision Processes

journal homepage: [www.elsevier.com/locate/obhdp](http://www.elsevier.com/locate/obhdp)

## The motivating potential of teams: Test and extension of Chen and Kanfer's (2006) cross-level model of motivation in teams

Gilad Chen<sup>a,\*</sup>, Ruth Kanfer<sup>b</sup>, Richard P. DeShon<sup>c</sup>, John E. Mathieu<sup>d</sup>, Steve W.J. Kozlowski<sup>c</sup>

<sup>a</sup> Management and Organization Department, Robert H. Smith School of Business, University of Maryland, College Park, MD 20742-1815, United States

<sup>b</sup> School of Psychology, Georgia Institute of Technology, Atlanta, GA 30332-0170, United States

<sup>c</sup> Department of Psychology, Michigan State University, East Lansing, MI 48824-1116 United States

<sup>d</sup> Management Department, University of Connecticut, Storrs, CT 06269-1041 United States

### ARTICLE INFO

#### Article history:

Received 14 July 2008

Accepted 29 June 2009

Available online 24 July 2009

Accepted by Daan van Knippenberg

#### Keywords:

Motivation

Teams

Performance

Cross-level

### ABSTRACT

Although individual- and team-level studies of motivational processes abound, very few have sought to link such phenomena across levels. Filling this gap, we build upon Chen and Kanfer's (2006) multilevel theoretical model of motivation in teams, to advance and test a cross-level model of relationships between individual and team motivation and performance. Data from two samples of undergraduates performing simulated team tasks supported the direct and mediated cross-level relationships between *team-level* prior performance, efficacy, and action processes with *individual-level* self-efficacy, goal striving, and performance. The findings provide support for a multilevel, system-based formulation of motivation and performance in teams. Findings also contribute to the on-going debate on whether motivational processes account for performance once controlling for prior performance.

© 2009 Elsevier Inc. All rights reserved.

Stimulated by the growing use of interdependent teams in work organizations, interest in work motivation as it operates at and within team contexts has burgeoned over the past two decades (Kozlowski & Bell, 2003; Kozlowski & Ilgen, 2006; Mathieu, Maynard, Rapp, & Gilson, 2008). Extending theories of work motivation and teams, Chen and Kanfer (2006) developed an integrated theoretical model which postulates team motivation as multilevel, system-like phenomena involving parallel and inter-related individual-level, team-level, and cross-level processes. However, only limited *empirical* research has explicitly considered individual or team motivation from a multilevel perspective (Kanfer, Chen, & Pritchard, 2008). The limited research on motivation in teams to date has focused on establishing functionally parallel, or homologous (Chen, Bliese, & Mathieu, 2005; Kozlowski & Klein, 2000), individual-level and team-level motivation constructs and processes. Initial evidence from this research suggests that motivational constructs at the individual and team levels are functionally similar, in that they relate to each other and to performance similarly at the individual and team levels (Chen & Bliese, 2002; Chen, Thomas, & Wallace, 2005; Chen, Webber, et al., 2002; DeShon, Kozlowski, Schmidt, Milner, & Weichmann, 2004; Gibson, 2001). In contrast, much less is known regarding *cross-level* relationships *between* individual and team motivation (exceptions

include Chen and Bliese (2002) and Watson, Chemers, and Preiser (2001)).

Accordingly, the primary purpose of this study was to empirically test cross-level hypotheses within an integrative, multilevel model of individual and team motivation and performance. Building on Chen and Kanfer's (2006) theorizing and prior research on motivational homology, we examine the model shown in Fig. 1, which specifies direct and mediated *cross-level* relationships between team-level and individual-level prior performance, efficacy beliefs, goal striving and action processes, and subsequent performance. Consistent with Chen and Kanfer, our emphasis in this research is on top-down (contextual) influences of team-level variables on individual-level outcomes, as opposed to bottom-up (emergent) influences of individual-level variables on team-level outcomes. Indeed, focusing on top-down influences is a logical next step in enhancing our understanding of multilevel motivation phenomena in teams beyond homology, as top-down effects are more prevalent, immediate, and powerful relative to bottom-up effects (Kozlowski & Klein, 2000; Mathieu & Taylor, 2007). Thus, a primary contribution of our research is the more complete empirical test of the cross-level relationships postulated by Chen and Kanfer, and the consideration of key mediating processes that link individual and team motivation across levels. Ultimately, we argue, this cross-level approach allows us to explain more variance in individual-level motivation and performance than would be explained by single-level or homologous formulations of these phenomena alone.

\* Corresponding author. Tel.: +1 301 405 0923; fax: +1 301 314 8787.

E-mail address: [giladchen@rhsmith.umd.edu](mailto:giladchen@rhsmith.umd.edu) (G. Chen).

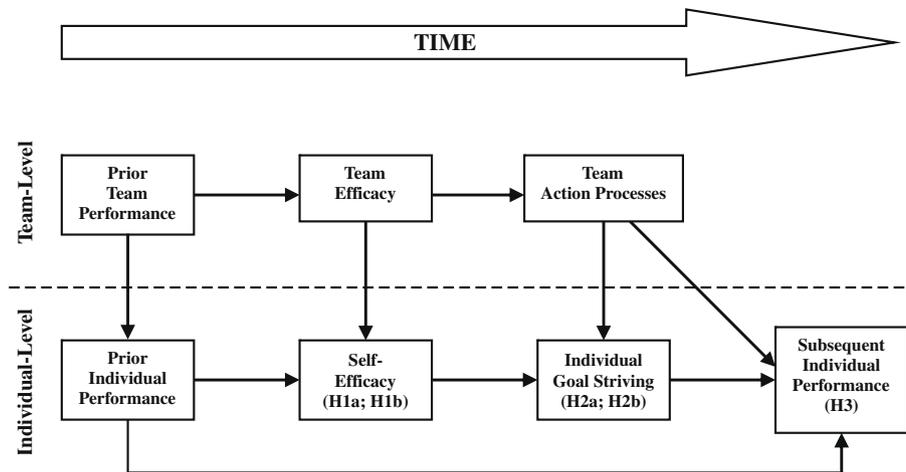


Fig. 1. Hypothesized multilevel model of motivation and performance in teams.

However, we also extend Chen and Kanfer's (2006) model by considering *dynamic* relationships in which, over time and across the individual and team levels, motivation contributes to performance, which in turn feeds back into subsequent motivation. Adopting this dynamic view of motivation in teams can help inform the recent debate regarding the efficacy–performance relationship (e.g., Bandura & Locke, 2003; Vancouver, Thompson, Tischner, & Putka, 2002; Vancouver, Thompson, & Williams, 2001). Specifically, work by Vancouver and his colleagues (2001, 2002) have suggested that self-efficacy relates to subsequent effort and performance more weakly and negatively when examined at the within-person level over repeated performance episodes. Extending these studies, we examine the dynamic within-person efficacy–performance relationship *within a team context*, where individual-level efficacy, effort and performance are likely influenced by team-level (i.e., contextual) phenomena. Likewise, our study also helps inform the broader question of whether self-efficacy predicts subsequent performance above and beyond past performance, which has yet to be studied in a team context (cf. Heggstad & Kanfer, 2005; Judge, Jackson, Shaw, Scott, & Rich, 2007). Finally, we also test our model in two samples consisting of 2-member and 3-member teams performing different tasks, and using different measures of individual goal striving, team action processes, and individual performance. Thus, the two samples allowed us to constructively replicate (Lykken, 1968) our findings across important operational boundaries of teams and motivation.

## Theory and hypotheses

Chen and Kanfer (2006) multilevel model of motivation in teams build upon and integrated among social-cognitive theories of individual motivation (e.g., Bandura, 1997; Locke & Latham, 1990) and theories of team processes and team effectiveness (e.g., Hackman, 1992; Marks, Mathieu, & Zaccaro, 2001). In this model, Chen and Kanfer postulated that, although individual motivation constructs are based on cognitive and behavioral processes and team-level constructs emerge from social and interpersonal processes, individual and team efficacy beliefs, goal processes, and performance share similar meanings and relate to each other similarly. Indeed, Bandura (1997) defined *self-efficacy* as the “belief in one’s capabilities to organize and execute the courses of action required to produce given attainments” (p. 408), and, similarly, *team efficacy* as “a group’s shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments” (p. 477).

Likewise, Chen and Kanfer (2006) proposed that goal striving – i.e., the self-regulation of effort when pursuing task objectives – captures functionally similar phenomena to what the team literature has coined as “team action processes” (Marks et al., 2001). According to Marks et al., team action processes include: (1) *monitoring progress toward goals* (i.e., assessing how the team does relative to its mission/task goals), (2) *system monitoring* (i.e., tracking material resources and environmental conditions as they relate to mission accomplishment), (3) *team monitoring and backup behaviors* (i.e., assisting team members in performing their task roles), and (4) *coordination* (i.e., orchestrating the sequence and timing of interdependent actions). A meta-analysis found that the four action process dimensions are positively related, and relate similarly (positively) to team performance (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008), suggesting that these processes reflect a unified, yet multidimensional system of collective effort. Thus, in teams, *individual goal striving* captures members’ allocation of *personal* effort towards team goals, which may involve effort directed at performing their individual role within the team, as well as assisting the team in other ways, such as helping other members perform their roles. Similarly, *team action processes* capture members’ allocation of *collective* effort towards team goals, which includes engagement in the four dimensions of team action processes.

Recently, Chen et al.’s (2005) study of teams performing a low-fidelity attack helicopter task and DeShon et al.’s (2004) study of simulated radar teams have shown that, in line with Chen and Kanfer’s (2006) theorizing, the individual-level relationships among self-efficacy, individual effort regulation, and individual performance are highly similar (i.e., homologous) to the team-level relationships among team efficacy, team effort regulation, and team performance. Although these studies advanced our understanding of the homologous nature and function of motivation in and of teams, they did not examine another important component of Chen and Kanfer’s theory, namely the *cross-level* interplay between individual and team motivation.

Accordingly, following the model displayed in Fig. 1, we next consider cross-level relationship involving prior team and individual performance, team and self-efficacy beliefs, team action processes and individual goal striving, and subsequent individual performance. Consistent with the general, multilevel principle of *bond strength* (Kozlowski & Klein, 2000), we expect that more proximal antecedents – i.e., those occurring closer in time and within the same level – will exert more powerful influences on an individual-level outcome than more distal antecedents. In line with Chen

and Kanfer's (2006) theorizing, we recognize that, at each stage of the model, direct cross-level relationships (e.g., between team efficacy and self-efficacy, team action processes and individual goal striving, etc.) may capture both top-down and bottom-up influences. However, given that top-down effects are likely more powerful than are bottom-up effects (especially in strong situations, such as after focal team constructs emerge and are shared among members), and since bottom-up influences may require more time to emerge (Kozlowski & Klein, 2000; Mathieu & Taylor, 2007), we assume that the cross-level relationships in our model are more likely to reflect top-down than bottom-up influences. Given our focus on top-down influences, we also consider individual performance as our ultimate criterion. We do, however, recognize that individual performance and team motivation promote team effectiveness (see Chen, 2005; Chen, Kirkman, Kanfer, Allen, & Rosen, 2007).

#### *Cross-level predictors of self-efficacy*

Extending social cognitive theory (Bandura, 1997), Chen and Kanfer (2006) proposed that prior individual performance represents a form of discretionary input that conveys personal performance feedback that can be unique to each member within a team, whereas team performance represents a form of ambient input that conveys a common (or collective) performance feedback to all team members (cf. Hackman, 1992). Thus, following Chen and Kanfer, we expect that prior individual performance would relate more strongly and directly to self-efficacy, whereas prior team performance would relate more strongly or directly to team efficacy. A study of collegiate sports teams by Feltz and Lirgg (1998) provided support for this expectation. However, we also propose two mediating pathways through which prior team performance relates to self-efficacy of individual team members.

First, we expect prior team performance to positively relate to self-efficacy through its association with individual performance. Indeed, the performance of individuals in interdependent teams is likely to be tightly and positively coupled with the performance of the team as a whole. For example, prior team performance may set norms for higher (or lower) individual performance (see Hackman, 1992), and hence promote more positive individual performance in a team. In support, previous research has found a positive relationship between individual performance and team performance, especially when the teams are highly interdependent (e.g., Chen, 2005; Chen et al., 2007). However, prior individual performance is likely to have a stronger relationship with self-efficacy than prior team performance, since it conveys to members more relevant information regarding personal competence.

Second, we propose that team efficacy will also mediate between prior team performance and subsequent self-efficacy. Social cognitive theory (Bandura, 1997) argues that prior team performance positively promotes subsequent team efficacy, as supported by empirical research (e.g., Feltz & Lirgg, 1998). In turn, team efficacy is likely to influence self-efficacy, because, due to the interdependent nature of individual roles in teams, members are likely to be more efficacious regarding performing their own roles (i.e., have high self-efficacy) when they believe their team is highly capable of performing its collective task (i.e., when members share high levels of team efficacy; see Chen and Bliese (2002) and Chen and Kanfer (2006)). Indeed, Eden (2001) has argued that individuals view teammates as important means for their success in a team, and hence team efficacy is an important source of self-efficacy in teams. Thus, team efficacy likely mediates the impact of prior team performance on self-efficacy, because it captures members' shared interpretation of past team performance and competence. Accordingly:

**Hypothesis 1.** The positive cross-level relationship between prior team performance and subsequent individual self efficacy is fully mediated by (a) prior individual performance, and (b) team efficacy.

#### *Cross-level predictors of individual goal striving*

According to Chen and Kanfer (2006), individuals' ability to regulate effort effectively when performing interdependent team tasks depends on how effectively other team members perform their roles. As such, individuals may be more motivated to exert effort on behalf of their team when their team shares high percepts of team efficacy. In contrast, when team efficacy is low, individuals may be less motivated to exert effort on behalf of their team since such efforts are likely to be perceived as unlikely to translate into positive team outcomes. However, we propose further that the positive relationship between team efficacy and individual goal striving is mediated by self-efficacy and team action processes.

First, we argue that self-efficacy is more proximal to individual-level self-regulation than is team efficacy, due to its greater information value in terms of forming judgments about personal competence in the context of the team. Specifically, individuals' effort allocation in a team can vary across members, and hence is more likely to be based on personal self-efficacy (which also varies across members) than on team efficacy (which is shared among members). Second, as argued by Marks et al. (2001), team action processes reflect important manifestations of team efficacy and other "emergent states." Further, as suggested by Chen and Kanfer (2006, p. 247), team action processes can directly and positively promote individual-level goal striving, since "teams who engage in effective [team action processes] are likely to encourage and motivate their members to contribute to these processes (e.g., through mechanisms such as modeling, persuasion, or vicarious experiences)." Therefore:

**Hypothesis 2.** The positive cross-level relationship between team efficacy and subsequent individual goal striving is fully mediated by (a) self-efficacy, and (b) team action processes.

#### *Cross-level predictors of individual performance*

Team action processes can also directly facilitate individuals' ability to perform their roles in a team. For instance, when team members effectively coordinate the timing of their activities (e.g., when computer programmers deliver their portions of a computer code in timely and coordinated manner), or when members assist each other to perform their tasks (e.g., when a pilot asks a copilot to check on an important flight indicator), each individual member is more likely to perform his/her role more effectively. However, we also expect that individual goal striving will partially mediate between team action processes and individual performance, since team action processes enhance team members' goal striving processes. Thus, in accordance with Chen and Kanfer's (2006) theorizing, we propose that team action processes both *enable* and *motivate* individual performance in teams. Hence:

**Hypothesis 3.** The positive cross-level relationship between team action processes and subsequent individual performance is partially mediated by individual goal striving.

#### **Study overview**

To test the hypotheses, we re-analyzed data reported in Chen et al. (2005) and DeShon et al. (2004), which we term Sample 1 and Sample 2, respectively. However, none of the *cross-level* effects

we focus on in this study were reported in these previously published studies. Moreover, we also include additional data not previously reported in these studies (including data capturing previous individual and team performance, data from two additional performance episodes not reported by Chen et al., different operationalization of team action processes not reported by Chen et al., and different operationalizations of individual goal striving and team action processes than those reported in DeShon et al.). Further, Chen et al. and DeShon et al. established that the individual-level and team-level variables in our model are homologous, which is an important pre-condition for testing the cross-level relationships postulated by Chen and Kanfer (2006). Moreover, the explicit comparison of Samples 1 and 2 allowed us to examine the extent to which the hypothesized relationships generalized across 2-member and 3-member teams, teams performing different tasks, and different operationalizations of individual goal striving, team action processes, and individual performance.

## Sample 1

### Method

#### Participants, task, and procedures

Participants were 150 undergraduates from a large university in the Southeastern United States, who performed in 75 two-person teams as part of a larger study investigating training and performance in team contexts (Chen et al., 2005). Chen et al. (2005) examined individual- and team-level relationships involving only the first of three performance missions reported in the present study, without taking into account cross-level effects across performance episodes. The sample was 74% male with an average age of 20 ( $SD = 1.56$ ). All participants received extra course credit and an opportunity for cash reward, as described in Chen et al. Participants performed a low-fidelity PC-based flight simulator task (Longbow2, 1997), where one member assumed the role of a pilot (responsible for flying the helicopter, firing weapons, and escaping enemy anti-aircraft fire), and another member assumed the role of a gunner (responsible for radar surveillance, weapon selection and management, and system monitoring). The task required a high level of interdependence between the pilot and the gunner.

The study session lasted about 4 h and was conducted in two phases. First, participants completed a 90-min training program. Second, all teams performed a practice mission, followed by three 15-min performance missions. Participants completed the self-efficacy and team efficacy measures prior to each performance mission, and individual goal striving and team action processes following each mission. Indices of team and individual performance were also obtained following each mission. Each performance mission contained the same number of targets, but differed in terms of terrain, target locations, and flight routes. Pilot testing ensured that the three missions were equally difficult, and the order in which the three parallel flight missions were performed was counterbalanced.

### Measures

**Individual performance.** Trained research assistants, who served as Subject Matter Experts (SMEs), rated individual members' performance following each performance mission using locally developed Behaviorally Anchored Rating Scales (BARS). The performance measures captured three distinct dimensions of each role in the team (see Chen et al., 2005). Prior performance involved performance in the mission preceding the focal performance mission (i.e., practice performance was prior performance when considering performance on mission#1 as subsequent performance, performance on mission#1 was prior performance when considering

performance on mission#2 as subsequent performance, etc.). Average internal consistency reliabilities across the three missions were .82 and .78 for the pilot and gunner performance measures, respectively.

**Self-efficacy.** Participants completed different self-efficacy measures for individuals assuming the pilot and gunner roles. The measures focused on tasks identified as most critical for each respective role, and asked participants to "rate how confident you are in your ability to successfully and consistently accomplish each of the following tasks" (1 = not at all confident; 5 = extremely confident). Average internal consistency across the three performance missions were .70 for the pilot self-efficacy measure, and .75 for the gunner self-efficacy measure.

**Individual goal striving.** Participants completed an individual goal striving measure, which captured individual activities directed at assisting the team to execute its mission goals and plans. This measure asked individuals to "rate the extent to which you personally engaged in each of the following behaviors during this last flight mission" (e.g., "I provided verbal feedback to my flight partner"; 1 = never; 5 = constantly; average  $\alpha$  across missions = .84).

**Team performance.** Team performance scores on each mission were based on the extent to which the team accomplish various team objectives (see Chen et al., 2005), as recorded on a computer screen following each mission. The maximum possible score in each mission was 410 pts. Team performance on the mission preceding each focal performance episode constituted prior team performance (e.g., practice performance was prior team performance when considering the first performance mission, etc.).

**Team efficacy.** A six-item team efficacy measure asked the pilot and gunner to "rate how confident your team is in its ability to successfully and consistently accomplish each of the following team tasks" (1 = not at all confident; 5 = extremely confident; average  $\alpha$  across missions = .73). Supporting the aggregation of team efficacy to the team-level, average ICC(1) across the three missions was .53 ( $F = 2.81$  to  $3.86$ ,  $p < .05$ ), and average ICC(2) was .69.

**Team action processes.** Team members rated action processes using items that paralleled the individual-level goal striving measure, but the items used a team, rather than individual referent. This measure, which was not reported in Chen et al.'s (2005) study, asked members to "rate the extent to which your team collectively engaged in each of the following behaviors during this last flight mission" (e.g., "We focused on how well our team progressed toward accomplishing our goals") (1 = never; 5 = constantly; average  $\alpha$  across missions = .88).<sup>1</sup> Supporting aggregation to the team-level, the average ICC(1) across the three missions was .40,  $F = 2.14$  to  $2.75$ ,  $p < .05$ , and the average ICC(2) was .57.<sup>2</sup>

<sup>1</sup> Because the team-rated action processes included similar items to the individual-level goal striving measure, albeit with the team as the referent, it was important to demonstrate that the two measures were distinct. Confirmatory factor analyses indicated that, in each time period, the two-factor model (which allowed the individual goal striving and team action processes factors to covary freely) fit the data significantly better ( $p < .05$ ) than an alternative model which set the two factors to correlate at 1.0,  $\Delta\chi^2_{(\Delta df=1)} = 4.96$ , 24.80, and 7.58, CFI = .95, .96, and .96, and SRMR = .05, .04, and .03 for Times 1–3, respectively.

<sup>2</sup> As described in Chen et al. (2005), team action processes were also rated by SMEs at the conclusion of each mission. The team-rated and SME-rated measures significantly correlated (average  $r$  across the missions was .45,  $p < .01$ ), and very similar substantive results were obtained with the two measures (results are available upon request). Thus, we only report results from the team-rated measure of team action processes in this study.

**Table 1**  
Descriptive statistics and correlations (Sample 1).

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
Time	2.00	0.82	–									
Role in team	1.50	0.50	.00	–								
Prior individual performance	2.84	0.88	.05	–.08	–							
Self-efficacy	3.71	0.61	.13*	–.21*	.35*	–						
Individual goal striving	3.69	0.71	.24*	–.20*	.19*	.43*	–					
Subsequent individual performance	2.87	0.89	.03	–.11*	.66*	.25*	.33*	–				
Prior team performance	148.3	96.4	.24*	.00	.50*	.24*	.12*	.27*	–			
Team efficacy	3.55	0.59	.05	.00	.53*	.55*	.30*	.33*	.50*	–		
Team action processes	3.81	0.60	.28*	.00	.13*	.35*	.74*	.33*	.11*	.38*	–	
Subsequent team performance	174.0	99.9	.09*	.00	.19*	.08	.28*	.48*	.14*	.20*	.42*	–

Note.  $N = 450$ ; Role in Team: 1 = gunner; 2 = pilot; Correlations are at individual-level data, averaged across the three performance episodes, with team means assigned down to individuals.

\*  $p < .05$ .

### Analysis strategy

Due to the multilevel nature of the data, the hypotheses were tested using hierarchical linear modeling (HLM; Raudenbush, Byrk, & Congdon, 2004). In particular, individual-level outcomes were analyzed using 3-level HLM models, in which level 1 was composed of repeated individual-within-team observations (i.e., individual-level variables across the three missions, reflected by  $\pi$  coefficients), level 2 was composed of repeated team-level observations (i.e., team-level variables across the three missions, reflected by  $\beta$  coefficients), and level 3 included simply the team identification variable to reflect between-team differences (Raudenbush et al., 2004). These repeated-measures cross-level analyses captured longitudinal, within-individual and within-team relationships. In all analyses of individual outcomes, we controlled for team members' role in the team (gunner vs. pilot), since the pilot role was more challenging than the gunner role, and for time (coded as missions one, two, and three), to examine plausible changes in variables over time. Analyses of team-level outcomes were conducted using 2-level HLM (level 1 = repeated team-level observations over time; level 2 = team identification). We standardized all variables at their respective levels prior to the analysis (i.e., the estimates we report are standardized estimates).

To test the mediation hypotheses (H1–H3), we followed the meso-mediation framework proposed by Mathieu and Taylor (2007). Similar to Baron and Kenny (1986), full mediation occurs when: (1) the independent variable ( $X$ ) predicts the dependent variable ( $Y$ )<sup>3</sup>, (2)  $X$  predicts the mediating variable ( $M$ ), and, when regressing  $Y$  on both the  $X$  and  $M$ , (3)  $M$  significantly predicts  $Y$ , but (4)  $X$  no longer significantly predicts  $Y$ . Since H1–H3 involved two mediators each, we also report results from MacKinnon, Lockwood, Hoffman, West, and Sheets' (2002)  $z'$  test, which assesses whether an antecedent ( $X$ ) is related indirectly to a criterion ( $Y$ ) via each specific mediating or intervening variable ( $M$ ). Finally, we report Snijders and Bosker's (1999) pseudo  $\sim R^2$  as an estimate of criterion variance accounted for, based on estimates of the proportional reduction of error for predicting an individual outcome (using level 1, level 2, and level 3 residual variances for dependent variable).

### Results

Table 1 reports descriptive statistics and correlations among Sample 1 variables. Note that correlations were at the individual-level, averaged across the three missions, with team variable

means assigned down to individuals. For completion, we also report correlations with subsequent team performance, and address these in the "General discussion" section.

### Cross-level analyses of self-efficacy

To test H1a and b, we first examined whether prior team performance predicted the two mediators – prior individual performance (H1a) and team efficacy (H1b). HLM tests showed that prior team performance indeed significantly predicted both prior individual performance ( $\beta = .35$ ,  $p < .05$ ) and team efficacy ( $\pi = .49$ ,  $p < .05$ ). Also, as shown in Table 2 (Model 1), prior team performance positively and significantly predicted self-efficacy ( $\beta = .18$ ,  $p < .05$ ). In addition, Model 2 in Table 2 shows that both team efficacy ( $\beta = .53$ ,  $p < .05$ ) and prior individual performance ( $\pi = .13$ ,  $p < .05$ ) predicted self-efficacy, whereas prior team performance significantly and negatively predicted self-efficacy ( $\beta = -.12$ ,  $p < .05$ ). The finding that prior team performance was significantly negatively related to self-efficacy once introducing the mediators may be indicative of suppression, which, according to Shrout and Bolger (2002, p. 430) occurs when the indirect effect has the opposite sign of the estimated direct effect of the independent variable in the presence of the mediator. Indeed, in contrast to the significant negative estimate obtained for team performance in Model 2 (Table 2), the indirect cross-level relationship between prior team performance and self-efficacy was significant and positive through both prior individual performance ( $z' = 2.11$ ,  $p < .05$ ) and team efficacy ( $z' = 6.75$ ,  $p < .05$ ), indicating that inclusion of the mediators led to significant drop in the parameter estimate of the prior team performance influence. Thus, in line with Shrout and Bolger, we conclude that these results provide support for H1a and b.

### Cross-level analyses of individual goal striving

The second set of hypotheses position self-efficacy (H2a) and team action processes (H2b) as mediators between team efficacy and individual goal striving. Providing support for the first mediation pre-condition, team efficacy significantly and positively predicted self-efficacy, as noted above (see Table 2, Model 2). Additional 2-level HLM tests indicated that, after controlling for prior team performance, team efficacy significantly and positively predicted team action processes ( $\beta = .21$ ,  $p < .05$ ). As shown in Model 3 of Table 2, team efficacy positively and significantly predicted individual goal striving ( $\beta = .12$ ,  $p < .05$ ). Moreover, as shown in Model 4 (Table 2), both self-efficacy ( $\pi = .18$ ,  $p < .05$ ) and team action processes ( $\beta = .70$ ,  $p < .05$ ) positively predicted individual goal striving, and team efficacy negatively and significantly predicted individual goal striving ( $\beta = -.11$ ,  $p < .05$ ). The significant negative estimate associated with team efficacy in the model including team-rated action processes and self-efficacy may again

<sup>3</sup> We recognize that the " $X \rightarrow Y$  pre-condition" has been relaxed in recent years (e.g., Shrout & Bolger, 2002). However, as noted by Mathieu and Taylor (2002), establishing at least some relationship between the independent and dependent variable can help distinguish between mediated versus indirect relationships.

**Table 2**  
Hierarchical linear modeling tests of hypotheses (Sample 1).

	Dependent variable: self efficacy		Dependent variable: individual goal striving		Dependent variable: individual performance	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Individual-level predictors</i>						
Position <sup>a</sup>	-.20 (.06)*	-.19 (.05)*	-.19 (.05)*	-.15 (.04)*	-.04 (.02)	-.03 (.03)
Prior individual performance	–	.13 (.06)*	.12 (.07)	.07 (.04)	.62 (.04)*	.60 (.04)*
Self efficacy	–	–	–	.18 (.05)*	.06 (.03)*	.04 (.03)
Individual goal striving	–	–	–	–	–	.08 (.04)*
<i>Team-level predictors</i>						
Time	.10 (.05)*	.15 (.04)*	.31 (.05)*	.02 (.03)	-.11 (.05)*	-.12 (.04)*
Prior team performance	.18 (.04)*	-.12 (.04)*	-.11 (.06)	.00 (.03)	-.03 (.05)	-.03 (.04)
Team efficacy	–	.53 (.05)*	.12 (.06)*	-.11 (.04)*	-.18 (.06)*	-.17 (.05)*
Team action processes	–	–	–	.70 (.03)*	.35 (.05)*	.30 (.05)*
~R <sup>2</sup>	.11*	.24*	.20*	.44*	.23*	.24*

Note. Table entries represent HLM parameter estimates with standard errors in parentheses;  $N = 75$  teams, 150 individuals, and 450 observations (across three performance episodes).

\*  $p < .05$ .

<sup>a</sup> 1 = weapon specialist; 2 = pilot.

be a function of suppression, as the indirect cross-level relationships between team efficacy and individual goal striving were significant and positive through both self-efficacy ( $z' = 3.40, p < .05$ ) and team action processes ( $z' = 2.97, p < .05$ ). Thus, results supported H2a and b.

#### Cross-level analyses of subsequent individual performance

H3 posits that team action processes positively relate to subsequent individual performance both directly and as (partially) mediated by individual goal striving. As indicated above (Table 2), team action processes positively and significantly predicted individual goal striving. In addition, as shown in Table 2 (Model 5), team action processes positively predicted subsequent individual performance ( $\beta = .35, p < .05$ ). In addition, Model 6 (Table 2) shows that individual goal striving significantly and positively predicted subsequent individual performance ( $\pi = .08, p < .05$ ), while team action processes remained a significant predictor ( $\beta = .30, p < .05$ ). Further, the indirect relationship between team action processes and individual performance through goal striving was significant ( $z' = 1.99, p < .05$ ). Thus, H3 was also supported.

Interestingly, in Model 5, self-efficacy positively and significantly predicted subsequent individual performance,  $\pi = .06, p < .05$ . When introducing individual goal striving, self-efficacy no longer significantly predicted performance in Model 6,  $\pi = .04, ns$ . Also, the indirect relationship between self-efficacy and subsequent individual performance through individual goal striving approached significance,  $z' = 1.70, p < .10$ . These results indicate that self-efficacy related to subsequent individual performance at least partially through individual goal striving.

Finally, team efficacy was significantly negatively related to subsequent individual performance in Models 5 and 6 ( $\beta = -.18$  and  $-.17, p < .05$ ). However, in additional analyses which excluded individual goal striving and action processes from Models 5 and 6, team efficacy did not significantly relate to subsequent individual performance,  $\beta = -.04, ns$ . This suggests that the negative effect detected for team efficacy in Models 5 and 6 may be due to suppression.

#### Auxiliary analyses

Given the self-efficacy, team efficacy, team action processes, and goal striving measures were based on self-reports, cross-level relationships involving these measures may have been inflated due to common-source variance. To examine the extent of this potential concern, we divided the dataset such that the individual-level outcome measure (self-efficacy or individual goal striving) was

based on one focal team member, whereas the team-level predictor measure (team efficacy or team action processes) was based on the other member from the same team/dyad. We then compared the average correlations between these “split-team” team-level and individual-level measures across the three missions to those obtained from the “full team” data (which was susceptible to common-source variance). Results indicated that the split team and the full team correlations (respectively) were .35 and .55 between team efficacy and self-efficacy, .20 and .30 between team efficacy and individual goal striving, and .40 and .70 between team-rated action processes and individual goal striving (all significant at  $p < .05$ ). Thus, although common-source variance inflated these relationships to some extent, these relationships held even when removing common-source variance.

#### Discussion

The results obtained from Sample 1 provide support for our theoretical, cross-level model of relationships. However, there are two limitations associated with Sample 1. First, additional approaches for operationalizing team and individual motivation are possible. Second, Sample 1 involved 2-member teams, and as such it is unclear whether findings would generalize to larger (3 or more member) teams, where team processes can be more complex. Accordingly, we attempted to constructively replicate findings from Sample 1 using Sample 2.

#### Sample 2

##### Method

##### Participants, task, and procedures

Sample 2 included participants from a study conducted by DeShon et al. (2004). Participants were 225 undergraduate psychology students who composed 75 teams of 3, who received partial course credit for participation; 90% were under the age of 22, 56% percent were women, and 77% were Caucasian. The study lasted 3.5 h per team.

Teams performed a PC-based simulation of a team-based, radar-tracking task (TEAMSIm). Team members worked interdependently to identify radar contacts, make decisions, and prevent intrusions into their radar perimeter. Each team member was primarily responsible for one of three sectors designated on the display but could also monitor and work in other members' sectors. Each team member's workload was equal over the course of the

task but the task was designed so that each team member became overloaded at different times during the task. The workload distribution was used to create discretionary opportunities for other members to shift their priorities and strategies, coordinate effort, and contribute to team performance. Although collective effort contributed to team performance, team members working outside their primary sector could not simultaneously work toward accomplishing individual goals.

Following individual and team training protocols, participants completed three 10-min performance episodes, each consisting of two 5-min sub-trials. Team members completed measures of self-efficacy and team efficacy prior to each 10-min performance episode and then goal striving, action processes, and performance measures were obtained using objective data collected during the performance episodes.<sup>4</sup> Although the teams performed three performance episodes, prior individual and team performance scores were not available for the first episode. Thus, we only focused on the second and third performance episode, using performance scores from episode 1 as prior performance for episode 2, etc.

### Measures

**Individual performance.** Individual performance was assessed using objective data obtained from the computer during each trial. Individuals gained 1000 pts for every correctly processed contact in their assigned sector, lost 1000 pts for every incorrectly processed contact in their assigned sector, lost 200 pts for each contact that penetrated the outer perimeter in their assigned sector, and lost 1 pt for every second the contact remained in the perimeter until it was processed. Individuals also lost 50 pts for each contact that penetrated the inner perimeter in their assigned sector, and 5 pts for every second the contact remained in the perimeter. Individuals did not receive points on their individual score for processing contacts outside their assigned sector. Rather, these points contributed to the team score, as described below.

**Self-efficacy.** Self-efficacy was measured using an eight-item Likert scale (1 = strongly disagree; 5 = strongly agree;  $\alpha = .96$  and  $.96$  prior to performance trials 2 and 3, respectively) developed to assess task-specific self-efficacy for performing individual tasks within this simulation (Kozlowski et al., 2001).

**Individual goal striving.** Goal striving was assessed based on the total number of contacts that individuals processed within their own assigned sectors (i.e., self-focused effort) as well as in other members' sectors (i.e., team-focused effort), irrespective of whether the contacts were processed correctly and incorrectly. In DeShon et al.'s (2004) study, individual goal striving was operationalized based only on self-focused effort, since their study emphasized the distinction between self-directed and team-directed effort. However, the combination of self-focused effort and team-focused effort matches more closely Chen and Kanfer's (2006) conceptualization of individual goal striving in teams, and matches better the operationalization of individual goal striving in Sample 1.

**Team performance.** Team performance was based on the same scoring procedure used for individual performance, except it was based on both members' performance in their own assigned sector and

similar scores from members' performance in other members' sectors.

**Team efficacy.** Team efficacy was measured using an eight-item scale (1 = strongly agree; 5 = strongly agree) that was similar to the self-efficacy scale, except items used the team – not the individual – as the referent,  $\alpha = .96$  and  $.97$  prior to the second and third performance trials, respectively. Supporting aggregation to the team-level, the average ICC(1) was  $.28$  (average  $F = 2.16$ ,  $p < .05$ ), and the average ICC(2) was  $.52$ .

**Team action processes.** In DeShon et al.'s (2004) study, team action processes were based only on the average team-focused effort within the team. However, to be more consistent with the broader conceptualization of team action processes as the collective effort team members allocate while pursuing team goals, we operationalized team action processes by aggregating average team members' individual goal striving scores to the team level, which included both self-focused and team-focused effort. In support of aggregation to the team-level, across the second and third performance trials, the average ICC(1) was  $.15$  (average  $F = 1.54$ ,  $p < .05$ ), and the average ICC(2) was  $.35$ .

**Controls.** As described in DeShon et al. (2004), teams were randomly assigned to three feedback conditions, which provided participants with feedback regarding individual performance, team performance, or both, after completion of each 10-min performance episode. We thus controlled for the experimental feedback manipulations in all analyses, via two dummy variables – one for individual feedback vs. all else, and another for team feedback vs. all else.<sup>5</sup> In addition, as in Sample 1, we controlled individuals' role in the team at the individual-level of analysis (using two dummy variables), as well as for time at the team-level of analysis.

### Analysis strategy

As in Sample 1, individual-level outcomes were analyzed using 3-level HLM tests, and team-level outcomes were analyzed using 2-level HLM tests.

### Results

Table 3 reports descriptive statistics, as well as individual-level correlations, averaged across the two performance trials, with team variable means assigned down to individuals.

### Cross-level analyses of self-efficacy

As part of the mediation analyses of H1a and b, HLM tests indicated that prior team performance significantly predicted both prior individual performance ( $\beta = .16$ ,  $p < .05$ ) and team efficacy ( $\pi = .16$ ,  $p < .05$ ). In addition, as shown in Table 4 (Model 1), prior team performance positively and significantly predicted self-efficacy ( $\beta = .16$ ,  $p < .05$ ). In the second step of the analyses (Model 2, Table 4), both team efficacy ( $\beta = .43$ ,  $p < .05$ ) and prior individual performance ( $\pi = .18$ ,  $p < .05$ ) predicted self-efficacy, whereas prior team performance no longer related significantly to self-efficacy ( $\beta = .04$ , *ns*). In addition, the indirect cross-level relationship between prior team performance and self-efficacy was significant and positive through both prior individual performance ( $z' = 3.40$ ,

<sup>4</sup> Participants completed a variety of other individual-level and team-level measures as part of this larger experiment (see DeShon et al., 2004). However, consistent with findings by DeShon et al., additional analyses we conducted revealed that our cross-level results held even when controlling for additional individual-level and team-level measures of ability, goal orientation, self-set goals, goal commitment, and strategy. Given these additional measures also had relatively weaker relationships with goal striving, team action processes, and individual and team performance, we do not report analyses with these measures in this article.

<sup>5</sup> We also examined whether the feedback manipulations moderated the relationships in our model. Results indicated that only two interactions were significant ( $p < .05$ ): (1) team efficacy related to self-efficacy more positively when individual feedback was present; and (2) self-efficacy related to individual goal striving more positively when individual feedback was absent. Given only two interactions were significant – and in opposite directions, we concluded that the results remained rather consistent irrespective of the feedback manipulation.

**Table 3**  
Descriptive statistics and correlations (Sample 2).

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
Time	1.50	0.50	–												
Role 2 (vs. rest)	0.33	0.47	.00	–											
Role 3 (vs. rest)	0.33	0.47	.00	–.50*	–										
Prior individual performance	6121.8	10597	.24*	–.05	.01	–									
Self-efficacy	4.14	0.65	.09	.05	–.18*	.24*	–								
Individual goal striving	27.15	6.07	.13*	–.07	.03	.36*	.31*	–							
Subs. individual performance	9692.8	8834	.12*	–.04	–.02	.62*	.36*	.54*	–						
Individual feedback condition	0.33	0.47	.00	.00	.00	.03	–.09	.09*	.09*	–					
Team feedback	0.33	0.47	.00	.00	.00	–.02	.08	–.03	–.04	–.50*	–				
Prior team performance	7623.0	10400	.41*	.00	.00	.29*	.23*	.22*	.26*	–.06	.17*	–			
Team efficacy	4.13	0.47	.10*	.00	.00	.11*	.46*	.17*	.18*	–.05	.10*	.32*	–		
Team action processes	27.15	3.32	.23*	.00	.00	.31*	.24*	.55*	.44*	.17*	–.06	.41*	.32*	–	
Subsequent team performance	12150	10490	.03	.00	.00	.22*	.23*	.15*	.16*	–.12*	.28*	.46*	.34*	.28*	–

Note. N = 450; Correlations are at individual-level data, averaged across the two performance episodes, with team means assigned down to individuals.

\* p < .05.

p < .05) and team efficacy (z' = 2.48, p < .05). Thus, H1a and b were both supported.

*Cross-level analyses of individual goal striving*

In support of H2a and b, team efficacy significantly and positively predicted self-efficacy (see Table 4, Model 2). In addition, 2-level HLM tests showed that, after controlling for prior team performance, team efficacy significantly and positively predicted team action processes (β = .30, p < .05). Further, as shown in Table 4, Model 3, team efficacy positively and significantly predicted individual goal striving (β = .11, p < .05). In a subsequent model (Model 4, Table 4), both self-efficacy (π = .21, p < .05) and team-rated action processes (β = .48, p < .05) positively and uniquely predicted individual goal striving, whereas team efficacy no longer significantly predicted individual goal striving (β = –.08, ns). Moreover, the indirect cross-level relationships between team efficacy and individual goal striving were significant and positive through both self-efficacy (z' = 4.21, p < .05) and team action processes (z' = 3.57, p < .05). These results thus supported H2a and b.

*Cross-level analyses of subsequent individual performance*

As indicated above (Table 4, Model 4), team action processes positively and significantly predicted individual goal striving. In addition, as shown in Table 4 (Model 5), team action processes uniquely and positively predicted subsequent individual performance, β = .24, p < .05. Additionally, as shown in Table 4 (Model 6), when including individual goal striving in the model, both individual goal striving (π = .26, p < .05) and team action processes (β = .12, p < .05) significantly and positively predicted subsequent individual performance. Moreover, the indirect relationship of team action processes with subsequent individual performance through goal striving was significant (z' = 5.70, p < .05). Thus, in support of H3, the positive cross-level relationship between team action processes and subsequent individual performance was both direct and through individual goal striving.

Table 4 (Models 5 and 6, respectively) also indicated that self-efficacy positively and significantly predicted subsequent individual performance (π = .21, p < .05), and this relationship held even when controlling for individual goal striving (π = .15, p < .05). Also, the indirect relationship between self-efficacy and subsequent individual performance through individual goal striving was significant, z' = 2.93, p < .05. These results indicate that self-efficacy related to subsequent individual performance at least partially through individual goal striving.

Table 4 (Models 5 and 6, respectively) also indicated that self-efficacy positively and significantly predicted subsequent individual performance (π = .21, p < .05), and this relationship held even when controlling for individual goal striving (π = .15, p < .05). Also, the indirect relationship between self-efficacy and subsequent individual performance through individual goal striving was significant, z' = 2.93, p < .05. These results indicate that self-efficacy related to subsequent individual performance at least partially through individual goal striving.

*Discussion*

Despite important differences in team characteristics (larger team size and different team task) and measurement approaches (objective indices of goal striving, action processes, and individual

**Table 4**  
Hierarchical linear modeling tests of individual-level outcomes (Sample 2).

	Dependent variable: self efficacy		Dependent variable: individual goal striving		Dependent variable: individual performance	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Individual-level predictors</i>						
Position dummy 1 <sup>a</sup>	–.05 (.06)	–.04 (.06)	–.05 (.05)	–.05 (.04)	–.03 (.04)	–.02 (.04)
Position dummy 2 <sup>b</sup>	–.21 (.07)*	–.20 (.07)*	.00 (.05)	.04 (.04)	.00 (.04)	–.01 (.04)
Prior individual performance	–	.18 (.04)*	.32 (.05)*	.19 (.04)*	.51 (.04)*	.46 (.04)*
Self efficacy	–	–	–	.21 (.04)*	.21 (.04)*	.15 (.04)*
Individual goal striving	–	–	–	–	–	.26 (.04)*
<i>Team-level predictors</i>						
Time	.04 (.05)	–.03 (.05)	.00 (.10)	–.05 (.08)	–.15 (.08)*	–.14 (.07)
Individual feedback	–.15 (.16)	–.15 (.09)	.19 (.11)	.04 (.09)	.11 (.08)	.10 (.08)
Team feedback	.05 (.14)	.01 (.10)	–.02 (.11)	.01 (.09)	–.01 (.08)	–.02 (.08)
Prior team performance	.16 (.03)*	.04 (.03)	.10 (.05)*	–.04 (.05)	.01 (.04)	.02 (.04)
Team efficacy	–	.43 (.06)*	.11 (.04)*	–.08 (.05)	–.04 (.04)	–.01 (.04)
Team action processes	–	–	–	.48 (.04)*	.24 (.04)*	.12 (.04)*
~R <sup>2</sup>	.05*	.11*	.10*	.32*	.38*	.43*

Note. Table entries represent HLM parameter estimates with standard errors in parentheses; Ns = 75 teams, 225 individuals, and 450 observations (across two performance episodes).

\* p < .05.

<sup>a</sup> Role 2 vs. else.

<sup>b</sup> Role 3 vs. else.

performance), results from Sample 2 largely replicated results from Sample 1. In fact, the only difference in results across the two samples involved suppressor effects detected in Sample 1. However, despite suppressor effects in Sample 1, all hypotheses received support in both samples. Interestingly, results in Sample 2 held even after taking into account the experimental manipulations of feedback. Particularly informative was the finding that prior team and individual performance significantly related to subsequent self-efficacy and team efficacy, over and above individual and team feedback, respectively. This suggests that actual prior performance levels more significantly related to efficacy beliefs than the performance feedback provided to participants via the manipulation.

## General discussion

Building off studies by Chen et al. (2005) and DeShon et al. (2004), which established homology between individual-level and team-level motivation and performance, this research provided consistent evidence for the *cross-level* pathways by which team and individual motivation are connected, supporting key tenets of the Chen and Kanfer (2006) multilevel model of motivation in teams. More broadly, our findings also contribute unique empirical evidence to a growing recognition that motivation is not just an intra-psychic process, but, rather, involves a more complex set of contextually-grounded, interpersonal, temporal, as well as person-centered phenomena (Grant, 2007; Kanfer et al., 2008; Kark & van Dijk, 2007).

### Findings and contributions

The present findings augment extant theory and the research literature in five ways. First, we extend previous research on individual and team homology by demonstrating *how* motivational processes at the team level influence motivational processes at the individual level. Consistent with Chen and Kanfer (2006), our findings indicate that with the exception of the relationship between team action processes and individual performance, team level motivation constructs exert cross-level influences on individual motivation through mediated pathways, rather than directly. Our findings further show that the mediating pathways linking between team and individual motivation involved overlap in level (i.e., some mediators were at the individual level, as were the outcomes), as well as in content and timing (i.e., other mediators captured similar conceptual meanings and operated simultaneously with the outcomes). Although these results may represent an artifact of design, it is also possible that these findings reflect an important boundary condition on cross-level influences – namely that influences may be limited to contexts that afford intrinsic alignment of multilevel motivation constructs, whether they be experiential (e.g., prior individual and team enactive mastery), cognitive (e.g., team efficacy and self-efficacy), or behavioral (e.g., team action processes and individual goal striving).

Our second contribution pertains to the findings that team-level motivation can explain additional variance in individual performance over and above individual-level motivation. The direct cross-level relationships between team action processes and individual performance stands in sharp contrast to the mediated pathway observed in analyses of cross-level relationships at all prior points in the chain. Conceptually, we suggest that team-level action processes, in contrast to team efficacy, for example, operate directly on the context for performance and may be influential due to their environmental (rather than psychological) impact on action. For example, a teammate's backup behavior may contribute directly to another individual's performance without necessarily enhancing that person's self efficacy or goal striving.

The third contribution of our findings pertains more generally to the measurement of motivational processes in teams. In particular, we detected strong support for cross-level relationships in our model despite quite different approaches measuring goal striving and team action processes (i.e., self-ratings in Sample 1 vs. objective indices in Sample 2). Regardless of measurement approaches and other differences in team attributes (e.g., 2-member vs. 3-member teams), the findings involving team action process and individual goal striving were quite similar. These results suggest that these measurement approaches all represent viable means of capturing these critical motivational processes. Collectively, the reliance on different measurement approaches and the differences in team characteristics across the studies serve to substantially enhance the validity and generalizability of our findings.

Fourth, our findings also contribute to the literature by helping to further inform the controversy regarding the direction of efficacy influences on performance. Heggstad and Kanfer (2005) found that self-efficacy does not predict performance after controlling for prior performance. Findings by Vancouver and his colleagues (2001, 2002) indicate further that when examined from a within-individual perspective, self efficacy exerts a slight negative influence on subsequent performance. In contrast, using a within-individual (and within-team) design in both Samples 1 and 2, we found a positive relation between self-efficacy and subsequent goal striving and performance, even when controlling for prior performance. It is quite possible that the contextual features of task performance in our studies, in which individuals were accountable to teammates, operated to reduce the likelihood of overconfidence (and a resulting reduction in effort). Further, it is reasonable to propose that the significant relationships between self-efficacy and subsequent performance in our studies stemmed primarily from context (cross-level) influences, and that context influences modulated self-efficacy judgments beyond past individual performance alone. Given the ubiquitous nature of teams in modern work, further research is needed to identify the task/team context conditions that may indeed produce the negative relation observed by Vancouver et al. (2001, 2002). For example, team longevity, rewards, leadership, and task interest/meaningfulness can all play important roles in whether or not individuals and teams become overconfident as they perform over repeated episodes.

Finally, our findings with respect to cross-level relationships suggest several potential implications for managing teams and individuals working in teams, which, to date, has focused largely on managing team-level motivational processes (Kozlowski & Bell, 2003). Specifically, effective management of team effectiveness can also pay high dividends in terms of influencing the motivation and performance of individual members within the team. Indeed, our findings suggest that interventions and practices directed at improving team efficacy and team action processes translate into more effective individual-level self-regulation and performance. This may prove to be particularly beneficial if members work simultaneously on multiple teams. To the extent that participation in "Team A" helps to promote effective members' self-regulation processes, organizations may not only reap the benefits of more effective Team A performance, but they may also derive value from more effective performance of those same members in "Teams B, C, D, etc." as well as, perhaps, in their non-team work activities. Thus, managerial actions that enhance the effectiveness of a team's operations may prove beneficial far beyond the value of just that team's performance.

### Limitations and future research

No research is without limitations and two associated with these studies warrant note. First, we investigated cross-level relationships with students performing in the context of two simula-

tions designed to map well to the major time, task, and psychological demands of modern flight and radar teams. Although psychological fidelity was rather high in both samples, replications of our findings using organizational teams in field settings and teams performing different tasks are clearly needed. Another limitation of our study is that we did not experimentally manipulate key constructs in our model. As such, we cannot draw strong causal inferences from our results. Although feedback was manipulated in Sample 2, this manipulation did not seem to affect the processes we studied. Clearly, experimental replications of our findings are needed to strengthen the internal validity of our findings.

In addition to strengthening the internal and external validity of our research, additional fruitful avenues for future research include incorporating various predictors of individual and team motivation, beyond prior performance, as well as testing possible boundary conditions for the generalization of motivation theory across levels of analysis. First, researchers should uncover unique and complementary practices that motivate individuals both personally and collectively. For instance, team staffing systems may need to identify individual differences that help drive individual team members' performance, as well as the best combination or configuration of individual differences at the team-level. Second, it is important to examine the possible moderating effects of certain boundary conditions on the interplay between individual and team motivational processes. For instance, work team characteristics (e.g., reward structure, team composition), as well as the extent to which team-level motivation constructs (such as team efficacy beliefs) are strongly vs. weakly shared among members can moderate the extent to which team and individual motivation processes are related.

More research is also needed to enhance our understanding of the individual-level efficacy–performance relationship by considering contextual moderators of this relationship. For example, it is possible that this relationship remains positive and significant over time when individuals perform in a team that has a more learning oriented climate, but that this relationship becomes more negative over time when team climate is more performance oriented, since a more learning oriented climate may encourage team members to be more receptive to changes in the task environment (cf. Audia, Locke, & Smith, 2000). A related issue that deserves additional attention is whether goal striving and team action processes always positively contribute to performance. Research should examine, for example, whether effective allocation of individual and collective effort towards accomplishing a misguided goal (e.g., due to a mismatch between the goal and the environmental requirements) may be harmful in teams.

Finally, an underlying assumption in our study was that top-down (contextual) influences are more powerful than bottom-up (emergent) influences. Now that we have clear evidence that team motivational variables can exact strong influences on individual motivation and performance, the time may be ripe to consider more carefully whether, when, and how individual motivation may also exert emergent influences on team outcomes. Indeed, inspection of Tables 1 and 3 suggests that, in both samples, prior and subsequent individual performance both correlated positively with subsequent team performance, which could be suggestive of plausible upward influences. However, the motivational and social mechanisms through which individual motivation and performance emerge to influence team motivation and performance may be complex, and are not yet clear. Providing some guidance on this issue, Mathieu and Taylor (2007, p. 145) suggested that “upward influences would be more prominent in instances where higher level phenomena have yet to fully crystallize or form, such as during socialization periods, early team interactions, following a major organizational intervention, and so forth.” Thus, research that measures and/or manipulates individual and team motiva-

tional processes at critical junctures in the team's development and compilation process (cf. Kozlowski, Gully, Nason, & Smith, 1999) can shed more light on the relative importance and likely timing of top-down vs. bottom-up motivational influences in teams. Although designing and executing such studies can be quite challenging and complex, such research will no doubt enhance our understanding of the complex, multilevel nature of motivation in teams.

## References

- Audia, P. G., Locke, E. A., & Smith, K. G. (2000). The paradox of success: An archival and a laboratory study of strategic persistence following radical environmental change. *Academy of Management Journal*, 43, 837–853.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.
- Bandura, A., & Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, 88, 87–99.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182.
- Chen, G. (2005). Newcomer adaptation in teams: Multilevel antecedents and outcomes. *Academy of Management Journal*, 48, 101–116.
- Chen, G., & Bliese, P. D. (2002). The role of different levels of leadership in predicting self and collective efficacy: Evidence for discontinuity. *Journal of Applied Psychology*, 87, 549–556.
- Chen, G., Bliese, P. D., & Mathieu, J. E. (2005). Conceptual framework and statistical procedures for delineating and testing multilevel theories of homology. *Organizational Research Methods*, 8, 375–409.
- Chen, G., & Kanfer, R. (2006). Toward a systems theory of motivated behavior in work teams. *Research in Organizational Behavior*, 27, 223–267.
- Chen, G., Kirkman, B. L., Kanfer, R., Allen, D., & Rosen, B. (2007). A multilevel study of leadership, empowerment, and performance in teams. *Journal of Applied Psychology*, 92, 331–346.
- Chen, G., Thomas, B. A., & Wallace, J. C. (2005). A multilevel examination of the relationships among training outcomes, mediating regulatory processes, and adaptive performance. *Journal of Applied Psychology*, 90, 827–841.
- Chen, G., Webber, S. S., Bliese, P. D., Mathieu, J. E., Payne, S. C., Born, D. H., et al. (2002). Simultaneous examination of the antecedents and consequences of efficacy beliefs at multiple levels of analysis. *Human Performance*, 15, 381–409.
- DeShon, R. P., Kozlowski, S. W. J., Schmidt, A. M., Milner, K. R., & Weichmann, D. (2004). A multiple goal, multilevel model of feedback effects on the regulation of individual and team performance in training. *Journal of Applied Psychology*, 89, 1035–1056.
- Eden, D. (2001). Means efficacy: External sources of general and specific subjective efficacy. In M. Erez, U. Kleinbeck, & H. Thierry (Eds.), *Work motivation in the context of a globalizing economy* (pp. 65–77). Mahwah, NJ: Lawrence Erlbaum.
- Feltz, D. L., & Lirgg, C. D. (1998). Perceived team and player efficacy in hockey. *Journal of Applied Psychology*, 83, 557–564.
- Gibson, C. B. (2001). Me and us: Differential relationships among goal setting, training, efficacy, and effectiveness at the individual and team level. *Journal of Organizational Behavior*, 22, 789–808.
- Grant, A. M. (2007). Relational job design and the motivation to make a prosocial difference. *Academy of Management Review*, 32, 393–417.
- Hackman, J. R. (1992). Group influences on individuals in organizations. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (Vol. 3, pp. 199–267). Palo Alto, CA: Consulting Psychologists Press.
- Heggestad, E. D., & Kanfer, R. (2005). The predictive validity of self-efficacy in training performance. Little more than past performance. *Journal of Experimental Psychology: Applied*, 11, 84–97.
- Judge, T. A., Jackson, C. L., Shaw, J. C., Scott, B. A., & Rich, B. L. (2007). Self-efficacy and work-related performance: The integral role of individual differences. *Journal of Applied Psychology*, 92, 107–127.
- Kanfer, R., Chen, G., & Pritchard, R. (2008). Work motivation: Forging new perspectives and directions in the post-millennium. In R. Kanfer, G. Chen, & R. D. Pritchard (Eds.), *Work motivation: Past, present, and future* (pp. 601–632). Routledge: New York.
- Kark, R., & van Dijk, D. (2007). Motivation to lead, motivation to follow: The role of the self-regulatory focus in leadership processes. *Academy of Management Review*, 32, 500–528.
- Kozlowski, S. W. J., & Bell, B. S. (2003). Work groups and teams in organizations. In *Industrial and organizational psychology*. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), *Comprehensive handbook of psychology* (Vol. 12, pp. 333–375). New York: Wiley.
- Kozlowski, S. W. J., Gully, S. M., Brown, K. G., Salas, E., Smith, E. M., & Nason, E. R. (2001). Effects of training goals and goal orientation traits on multidimensional training outcomes and performance adaptability. *Organizational Behavior and Human Decision Processes*, 85, 1–31.
- 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 work performance: Implications for staffing, personnel actions, and development* (pp. 240–292). San Francisco, CA: 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.
- Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3–90). San Francisco, CA: Jossey-Bass.
- LePine, J. A., Piccolo, R. F., Jackson, C. L., Mathieu, J. E., & Saul, J. R. (2008). A meta-analysis of teamwork processes: Tests of a multidimensional model and relationships with team effectiveness criteria. *Personnel Psychology*, 61, 273–307.
- Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice-Hall.
- Longbow2 (1997). *Computer software*. Coulsdon, England: Janes Combat Simulations.
- Lykken, D. T. (1968). Statistical significance in psychological research. *Psychological Bulletin*, 70, 151–159.
- MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, 7, 83–104.
- Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A conceptual framework and taxonomy of team processes. *Academy of Management Review*, 26, 356–376.
- Mathieu, J. E., Maynard, M. T., Rapp, T. L., & Gilson, L. L. (2008). Team effectiveness 1997–2007: A review of recent advancements and a glimpse into the future. *Journal of Management*, 34, 410–476.
- Mathieu, J. E., & Taylor, S. R. (2007). A framework for testing meso-mediational relationships in organizational behavior. *Journal of Organizational Behavior*, 28, 141–172.
- Raudenbush, S. W., Byrk, A. S., & Congdon, R. (2004). *HLM6: Hierarchical linear and nonlinear modeling*. Lincolnwood, IL: Scientific Software International.
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, 7, 422–445.
- Snijders, T., & Bosker, R. (1999). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. London: Sage.
- Vancouver, J. B., Thompson, C. M., Tischner, E. C., & Putka, D. J. (2002). Two studies examining the negative effect of self-efficacy on performance. *Journal of Applied Psychology*, 87, 506–516.
- Vancouver, J. B., Thompson, C. M., & Williams, A. A. (2001). The changing signs in the relationships between self-efficacy, personal goals, and performance. *Journal of Applied Psychology*, 86, 605–620.
- Watson, C. B., Chemers, M. M., & Preiser, N. (2001). Collective efficacy: A multilevel analysis. *Personality and Social Psychology Bulletin*, 27, 1057–1068.