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Translating Team Creativity to Innovation Implementation: The Role of Team Composition and Climate for Innovation

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This study investigated team innovation as a process phenomenon by differentiating the creativity stage from the implementation stage. Based on the interactional approach, the authors argue that team composition (aggregated individual creative personality and functional heterogeneity) affects team creativity, which in turn promotes innovation implementation depending on the team's climate for innovation. Results from a study of 96 primary care teams confirmed that aggregated individual creative personality, as well as functional heterogeneity, promotes team creativity, which in turn interacts with climate for innovation such that team creativity enhances innovation implementation only when climate for innovation is high.

Keywords: *team innovation; team creativity; innovation implementation; climate for innovation*

Innovation has been highlighted as a core competence for contemporary organizations to maintain or enhance effectiveness in rapidly changing and challenging environments (Bledow, Frese, Anderson, Erez, & Farr, 2009; Choi & Chang, 2009; Hansen & Levine, 2009). Despite the recognized importance of innovation and the vast amount of research addressing it, one question has received relatively less attention than others. This is how teams in organizations can facilitate or inhibit innovation (e.g., Anderson & West, 1998; Caldwell & O'Reilly, 2003; Drach-Zahavy & Somech, 2001; Eisenbeiss, van Knippenberg, & Boerner,

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2008; Gibson & Gibbs, 2006; Nijstad & Levine, 2007). This is a substantial shortcoming because often an innovation originates and is subsequently developed by a team into routine practice (Anderson & West, 1998). *Team innovation* refers to the introduction and application in a team of ideas, processes, products, or procedures that are new to the team and are designed to be useful (West & Farr, 1990). Accordingly, for teams to be innovative, team members need to generate creative ideas and must critically process them so as to discard those ideas that seem useless and implement those with promise (Amabile, Conti, Coon, Lazenby, & Herron, 1996).

Reviewing the innovation literature to date revealed that most studies refer to innovation as a generic concept and consequently do not differentiate the two stages of innovation: the creativity stage, namely, the generation of new ideas, and the implementation stage, namely, the successful implementation of creative ideas (George, 2007). Further, while the primary focus of the creativity literature has been to identify personal attributes that facilitate or constrain individual creative performance (e.g., Amabile et al., 1996), studies on team innovation tend to take a team-level perspective by concentrating on the team and the organizational context as the significant potential factors to promote team innovation (e.g., Choi, 2007; Shalley & Gilson, 2004). However, creativity and innovation researchers have recently adopted an interactional approach, arguing that situational and personal factors jointly contribute to team innovation (Choi, Anderson, & Veillette, 2009; George & Zhou, 2001; Taggar, 2002). This approach suggests that to fully understand how to promote innovation in teams, we should look simultaneously at team members' characteristics and at team context. Accordingly, in this article we report a study that seeks to expand the knowledge about the team innovation process. Specifically, we suggest that the dispositional characteristics of team members (creative personality) and team functional diversity will affect team creativity. Then we suggest that the extent to which team creativity will promote innovation implementation depends on the contextual factor of team climate for innovation. This model contributes to the innovation literature in several respects. First, it tests team innovation as a process phenomenon by differentiating the creativity stage from the implementation stage. Second, by examining simultaneously team members' characteristics and team context, this model follows the interactional approach and suggests an integrative perspective for understanding team innovation.

Theoretical Background and Hypotheses

This study focused on team innovation, "the intentional introduction and application within a team, of ideas, processes, products or procedures new to the team, designed to significantly benefit the individual, the team, the organization, or wider society" (West & Wallace, 1991: 303). This definition emphasizes that innovation is related to the *intentional attempts* of team members to arrive at anticipated benefits for the individual, the team, the organization, or the surrounding society, in contrast to top-down change (Drach-Zahavy & Somech, 2002). Further, this definition refers to innovation as a process that encompasses creativity and implementation (De Dreu & West, 2001; George, 2007; Hülsheger, Anderson, & Salgado, 2009; Shalley, Zhou, & Oldham, 2004). *Creativity* often refers to the first stage of the innovation process

and can therefore be seen as a subprocess of innovation. Creativity is typically defined as the generation or production of ideas that are both novel and useful (e.g., Amabile, 1988, 1996; Oldham & Cummings, 1996; Scott & Bruce, 1994). Thus, to be considered creative, ideas must be unique relative to other ideas currently available in the team or the organization (Shalley et al., 2004) and seen as having the potential to create value for the organization in the short or long run (George, 2007). Creative ideas can relate to work procedures, products, services, and organizing structures and can vary in terms of the degree to which the idea reflects an incremental versus radical departure from the status quo (Mumford & Gustafson, 1988; Shalley et al., 2004). *Innovation implementation* refers to "the process of gaining targeted employees' appropriate and committed use of an innovation" (Klein & Sorra, 1996: 1055). Accordingly, innovation depends on a person or a team not only having a good idea but also developing that idea beyond its initial state (Amabile et al., 1996; Choi & Chang, 2009).

Our framework for the study derives from the interactionist model (Woodman, Sawyer, & Griffin, 1993; Woodman & Schoenfeldt, 1990), which suggests that "innovation has to be considered a complex interaction of person and situation" (Woodman et al., 1993: 296). The central argument of this model is that team innovation is not the simple aggregate of all team members' creativity, although it is clearly a function of the creativity of individuals on the team. It is also influenced by team functional composition, team processes, and context, wherein context may facilitate or inhibit innovative accomplishments (Ford, 1996).

Team Composition and Team Creativity

Team composition has repeatedly been proposed as a concomitant factor in promoting team creativity (Hansen & Levine, 2009; Hülsheger et al., 2009). Team composition is the configuration of member attributes in a team (Levine & Moreland, 1990) and is thought to have a powerful influence on team processes and outcomes (Kozlowski & Bell, 2003). In general, team composition is thought to be related to team outcomes because it affects the amount of members' knowledge and skill applied to the team task—in terms of both task completion and working interdependently (Hackman, 1987). The most common analytical perspective views team composition as a cause that shapes various teamwork processes and outcomes of interest (Kozlowski & Bell, 2003). The literature differentiates surface-level composition variables, which are overt demographic characteristics that can be reasonably estimated after brief exposure, such as age or education level, from deep-level composition variables, which are underlying psychological characteristics such as personality factors or values (Bell, 2007). We focused on two elements of team composition: team members' dispositional characteristics of creative personality (a deep-level composition variable) and team functional diversity (a surface-level composition variable). Our choice of these two composition variables was grounded in recent team creativity research (e.g., Drach-Zahavy & Somech, 2001; Taggar, 2002) pointing at the critical role of exposure to various perspectives, knowledge, and experiences, as well as to unusual ideas, in promoting team creativity. In this sense, whereas the summative composition approach seems appropriate for team creativity, the dispersion approach suits functional composition better. These notions will be elaborated below.

Team members' creative personality. Overall, team members' personality factors are characteristic patterns of thinking, feeling, and acting that should affect team innovation through a variety of processes ranging from how team members approach task completion to how they interact. Here we focus on *creative personality,* which refers to the ability to generate many alternative solutions to an open-ended problem; to approach problems with an open mind, allowing the individual to recognize divergent information and opinions; and to possess self-confidence and tolerance for ambiguity, to be patient with competing views, and to persist in developing original ideas (Barron & Harrington, 1981; Ford, 1996). Previous studies provide some support for the expected positive relationship between creative personality and creativity at the individual level (e.g., Feist, 1998, 1999; Oldham & Cummings, 1996; Zhou & Oldham, 2001). Therefore, to predict team creativity, it is logical that the most parsimonious proposition is to link individual members' creative personalities to team creativity, namely, to the extent to which the team generates novel and useful ideas (Burningham & West, 1995; Shalley, Gilson, & Blum, 2009; West & Anderson, 1996). Here the assumption is that the innovation process begins within individuals. The generation of a new idea is a cognitive process in an individual, albeit fostered by interaction processes in teams (Mumford & Gustafson, 1988). Hence, in this study we differentiate two team-level constructs, team composition of creative personalities and team creativity, and we explore the role of the former as a compositional input for the latter.

Conceptualizing creative personality as a compositional measure at the team level can draw on the input-process-output model for team effectiveness (Campion, Papper, & Medsker, 1996; Mathieu, Maynard, Rapp, & Gilson, 2008) by regarding team members' creative personalities as an input factor: the pooled resources that individual team members bring to the team. In other words, creative personalities are a resource that team members combine to share and draw on when needed. Similarly, Moreland and Levine (1992) argued that the combination of team members' personality characteristics such as creative personality constitutes the configural properties of the team. Namely, aggregated team-level creative personality emerges from individuals' creative personalities, but these do not coalesce (Kozlowski & Klein, 2000). Moreover, according to Kozlowski and Klein (2000), sometimes lower level characteristics may vary within a group or organization, yet the configuration or pattern of these characteristics may nevertheless emerge, bottom-up, to characterize the unit as a whole (Arthur, 1994). Accordingly, we suggest that, conceptually, creative personality can be extended to the team.

In terms of the measurement model for team members' creative personalities, we also draw on the input-process-output framework (similar to Bell, 2007) and on Kozlowski and Klein's (2000) pooled emergence typology to justify our summative composition approach. A review of the research reveals many ways (e.g., minimum, maximum, diversity average) to conceptualize and assess a team's collective level of personality characteristics. Among these, the average of individual team members' creative personalities is the most common way to operationalize team personality (see Pirola-Merlo & Mann, 2004; Taggar, 2002). Team members' creative personalities as an average are perceived as a pooled resource that members share to assist each other within the team. That is, different teams accumulate different amounts of creativity, and teams with large amounts may outperform teams with smaller amounts. Kozlowski and Klein's pooled unconstrained emergence prototype is probably

most closely aligned to our conceptualization of aggregated individual creative personality. It argues that although team members may vary in their levels of creative personality, the group product may be represented as a sum or a mean, as individuals have equal opportunities (interaction times as a team) to influence each other. To sum, although creative personality is an individual characteristic, conceptually it can be extended to the team level by taking a summative approach and hence be considered a team resource.

Having established the theoretical basis for viewing creative personality as a team-level phenomenon, we now turn to its hypothesized link with team creativity. Current research has shown that teams able to rely on each other's resources perform at a higher level (Jordan & Troth, 2004). These performance advantages are the outcome of the ways in which team members interact and compensate each other (e.g., Perry-Smith & Shalley, 2003). Working with highly creative members creates circumstances in which other team members become exposed to divergent information and opinions and to a variety of unusual ideas. As a result, individuals who have access to a range of alternatives are more likely to make connections, use wider categorizations, and generate more divergent solutions, which could lead to higher team creativity (Amabile et al., 1996; Perry-Smith & Shalley, 2003). Moreover, observing creative models allows individuals to acquire relevant strategies and approaches that enable them to exhibit higher creativity in the team context (Shalley et al., 2004). In addition, highly creative members can help the team develop attitudes and behaviors such as persistence or tolerance of ambiguity in the work environment that are crucial to promoting team creativity (Bliese, 2000; Chen, Thomas, & Wallace, 2005). Although only a few studies have focused on members' individual dispositions to be creative and team creativity, their results provide some support (e.g., Taggar, 2002).

Accordingly,

Hypothesis 1: There is a positive relationship between aggregated individual creative personality and team creativity.

Functional heterogeneity. Creativity can be fostered in the work group itself, through diversity in team members' roles (Somech, 2006). Functionally heterogeneous teams assemble people from different disciplines and functions who have pertinent expertise in the proposed course of action (Earley & Mosakowski, 2000). This kind of diversity might contribute to team creativity in several ways. First, assembling people with different organizational roles, who possess a broad array of skills, knowledge, and expertise, helps the team solve the complex task of developing new products or procedures (Hülsheger et al., 2009). Second, functionally heterogeneous teams carry variegated vocabularies, cognitive patterns, and styles (Drach-Zahavy & Somech, 2001). These patterns of heterogeneity may operate on creativity by exposing individuals to a greater variety of unusual ideas; such exposure has been demonstrated to positively impact creative thinking (Amabile et al., 1996). Constructive, challenging ideas might induce team members to discuss, reanalyze, question, and debate processes that are crucial to team creativity (Pelled, Eisenhardt, & Xin, 1999; Somech, 2006). Third, team diversity triggers communication with members outside the team, which in turn leads to the incorporation of diverse kinds of information, broadens team members' perspectives, and facilitates the generation of new approaches and ideas (Drach-Zahavy, in press;

Perry-Smith & Shalley, 2003; West, 2002). Thus, the positive effect of diversity on team creativity might be attributable to the diversity of cognitive resources (Hülsheger et al., 2009; Webber & Donahue, 2001).

Accordingly,

Hypothesis 2: There is a positive relationship between team's functional heterogeneity and team creativity.

The Moderating Role of Climate for Innovation

Scholars have emphasized that the success or failure of a work team depends greatly upon the team's context or environment (e.g., Amabile et al., 1996; Anderson & West, 1998; Gersick, 1988). Teams aiming to innovate are required not only to develop and explore new ideas but also to align team members to the implementation of these creative ideas. Maximizing the conditions fostering creativity is unlikely to translate directly into innovation implementation because it encompasses much more than idea generation. An antithetical proposition to the emphasis on diversity and divergent processes highlights the importance of convergence in teams (Bledow et al., 2009; Pearce & Ensley, 2004). Accordingly, our second argument is that a climate for innovation, which is a team-level concept of how far a team's values and norms emphasize innovation (Anderson & West, 1998; West, 1990; West & Anderson, 1996), will function as a critical contingency in enhancing the implementation stage of innovations. From the interactionist perspective, we expect team creativity and climate for innovation to work together to affect innovation implementation. Specifically, we suggest that climate for innovation in its four dimensions (vision, participative safety, task orientation, and support for innovation) will moderate the relationship between team creativity and team innovation implementation.

Vision. "Vision is an idea of a valued outcome, which represents a higher order goal and motivating force at work" (West, 1990: 310). If vision is high, team and organizational goals are clear to team members; goals are perceived as attainable and team members feel committed to them (Hülsheger et al., 2009). In congruence with goal-setting theory (Locke & Latham, 1990), teams with clearly defined objectives are more likely to develop new goal-appropriate methods of working since their efforts have focus and direction. Therefore, we expect that teams with high vision will be more likely to implement their creative ideas than teams with vague and abstract vision, which might find it difficult to develop the practical steps for implementing their creative ideas.

Participative safety. Participative safety has two components: One is participation in decision making and the other is intrateam safety, meaning a nonthreatening psychological atmosphere in the team, replete with trust and mutual support. This aspect is closely linked to the concept of psychological safety, which was proposed by Edmondson (1999). We suggest that participative safety should also function as a moderator of the relationship between team creativity and innovation implementation. Since problems appear during the implementation

of an innovation, team members need to collaborate increasingly more in their work (Parker & Wall, 1996). They must be able to venture to suggest new ways of working and to come up with alternative problem-solving approaches. A climate in which it is safe to speak up and take risks is argued to complement the implementation of team creativity (Wright & Cordery, 1999). By contrast, under a low level of participative safety, people may feel helpless and victim to the innovation, and they may not act when things go wrong (Baer & Frese, 2003).

Task orientation. *Task orientation* means team members sharing concern for achieving a good standard of performance. It encompasses excellence of task performance, characterized by evaluations, modifications, control systems, and critical appraisals (Anderson & West, 1998; West, 1990). These norms do not relate specifically to innovation but reflect a more general concern with excellence (Anderson & West, 1998). With a high level of team task orientation, the team's members are willing to work harder (West, 1990) and are more likely to overcome obstacles during the implementation process in order to transform the creative ideas into sizable improvements in products and processes (Eisenbeiss et al., 2008). But if team members lack a shared concern with excellence, team creativity is less likely to be translated into tangible innovative outcomes.

Support for innovation. *Support for innovation* means the expectation, approval, and practical support for attempts to introduce new and improved ways of doing things in the work environment (West, 1990). Support for innovation varies across teams to the extent that it is both articulated, by personnel documents, policy statements, or word of mouth, and enacted, by active promotion of innovative behavior such as sufficient time for producing novel work in the domain or availability of training. Aside from the obvious practical support required to implement new products or methods, perceptions of the adequacy of resources may affect teammates psychologically by leading to beliefs about the intrinsic value of the projects they have undertaken (Amabile et al., 1996), which in turn enhance their willingness to dedicate time, share resources, and cooperate in implementing their creative ideas (Eisenbeiss et al., 2008). In contrast, if teams lack support for innovation, team creativity is less likely to be translated into tangible innovative outcomes.

Hypothesis 3: Climate for innovation (vision, participative safety, task orientation, and support for innovation) moderates the relationship between team creativity and team innovation implementation, such that team creativity is positively associated with innovation implementation only under high levels of climate for innovation.

Moderated Mediation Model

Finally, our moderated mediation model proposes complete mediation of team creativity in the relation of team composition to innovation implementation, with climate for innovation functioning as a critical contingency in enhancing innovation implementation. This model suggests that since team composition (aggregated individual creative personality and functional heterogeneity) may promote team creativity, team composition may have an indirect

effect on innovation implementation through the intervening process variable of team creativity. This indirect effect may be conditional on the moderator variable of climate for innovation for the path from team creativity to innovation implementation. Specifically, team composition is related to team creativity, which in turn interacts with climate for innovation to predict innovation implementation. Such a moderated mediation model will clarify when (high climate for innovation) and why (translating team composition into team creativity) team composition may have beneficial consequences for teams in terms of promoting innovation implementation.

This model is consistent with previous team effectiveness models (e.g., Campion et al., 1996; Somech, 2006). These input-process-output models separate objective job characteristics from effectiveness and internal responses to these characteristics. All these models involve a three-stage process: (1) Leaders take various actions (inputs), (2) these actions affect teams' work processes in Stage 2 (process), and (3) important outcomes result from workers' positive processes (outputs). Kozlowski and Bell (2003) noted that a team's composition is one of the most potent determinants of what constitutes an effective process for promoting team effectiveness.

Our model of team innovation deviates from these models in that it also considers the moderating effect of climate for innovation. Nevertheless, in keeping with input-process-output models, this argument is justified by the fact that team composition is not likely to influence innovation implementation directly (West, 2002). Its beneficial effect may be exercised through its impact on team creativity, which in turn will promote innovation implementation depending on the team's climate for innovation.

Accordingly,

Hypothesis 4: The indirect effect of team composition (aggregated individual creative personality and functional heterogeneity) on innovation implementation is mediated by team creativity and moderated by climate for innovation, for the path from team conflict to innovation implementation.

Method

Sample and Data Collection Procedure

One hundred and ten primary care teams were selected at random from 1,200 primary clinics of the largest health maintenance organization in Israel to participate in the study. However, because individual responses were aggregated to the team level, we used a 60% response rate as the criterion for including teams in the study analyses. Therefore, the final sample in the present study consisted of 96 teams (response rate of 87%).

Being part of the same health organization, each primary clinic has the same objectives, work design, roles, and standards for performance. Primary care clinics aim to provide a broad medical-social perspective for the care of the individual, the family, and the community. Through the family medicine program, the individual is treated in the context of the family and community. Health education, preventive medicine, screening, post-hospital care, and home care are integral parts of the program. In addition, these clinics serve as centers of

health activities for community residents. Each primary care clinic is managed by a practice manager who is responsible for the ongoing functioning of one clinic. This manager works fairly autonomously and reports to the regional management.

To identify team working, preassessment interviews were conducted with the 110 sampled primary care clinics. For each primary care team, the interviews were with the practice manager, head nurse, and head physician. According to these interviews, all team members interacted regularly to achieve shared goals regarding the quality of care given to their patients. They also depended on each other for knowledge and effort by means of several permanent structures such as scheduled staff meetings, "brown bag" lunch meetings, and joint refresher workshops.

Data were collected at different time points and from multiple sources. The questionnaire administered to teams covered scales on capacity for creativity, climate for innovation, and demographic information. Actual demographic data were collected from administrative archives. In the subsequent six-month period, accounts of team creativity introduced by the teams (creative ideas generating by the team) were gathered and then rated by domain-relevant experts (described later). Finally, one year after the first measurement period, practice managers and regional managers were asked to evaluate the extent to which the creative ideas were implemented.

In total, these teams consisted of 175 physicians, 561 nurses, 96 social workers, 95 occupational therapists, and 69 dieticians. Team size ranged from 5 to 17 members, with an average of 8.39 ($SD = 4.07$). The sample was 69.2% women, and average age was 39.4 years ($SD = 8.01$). Average job tenure was 8.4 years ($SD = 6.61$). In education level, 67% had a bachelor's degree, 12% a master's degree, and 21% a PhD or equivalent degree. These teams were supervised by practice managers, of whom 65% were female; their average age was 41.2 years ($SD = 7.09$) and tenure was 12.08 years ($SD = 7.92$). In education level, 68% of the practice managers had a bachelor's degree, 16% a master's degree, and 16% a "professional" degree. Analyses of variance of the team averages of the demographic variables confirmed no statistically significant differences across teams in gender, age, job, tenure, or education. In addition, none of the demographic variables predicted a significant portion of the variance in team climate for innovation, team creativity, and team innovation implementation. Hence, these demographic variables were not included in subsequent analyses to test the hypotheses.

Prior to data collection, several steps were taken to address ethical concerns and to ensure members' commitment to the research. First, the regional management's initial consent was obtained. Second, each team was visited by a researcher who outlined the research project and the commitment to the research process that would be required from the team. Teams were ensuring that this study concern was not with specific team members but with the teams. This ensured confidentiality and would foster the members' cooperation. Practice managers were encouraged to approach the researchers for any clarifications and questions. To ensure anonymity, team members were asked to return their completed questionnaires in sealed envelopes. Then all individual team members' envelopes were inserted into one large team envelope. Each of these envelopes received a special identification sign, clearly distinguishing teams.

Measures

Team functional heterogeneity. *Team functional heterogeneity* was defined as the diversity of organizational roles embodied in the team (Jackson, 1992). Information for this measure was provided by each team's practice manager; therefore, functional heterogeneity was based on the actual composition of the team. Functional heterogeneity was measured by the diversity index recommended by Blau (1977) and used by Simons, Pelled, and Smith (1999): $1 - \Sigma Pi^2$, where Pi is the proportion of the total team that each function category represents. The function categories used were physicians, nurses, social workers, occupational therapists, and dieticians.

Creativity-relevant personal characteristics. The 30-item Creative Personality Scale (CPS; Gough, 1979) of the Adjective Check List (Gough & Heilbrun, 1965) was used to assess employees' creativity-relevant personal characteristics. Employees were asked to "check each adjective that you think describes you." In accordance with Oldham and Cummings (1996), 18 of the 30 adjectives described highly creative people: capable, clever, confident, egotistical, humorous, informal, individualistic, insightful, intelligent, interests wide, inventive, original, reflective, resourceful, self-confident, sexy, snobbish, and unconventional. Each of these checked adjectives was given a value of +1. The remaining 12 adjectives described less creative people: cautious, commonplace, conservative, conventional, dissatisfied, honest, interests narrow, mannerly, sincere, submissive, suspicious, and phony. Each of these checked adjectives was assigned a value of –1. The values were then summed to form a CPS index. The reliability of the CPS index was .74.

From this, creativity personality was assessed at the team level. The relationship between team members' composition variables and team innovation probably depends on how the construct is operationalized at the team level; more appropriate team-level operationalizations of the constructs reveal stronger relationships between the team composition variable and team performance (Arthur, Bell, & Edwards, 2007). Researchers have used different justifications for choosing from a variety of statistical operationalizations (e.g., mean, variance, minimum, maximum). The most common approaches have been to focus on the nature of the team's task or the nature of the specific trait. Kozlowski and Klein (2000) suggested that in trying to understand multilevel phenomena, researchers should indicate how a lower level phenomenon might manifest itself at a higher level. They surmise that for phenomena that emerge in the same way and that are functionally equivalent across levels (e.g., individual and team), appropriate operationalizations are the sum or average. Similarly, after examining several alternatives to identify which showed the strongest relation with team creativity, Pirola-Merlo and Mann (2004: 242) based their "hypothesis on the average function, as this is conceptually and computationally the simplest." Accordingly, to assess creativity personality at the team level, we obtained the team creativity score by aggregating individual creativity scores.

Team creativity. To assess team creativity (i.e., generation of ideas that are both novel and useful to the team), we followed West and Anderson's (1996) approach. The practice managers (in all cases, the team leaders) were asked to complete monthly forms describing creative ideas raised by the team. Each team also was asked to send copies of minutes of

team meetings for the six-month study period. Regular telephone calls and letters from the researchers during the period prompted the return of copies of minutes. The researchers presented to each team lists of creative ideas developed from these data at team meetings at the end of the six-month period to determine their accuracy. Ideas that should have been included or excluded by common agreement were added or deleted accordingly.

Ratings of creativity were reached through consensual validation by domain-relevant experts. Three senior people employed in the health maintenance organization and two researchers in the area of organizational behavior in health care organizations were asked to rate the creative ideas. Lists of the creative ideas for each of the 96 primary care teams were combined to form one overall list of 485 ideas. The maximum number of innovations reported during the six-month period was 16, and the minimum was 2. The overall mean was 8 innovations per team. Examples of the creative ideas included developing health promotion programs for subpopulations; setting up a new personnel function; including a coordinator for monitoring cancer patients in the transition from ambulatory to primary care; developing peer-learning communities to improve the care of diabetes patients; improving services through initiatives such as shortening waiting time at the clinic; and improving communication among the caring agents. The list was then distributed to the expert raters who rated each of the 485 creative ideas; the order of the ideas was randomized for different expert raters.

To be considered creative, ideas must be unique relative to other ideas currently available in the team (Shalley et al., 2004) and seen to have the potential to create value for the team or the organization in the short or long run (George, 2007). Accordingly, raters were asked to rate each of the creative ideas on a scale from 1 to 5 on one of three dimensions: (1) *magnitude,* defined as how great the consequence of this change would be (1= *of no consequence at all in comparison with other changes* to 5 = *of very great consequence in comparison with other changes*); (2) *radicalness,* defined as the extent to which a change to the status quo would be likely to result (1 = *not at all radical* to 5 = *extremely radical*); (3) *useful,* defined as the extent to which the change is beneficial for patient care, the staff, or the administration (1 = *will not benefit* to 5 = *will very greatly benefit*).

Kendall's coefficient of concordance was used to determine the extent of agreement among the domain-relevant experts. Each list of ideas and each dimension of raters' assessments were compared and agreements calculated. The Kendall's coefficient of values ranged from .69 to .87, thus indicating acceptable levels of agreement. Reliability of the three dimensions was .79. Finally, the team creativity score was calculated as the product of the number of ideas and the average score for creativity.

Climate for innovation. A short version of the Team Climate Inventory (Anderson & West, 1998), developed by Kivimaki and Elovainio (1999), was used to assess climate for innovation. The questionnaire (14 items) comprises four subscales: participative safety (4 items, e.g., "People feel understood and accepted," "'We are together' attitude"; $\alpha = .86$); support for innovation (3 items, e.g., "Search for new ways of looking at problems," "Cooperation in developing and applying ideas"; $\alpha = .90$); vision (4 items, e.g., "Team's objectives clearly understood," "Team's objectives achievable"; $\alpha = .88$); and task orientation (3 items, e.g., "Critical appraisal of weaknesses," "Preparedness to basic questions"; $\alpha = .80$). Team members used a 7-point Likert-type scale (from 1 = *not at all* to 7 = *very much*).

Table 1
Descriptive Statistics and Intercorrelation Matrix for the Study's Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1. Team size	8.39	4.07	1.00	.17	.15	.09	.25*	.22*	–.13	–.14	–.07	–.14	–.11	–.01
2. Gender heterogeneity	0.37	0.21		1.00	–.27	.01	–.04	.13	–.01	.01	.08	–.08	–.06	.08
3. Educational heterogeneity	0.49	0.09			1.00	.33**	–.01	.11	–.30**	–.20**	–.28**	–.23**	–.31**	.01
4. Functional heterogeneity	0.59	0.09				1.00	–.10	.22*	–.23*	–.20*	–.20*	–.27*	–.23*	.10
5. Creative personality (team level)	4.91	3.01					1.00	.23*	.29**	.22*	.23*	.30**	.27**	.09
6. Team creativity	28	6.67						1.00	.03	–.08	.01	.02	.11	.35**
7. Climate for innovation	5.32	0.67							1.00	.89***	.90***	.92***	.81***	.13
8. Participative safety	5.14	0.73								1.00	.84***	.71***	.61***	.14
9. Support for innovation	5.41	0.87									1.00	.73***	.63***	.05
10. Vision	5.34	0.78										1.00	.84***	.16
11. Task orientation	5.45	0.67											1.00	.05
12. Innovation implementation	3.4	0.76												1.00

Note: $N = 96$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Pearson correlations among the four subscales indicated high significant correlations (from .61 to .84; see Table 1). Accordingly, a series of confirmatory factor analyses was conducted on the climate for innovation items to determine the appropriateness of proceeding with four separate subscales. Specifically, we compared a four-factor model with a three-factor model, a two-factor model, and a single-factor model. The results indicated that the single-factor model provided a better fit than the three other models—one-factor model: goodness-of-fit index (GFI) = .98, adjusted goodness-of-fit index (AGFI) = .97, normed fit index (NFI) = .96, non-normed fit index (NNFI) = .95, incremental fit index (IFI) = .95, comparative fit index (CFI) = .95, root mean square error (RMSE) = .02; two-factor model: GFI = .77, AGFI = .80, NFI = .80, NNFI = .81, IFI = .81, CFI = .81, RMSE = .19; three-factor model: GFI = .80, AGFI = .81, NFI = .81, NNFI = .81, IFI = .81, CFI = .81, RMSE = .19; and four-factor model: GFI = .89, AGFI = .90, NFI = .90, NNFI = .90, IFI = .90, CFI = .90, RMSE = .12. These results indicate that treating climate for innovation as one construct may be more appropriate than treating it as a two-, three-, or four-dimensional construct.

Innovation implementation. Innovation implementation was evaluated in Time 3 (one year after the first measurement period) by two sources: the practice manager and the regional manager. Raters were asked to rate the extent of implementation of each of the creative ideas raised by the team (which were included in the final list, as detailed in the team creativity measure) on a 1-to-5 scale: (1) pilot, (2) small pockets, (3) debated and some spread, (4) significant spread but still contestation, and (5) spread across the system (Ferlie, Fitzgerald, Wood, & Hawkins, 2005). Pearson correlations were calculated, and average correlations between the raters ranged from .58 to .66. However, to avoid the bias of dependence (each of the seven regional managers evaluated 10-18 teams), the high agreement between the raters allowed us to use the practice managers' evaluations to assess team innovation implementation.

Control variable. Team size and the heterogeneity of two main background characteristics of team members (gender and education) were included as control variables because the literature has noted their effects on team process and outcomes (e.g., Keller, 2001; Simons et al., 1999). Team size was the total number of team members reported on the practice management questionnaire. Gender heterogeneity was assessed by Blau's index, where male and female served as heterogeneity categories. Educational heterogeneity was assessed by Blau's index, where the degree (BA, MA, PhD) served as heterogeneity categories.

Level of Analysis

The unit of theory in the present study was the team. That is, all the hypotheses were posited at the team level, and the study variables (climate for innovation and creativity personality) were aggregates of individual responses to the team level of analysis. Aggregation is justified by theoretical as well as empirical arguments (Rousseau, 1985). Theoretically, Rousseau (1985) advocated the use of composition theories, which specify the functional similarities of constructs at different levels. For many reasons, team members may be expected to share perceptions of their work environment, such as team climate. Members' frequent interactions, shared tasks, the clear delineation of team boundaries, and the long-standing establishment of most of the teams should allow members to develop collective views, thereby creating shared norms and perceptions (George, 1990; Jehn, Chadwick, & Sherry, 1997). So it was critical to demonstrate high within-team agreement to justify using the team average as an indicator of a team-level variable (r_{wg}; James, Demaree, & Wolf, 1993). A value of .70 or above is suggested as a "good" amount of within-group interrater agreement (James et al., 1993). The climate for innovation scale exceeded this criterion (the averaged r_{wg} score was .86, ranging from .79 to .90). We also obtained the value of .35 for intraclass correlation coefficient (ICC) 1 and .73 for ICC 2. These values were comparable to the median or recommended ICC values reported in the literature (e.g., Liao & Chuang, 2004; Somech, 2006); thus, we concluded that aggregation was justified for the climate for innovation variable.

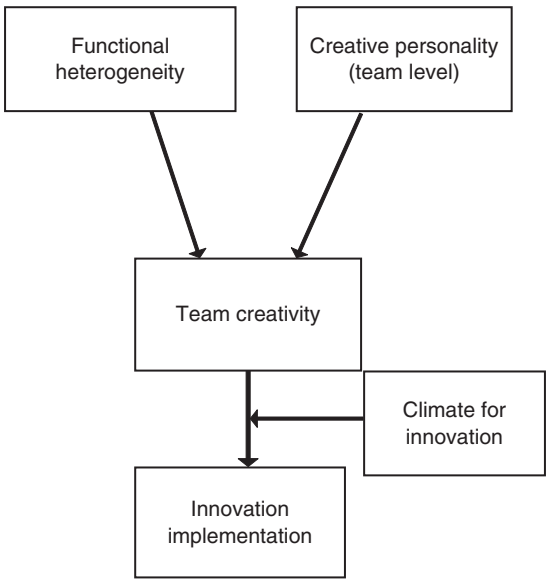
We defined team level of creative personality as a summative composition model and operationalized it based on the mean of individual members' collective creative personality scores within each team (Chen, Mathieu & Bliese, 2004; Côte, 2007). Note that Chen and colleagues (2004) argue that evidence of intraclass correlation—ICC (1) and (2)—and interrater agreement (r_{wg}) is not necessary to justify the validity of team-level measures based on summative composition models because agreement or sharedness regarding the construct is not assumed.

Results

Hypothesis Testing

Table 1 presents the means and standard deviations for all variables in the study as well as the correlation matrix of all these variables at the team level.

Figure 1
The Study Model



To test our hypotheses, and thus our overall theoretical model (see Figure 1), we followed a procedure to analyze conditional indirect effects, developed by Preacher, Rucker, and Hayes (2007) and used in the innovation research of Eisenbeiss et al. (2008). Moderated mediation models attempt to explain both how and when a given effect occurs. Formally, moderated mediation occurs when the strength of an indirect effect depends on the level of some variable, in other words, when mediation relations are contingent on the level of a moderator (Edwards & Lambert, 2007). A conditional indirect effect, defined by Preacher et al. (2007: 186) as "the magnitude of an indirect effect at a particular value of a moderator," covers mediated moderation and moderated mediation, respectively. Accordingly, using this MODMED method, we were able to estimate the conditional indirect effect of the independent variable of team composition on the dependent variable of innovation implementation through the proposed mediator variable of team creativity. This indirect effect proved conditional on the moderator of climate for innovation for the path from team creativity to innovation implementation.

To assess the moderated mediation model, we examined four conditions (Preacher et al., 2007): Steps 1 and 2 are conventional regression analyses in which the mediator variable (team creativity) is first regressed on the independent variable (team composition), intended to be a significant predictor of the mediator variable; next, multiple regression predicts the dependent variable (innovation implementation) from the mediator (team creativity), the

moderator (climate for innovation), the independent variable (team composition), and the moderator–mediator interaction (team creativity–climate for innovation). The interaction effect should also be statistically significant. Any variable used as a component of the interaction term is mean centered, as recommended by Aiken and West (1996). The last two conditions, which are the essence of moderated mediation, establish whether the strength of the mediation differs across the two levels of the moderator (Preacher et al., 2007). Moderated mediation is demonstrated when the conditional indirect effect of team composition on innovation implementation, via team creativity, differs in strength across low and high levels of climate for innovation. Step 3 assumes normality of sampling distribution, but the nonparametric Step 4 rests on bootstrapping.

In Table 2, Step 1 is seen to indicate that functional heterogeneity as well as team's creative personality significantly predicted team creativity, thus confirming Hypotheses 1 and 2. The second step yielded a significant interaction between team creativity and climate for innovation, suggesting that climate for innovation moderates the relationship of team creativity and innovation implementation. We plotted this interaction following Aiken and West (1996). As shown in Figures 2 and 3, functional heterogeneity and team's creative personality as well as team creativity related positively to innovation implementation only under high climate for innovation. Hypothesis 3 was thus confirmed as well.

The next two tests of the conditional indirect effect (Steps 3 and 4) both indicated that the indirect effects of functional heterogeneity and team's creative personality on innovation implementation were significant only when climate for innovation was high; this furnished support for Hypothesis 4 (see Table 2 for all statistics). Under low innovation climate, the indirect effects of functional heterogeneity and team's creative personality on innovation implementation were not significant.

Discussion

Our study's unique contribution to the literature lies in its investigating an integrative model for understanding the phenomenon of innovation in teams. To the best of our knowledge, this is the first study to examine team innovation as a two-stage process (team creativity and innovation implementation) and to look simultaneously at team members' characteristics as well as team context for understanding team innovation. This integrative perspective contributes to the literature by using an interactional approach (Woodman et al., 1993) to impart more precise understanding of the relation of team composition, team processes, and team innovation. Moreover, this study addresses the call for research in identifying mediating variables and moderators in team innovation (Eisenbeiss et al., 2008). To date, few efforts have been made to develop such integrative models, and the present findings suggest that we may advance our understanding of team innovation by further exploring such integrations in future research.

First, we found a positive link between team composition (creative personality and functional heterogeneity) and team creativity. Specifically, the results reported here showed that a high level of both team's aggregated individual creative personality and team's functional heterogeneity serves as a catalyst for promoting team creativity. Consistent with previous

Table 2
Test of Overall Model

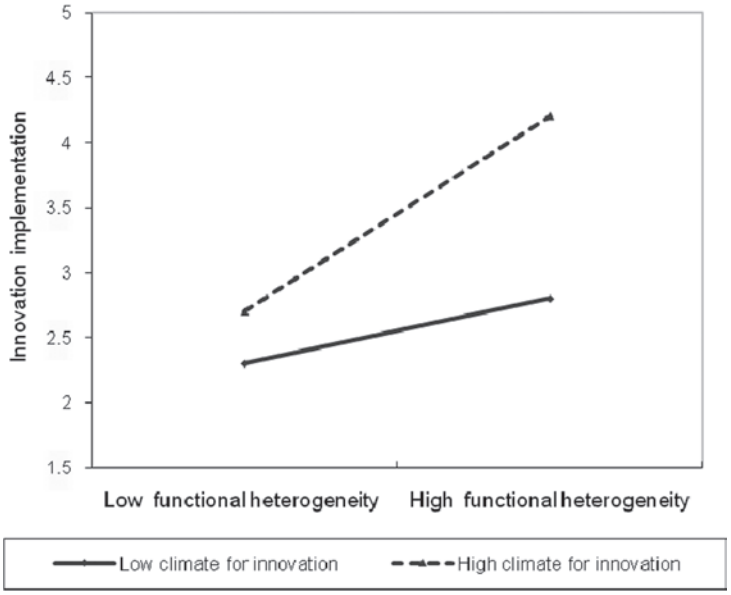
Variable	*b*	*SE b*	*t*	R^2
Mediator variable model (Step 1): Team creativity				.21
Team size	0.19	0.15	1.24	
Gender heterogeneity	3.14	1.91	1.64	
Educational heterogeneity	5.43	3.21	1.32	
Functional heterogeneity	7.16	3.08	2.33*	
Creative personality (team level)	1.85	0.71	1.97*	
Dependent variable model (Step 2): Innovation implementation				.53
Team size	–0.06	0.03	–1.64	
Gender heterogeneity	–0.05	0.43	–0.13	
Educational heterogeneity	–0.52	0.76	–0.68	
Functional heterogeneity	0.81	0.71	1.14	
Creative personality (team level)	0.16	0.17	0.99	
Team creativity	0.28	0.18	1.59	
Climate for innovation	0.08	0.07	1.01	
Team Creativity × Climate for Innovation	0.23	0.02	8.94**	

Level of Climate for Innovation	Indirect Effect	*SE*	*z*
Independent variable: Functional heterogeneity			
Conditional indirect effects assuming normal distribution (Step 3)			
–1 *SD*	–.81	.63	–1.27
Mean	.74	.40	1.85
+1 *SD*	.89	.30	2.96*
Conditional indirect effects with bootstrap method (Step 4)			
–1 *SD*	–.81	.63	–1.27
Mean	.74	.40	1.85
+1 *SD*	.89	.30	2.96*
Independent variable: Creative personality (team level)			
Conditional indirect effects assuming normal distribution (Step 3)			
–1 *SD*	–.19	.15	–1.27
Mean	.17	.09	1.83
+1 *SD*	.20	.08	2.50*
Conditional indirect effects with bootstrap method (Step 4)			
–1 *SD*	–.19	.15	–1.27
Mean	.17	.09	1.83
+1 *SD*	.20	.08	2.50*

*$p < .05$. **$p < .01$.

studies (e.g., Pirola-Merlo & Mann, 2004; West & Anderson, 1996), average team member's creative personality proved a good predictor of team creativity. This finding may suggest that the level of team creativity may be determined by the team members' creative personalities. If so, it may be possible to promote creativity by selecting team members so as to increase the proportion of those with highly creative personalities (Pirola-Merlo & Mann, 2004). But this finding may also suggest that teams provide a social and interpersonal context in which people are encouraged to propose new and improved ways of doing things.

Figure 2
Interaction Effects Between Functional Heterogeneity and Team's Creative Personality and Climate for Innovation on Innovation Implementation



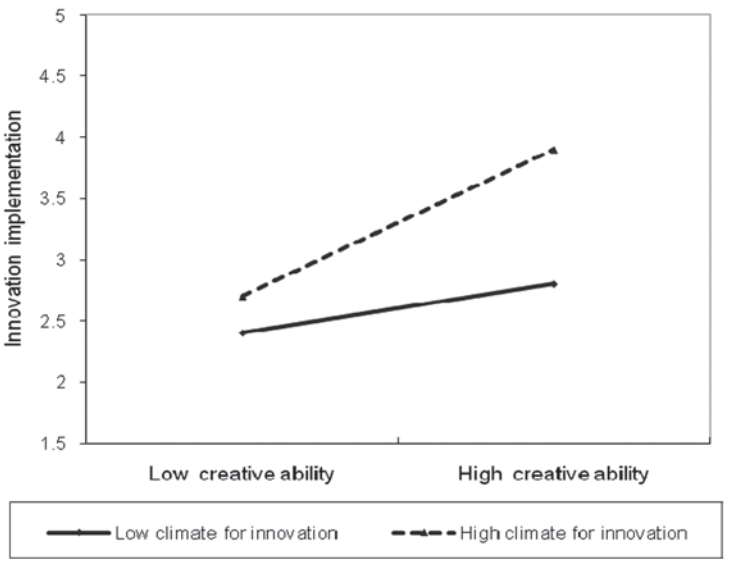
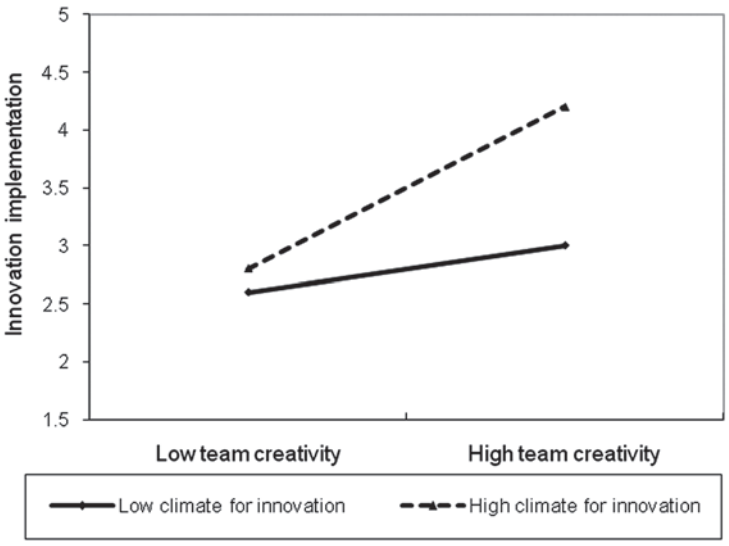


Figure 3
Interaction Effect Between Team Creativity and Climate for Innovation on Innovation Implementation



Members with high creative personalities may help team members to generate many alternative solutions to an open-ended problem (Ford, 1996). By introducing alternative interpretations and contrasting ways of thinking, they may encourage critical thinking that facilitates team creativity. In such an intimate setting, they can also encourage their teammates to adopt creative intentions as team norms, which may facilitate team creativity (Amabile et al., 1996; Howell & Shea, 2006).

This approach may receive additional support from our second finding, namely, a positive link between team functional heterogeneity and team creativity. As a few studies have revealed (Shalley & Gilson, 2004; Somech, 2006; West, 2002), by staffing a team with diverse organizational roles, a broad array of expertise, skills, and knowledge can be bundled within the team, resulting in increased environmental scanning, generation of alternatives, and multiple interpretations of information (Hambrick, Cho, & Chen, 1996), all of which are relevant to team creativity. So our present findings, together with other work (Howell & Shea, 2006; Shalley et al., 2004), lead us to speculate that team creativity may occur within a work team itself, as a result of team members' characteristics and social interaction.

Second, in examining the relationship between team creativity and climate for innovation, we were able to tease out which combinations are better suited for team innovation implementation. Specifically, our results showed that team creativity would translate to innovation implementation only under high levels of climate for innovation; under low levels of climate

for innovation this relation was not found. Our findings support the view that climate for innovation is a complementary asset, without which team creativity may not be converted to innovation implementation. Overall, this finding leads us to speculate that the contributions of input and team process factors may be heavily contingent on the context in which the team operates. Climate for innovation may become important in facilitating the team's personality to apply its creative ideas through team members' articulated and enacted support, as well as through participative safety, vision, and task orientation. Team implementation is more likely to occur if team objectives are clear and team members participate in decision making; if the team is conceived as open to change and encourages and values innovation; and if managers, supervisors, and coworkers support new ideas and their implementation (Madjar, Oldham, & Pratt, 2002; Shin & Zhou, 2003). These conditions seem even more important today, since modern innovations, especially in a team context, are characterized by a higher degree of interdependence. To promote team innovation, employees must increasingly perform activities that are more interpersonal in nature, so feeling safe in interactions becomes important. Team members must be able to take the risk of openly proposing new ways of working and to come up with alternative problem solving. A climate in which it is safe to speak up and take risks is suggested to complement the adaptation and implementation of innovation (Baer & Frese, 2003).

Third, the finding of the overall model showed that team composition promotes innovation implementation through its relationship with team creativity and therefore engenders innovation implementation only under high levels of climate for innovation. This finding leads us to speculate that the contributions of input and context factors may be differentially potent at different stages of the innovation process (e.g., West & Anderson, 1996). Team composition, which represents individuals' qualities that become a team asset in a social interaction, may be crucial at the initial stage of team creativity in determining the richness and quality of ideas available to the team. At the second stage, the team's values and norms (climate for innovation) may become important in facilitating team creativity turning into innovation implementation. The overall model may provide additional support for the interactionist model of creative behavior proposed by Woodman and Schoenfeldt (1989, 1990). Their model suggests that creative behavior, at the individual level, is the complex product of a person's behavior in a given situation. Within the person, both cognitive (knowledge, cognitive skills, and cognitive styles and preferences) and noncognitive (e.g., personality) aspects of the mind are related to creative behavior; the situation is characterized in terms of the contextual and social influences that facilitate or inhibit creative accomplishment. Similarly, in terms of the interactionist model and in congruence with the results of the present study, we can understand team innovation as a function of individual resource "inputs," the interaction of the individuals involved (e.g., team composition), and team context and characteristics (e.g., norms, values; Woodman et al., 1993).

Limitations and Future Research

Like all research, the contribution of this study can be assessed only in light of its purpose and methods. A clear strength of our study is our data. These were collected at different time

points and from multiple sources. The criterion variable of team creativity was gathered in the subsequent six-month period and then rated by domain-relevant experts; next, a year after the first measurement period, innovation implementation was evaluated by two sources: the practice manager and the regional manager.

There are some limitations to our study. First, we were not able to assess objective measures of innovation implementation. Accordingly, future research would clearly benefit from incorporating objective measures of team innovation. Second, composition variables pose a particular problem because, although individual difference variables are by definition at the individual level, interest in team composition lies in the unique combinations of individuals who compose a team, or in how the individual-level variables combine to reflect a team-level operationalization. The relationship between team members' composition variables and team outcomes may well be moderated by how the construct is operationalized at the team level. Future research should develop theoretical as well as empirical justification for choosing from a variety of statistical operationalizations (e.g., mean, variance, minimum, maximum; Bell, 2007).

Third, an implicit assumption in this study that seems to underlie creativity theorizing and research is that "usefulness" as a criterion for creative ideas is undisputed. Clearly, organizations have multiple stakeholders whose interests are often competing (George, 2007). Therefore, future research might benefit from considering innovation's multiple potential ramifications for organizations, their members, and their clients. Fourth, our data regarding climate for innovation were self-reported. This aspect of the study does not differ from previous work (e.g., Baer & Frese, 2003; Eisenbeiss et al., 2008); however, in our data, the likelihood of common method variance is low because the criterion variables (team creativity and innovation implementation) were obtained from different sources (practice manager and regional manager). Fifth, our study model focused on climate for innovation as a moderator in the relationship between team creativity and innovation implementation. This variable is only an example of the influence that context variables may exert on this relationship. Future research should extend the inquiry to other moderators to advance our understanding of the team innovation phenomenon.

The final limitation pertains to the uniqueness of the sampled organizations, namely, health care organizations. While theory cuts across organizational types, the question arises as to whether health care teams are sufficiently similar to other teams or if they are so distinct as to require different ways of viewing and measuring the team phenomenon. Two salient aspects of health care teams have been identified previously that make them interesting for cross-team comparisons (Carroll & Edmonson, 2002; Tucker, Edmondson, & Spear, 2002): They rely on knowledge workers, and they involve complex interdependent relationships across various professional groups as well as across organizations (e.g., clinic to hospital to rehabilitation center to home health agency). All in all, this might imply that results from well-executed research with health care teams should be applicable to teams comprising other types of workers who share these characteristics. Nevertheless, it is critical to assess the generalizability of the present findings to other types of organizations (Somech, 2006).

Managerial Implications

Given the need for innovation as a solution to the complex challenges faced by organizations, the present study provides interesting implications for managers. First, team composition is an important tool for promoting team innovation. If team members are exposed to individuals with high creative abilities, as well as to diverse individuals, who pose different organizational roles, with new kinds of information, and diverse viewpoints, they will evince a stronger link to team creativity. Accordingly, we advise managers to invest efforts in designing team composition and not only to rely on individual characteristics such as creative personality but also to integrate functional diversity into the conditions for selection of individuals for teams (Drach-Zahavy & Somech, 2002). But more important, our results pose a particular management challenge: Teams seem able to generate a high number of creative ideas, but if they do not operate in the proper environment, which affords them a supportive and participative context as well as a nonthreatening psychological atmosphere with excellence of task performance, team creativity will not be translated to innovation implementation. We conclude that if managers can be given guidance in designing and shaping teams' work contexts, we may expect more innovations among teams (Shalley et al., 2009). For example, because climate for innovation consists of shared norms, it may help to look at the social psychology literature. Sherif's (1936) seminal work showed that norms quickly develop in the first stages of team development on the basis of reciprocal and mainly unconscious influence processes among team members. Once established, shared norms are relatively resistant to revision (MacNeil & Sherif, 1976). Consequently, organizations should try to boost climate for innovation right from the start by anchoring such norms in their teams' visions and missions and by promoting their importance in everyday business (Silke et al., 2008).

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