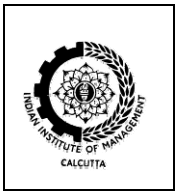

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Psychological Capital as a Mediator of the Relationship between Leadership and Creative Performance Behaviors: Empirical Evidence from the Indian R&D Sector

by

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PSYCHOLOGICAL CAPITAL AS A MEDIATOR OF THE RELATIONSHIP BETWEEN LEADERSHIP AND CREATIVE PERFORMANCE BEHAVIORS: EMPIRICAL EVIDENCE FROM THE INDIAN R&D SECTOR

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ABSTRACT

The present study tests the relationships between leader behaviors, psychological capital and employee creative performance behaviors in the Indian R&D context. A survey-based study was conducted in 11 government-owned R&D laboratories across India and 496 usable responses were collected. Data analysis, performed using Structural Equation Modeling technique, revealed that psychological capital fully mediates the relationship between leadership and creative behaviors. The study provides an insight into the underlying process through which leadership impacts employee creativity. The characteristics of R&D professionals (more educated, and having distinct goal orientations) and the nature of R&D projects (high risks of failures, uncertain processes) make R&D a unique and interesting context to study. To the best of our knowledge this study is first of its kind to be conducted in the R&D context.

Keywords: Leadership; creative performance behaviors; psychological capital; R&D management.

INTRODUCTION

Employee creativity, defined as the production of novel and useful ideas for organizational products, services, or processes has been found to fundamentally contribute to organizational innovation, effectiveness, and survival (Amabile, 1983; Shalley, Gilson and Blum, 2000; Zhang and Bartol, 2010; Montag, Maertz and Baer, 2012). The pace of change and the increasing integration of viable knowledge in work processes and outcomes, all require creativity for success and competitive advantage. Employees' ability to create and innovate depends not only on their individual characteristics, but also on their work environment within which the leader has an influential role (Amabile Conti, Coon, Lazenby and Herron, 1996). Supervisors or 'local leaders' direct and evaluate employees' work, facilitate or impede their access to resources and information, and play a significant role in the implementation of an organization's HR practices (George and Zhou, 2007; Oldham and Cummings, 1996; Shalley, Zhou and Oldham, 2004). Research shows that leadership is an effective organizational tool for successfully obtaining relevant outcomes in other arenas (e.g., job satisfaction, routine productivity). It is natural to extend this application and ask how we lead people to innovate. The present explores the impact of supervisory leadership on subordinate creative performance behaviors.

Given the intuitive appeal of the assertion that supervisor (referred to as *leaders* from here on) behaviors are likely to have their strongest and most immediate impact on subordinate perceptions, it is surprising that there is little research testing the behavior-perception connection (Shin and Zhou, 2003; Zhou and Oldham, 2001). There exists a dearth of evidence on the possible mediating role of subordinate reactions, and the absence of holistic views of how patterns of supervisor behaviors might have their effects over time (Amabile, Schatzel, Moneta and Kramer, 2004). The present study extends leadership theories by developing and testing a

causal framework delineating the processes that have high potential to explain the impact of leadership on employee creativity. The paper develops an understanding about the role of employee psychological capital in enhancing the exhibition of creative performance behaviors.

Psychological capital has been defined as "an individual's positive psychological state of development and is characterized by *confidence (self-efficacy),* being *optimistic,* and having *hope* and *resilience*" (Luthans, Youssef and Avolio, 2007, p. 3). The study has chosen psychological capital as a mediating variable for three reasons. First, psychological capital has been found to affect a variety of variables like job satisfaction (e.g. Larson and Luthans, 2006; Luthans, Norman, Avolio and Avey, 2008), absenteeism (e.g. Avey, Patera and West, 2006), employee well-being (e.g. Avey, Luthans, Smith and Palmer, 2010), employee performance (e.g. Combs, Clapp-Smith and Nadkarni, 2010; Luthans et al., 2008) and organizational commitment (Larson and Luthans, 2006; Luthans et al., 2008). Second, some earlier studies have documented a positive relationship between psychological capacities and creativity (e.g. Tierney and Farmer, 2002; Sweetman, Luthans, Avey and Luthans, 2011). Third, the capacities included within psychological capital are considered to be 'states' rather than 'traits' and are open to development.

Research Context: Indian R&D Organizations

Uniqueness of the Indian Context

Majority of studies on creativity have examined the effects of personal and contextual characteristics on the creativity of employees who worked in organizations located in the US or other "Western" nations. Research on employee creativity in different cultural contexts has shown that there may be value in considering the international context in which creative work is

produced (Shin and Zhou, 2003). Studies that identify what personal and contextual conditions are most relevant to individuals in different cultures are warranted (Shalley et al., 2004).

Leaders exhibit behaviors based on their assumptions about the nature of both the task and the employees (Aycan et al., 2000). Assumptions pertaining to the task deal with the nature of the task and how it can best be accomplished; those assumptions pertaining to the employees are influenced by characteristics of the societal-level culture, which is conceived as shared value orientations among people in a given society. The Indian world view has been influenced by a variety of influences including spiritual texts and scriptures spanning from 2500 BC to eighth-century AD, Mughal rulers, the colonial British masters and the post-independence and pre-1990s socialistic views and post-1990 liberalization. India of today is composed of two parts – one that is traditional and inward-looking, characterized by older traditions and values of collectivism and high power distance (Hofstede, 2001; Sinha and Sinha, 1990), and the other that is unconventional and outward-looking characterized by values like individualism and low power distance (Sinha, 2008). Educational institutes like the Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs) have served to inculcate western values into the Indian mindset. Increasing ease of access to technology and increasing opportunities to work and visit western countries post-liberalization has led to an enhanced exposure of Indians to the ideals of western societies. These experiences have led to the constitution of a composite mindset having overlapping and consistent as well as inconsistent and contradictory beliefs, values, norms, and behavior (Sinha, 2008). The composite nature of development of Indian mindset calls for a dedicated research effort to study the leadership-creativity relationship and possible process variables through which leadership impacts employee creativity.

Uniqueness of the R&D Context

R&D work will continue to be a driving force of the global economy (Dewett, 2007) and the main sources of innovation, at least on a scientific basis. The self-image of R&D professionals is usually that of men who make things work, avoid waste of time, capital, and labor, and are independent in thought and action. They are better educated, having one or more college degrees. When an occupational group sees itself, and is seen by others, as playing a critical role in the achievement of broader societal goals, it tends to demand quite different kind of authority relationships as compared to those that are seemingly performing less critical roles (Kakar, 1971). In this sense, it is important for leaders to carefully adopt suitable behaviors in order to motivate and enhance creativity of R&D workers. Relatively limited research has examined the type of leadership necessary for success in R&D settings (Berson and Linton, 2005). More research is needed to provide us a deeper understanding of the leadership needs of R&D professionals that would help human resource development professionals develop more effective interventions to nurture targeted leader competencies and set performance objectives (Zheng, Khoury and Grobmeiher, 2010). The identification of key factors that can foster and sustain R&D professionals' creativity carries significant implications for HRD practices that target enhancing organizational competitiveness. This study aims to quantitatively explore leadership characteristics in government-owned Indian R&D laboratories. This study intends to identify and provide empirical support to the leader behaviors needed to be developed in R&D leaders.

LITERATURE REVIEW AND PROPOSITION DEVELOPMENT

Creative Performance Behaviors

Although creativity literature (e.g. Amabile, 1983, 1996) makes explicit acknowledgment of creative performance behaviors, it has not received attention commensurate with its importance.

Montag et al. (2012), in a review of creativity criterion constructs, observed that the measures used in creativity studies conceptually confound behaviors with the outcome of these activities. The authors strongly argue for delineating creative performance behaviors from creative outcomes. Creative performance behaviors, defined as the set of interdependent observable and unobservable activities that occur in response to a non-algorithmic task or project and that purportedly constitute the creative process, are an antecedent of creative outcomes, defined as idea, prototype and products judged by relevant stakeholders to be both novel and useful. While exhibiting creative behaviors is within the control of employees, there are a number of environmental factors outside of employees' control (e.g., trends, market shifts) that may help drive outcome effectiveness. Non-significant to moderate correlations (e.g. Dewett, 2007; Tierney, Farmer and Graen, 1999) between behaviors and outcomes offer some support for the distinctiveness between the two constructs. In the present study, we focus on creative performance behaviors – the activities professionals engage in that make them achieve greater creative performance.

Creative performance behaviors can be broadly classified into *idea generating* and *idea promoting* behaviors (Janssen, 2000; Khazanchi and Masterson, 2011; Montag et al., 2012). Idea generating behaviors comprise of problem identification, information search, and solution generation behaviors that culminate in generating innovative ideas to tackle a problem (Reiter-Palmon and Illies, 2004; Zhang and Bartol, 2010). Problem construction or problem definition is the first step. Ill-defined problems typically have multiple appropriate solutions and different problem-solving goals. Defining a problem well is likely to result in higher quality solutions (Mumford, Baughman, Threlfall, Supinski and Costanza, 1996). After a problem has been constructed, a large and diverse set of information must be gathered and integrated. The third

stage is to make use of the existing knowledge in generating alternative solutions and then selecting the one that is most probable to achieve the set goal. The idea promotion behavior deals with employees persuading others to accept and recognize their ideas as creative (Janssen, 2000). Through idea promotion behavior, employees convince others of the originality and usefulness of their ideas, resulting in the ideas being recognized as creative (Khazanchi and Masterson, 2011). In the present study, creative performance behaviors have been defined to include problem identification, information search, idea generation and idea promotion behaviors.

Leadership and Creative Performance Behaviors

Researchers agree that leadership is an important determinant of creativity. Research works testing the relationship between leadership and creativity have focused on broad categories describing leadership styles like transformational leadership (e.g. Basu and Green, 1997; Gong, Huang and Farh, 2009; Howell and Avolio, 1993; Jaussi and Dionne, 2003; Jung, Chow and Wu, 2003; Shin and Zhou, 2003), Leader-Member Exchange (LMX) (Scott and Bruce, 1994; Tierney et al., 1999), controlling-supportive leadership (e.g., Amabile et al., 2004; Oldham and Cummings, 1996; Tierney and Farmer, 2002), empowering-controlling leadership (Zhang and Bartol, 2010), and consideration-initiating structure (Stoker, Looise, Fisscher and De Jong, 2001). The present study builds on the available evidence supporting the positive relationship between leadership and creativity and extends it proposing a positive relationship between leader behaviors and creative performance behaviors.

A review of leadership and creativity literatures reveals that most researchers (e.g. Gong et al., 2009; Jung et al., 2003; Zhang and Bartol, 2010) continue to use an available, "validated" questionnaire for their research without careful consideration about the relevance of its content for their research question and sample. Creativity scholars (e.g. De Jong and Hartog, 2007;

Hemlin and Olsson, 2011) have argued for a closer look at identifying the leader behaviors that might fundamentally address the nature of creative work. The apparent differences between the leadership requirements of traditional and empowered environments suggest that traditional measures of leadership may be, at most, only partially applicable to empowered team environments (Arnold, Arad, Rhoades and Drasgow, 2000). For example, Yukl (1999) observed that the transformational leadership, as conceptualized by Bass (Bass, 1985) and measured by the popular Multifactor Leadership Questionnaire (Bass and Avolio, 1990), does not include important behaviors like inspiring, developing, empowering, team building and leading by example. A more elaborate behavioral measure of leadership that is sensitive to the requirements of R&D environment thus, seems to be needed (Arnold et al., 2000; Yukl, 2008). Based on 52 interviews conducted with scientists of five government-owned R&D labs in India, Gupta and Singh (2011; in press) identified 5 R&D leader behavior categories, namely, task-oriented, recognizing and inspiring, team building, empowering and leading by example behaviors. Table 1 presents the identified leader behaviors along with their definitions. In the present study, we use the scale developed by Gupta and Singh (2011; in press) to measure R&D leader behaviors.

An individual's intrinsic motivation plays an important role in determining behaviors that may result in creative outcomes (Amabile, 1983; Zhang and Bartol, 2010). Self-determination theory (Deci and Ryan, 1985) suggests that an individual's involvement at work is determined by the fulfillment of three needs – need for autonomy, need for competence and need for relatedness. Empowering behaviors cater to the need for autonomy. Choice, acknowledgement of ideas and suggestions, and opportunities for self-direction are vital preconditions for creative outcomes and can significantly promote employee involvement in his/her work (Bakker and Demrouti, 2008; Yperen and Hagedoorn, 2003).

Table 1. R&D Leader Behaviors Included in the Study

Behavior	Definition
Task-Oriented	
Clarifying	Assigning tasks, providing directions about how to do the work, and communicating a clear understanding of job responsibilities, task objectives, deadlines, and performance expectations.
Problem Solving	Identifying work-related problems, pointing out problems and giving suggestions to improve, and acting decisively to implement solutions to resolve important problems or crises.
Monitoring	Gathering information about work activities and external conditions affecting the work, checking on the progress and quality of the work, evaluating the performance of individuals through regular meetings.
Buffering	Serving as the main buffer between their teams and the labs, in order to filter down unnecessary administrative duties to protect staff time, while ensuring communication between the lab and the members.
Empowering	
Consulting	Checking with people before making changes that affect them, encouraging suggestions for improvement, inviting participation in decision making, and incorporating the ideas and suggestions of others in decisions.
Empowering	Allowing subordinates to have substantial responsibility and discretion in carrying out work activities, handling problems, and making important decisions.
Recognizing and Inspiring	
Inspiring	Using influence techniques that appeal to emotion or logic to generate enthusiasm for the work, commitment to task objectives, and compliance with requests for cooperation, assistance, support, or resources.
Recognizing	Providing praise and recognition for effective performance, significant achievements, and special contributions, and expressing appreciation for someone's contributions and special efforts.
Team Building	
Team Building	Facilitating the constructive resolution of conflict, and encouraging cooperation, teamwork, and identification with the work unit.
Leading by Example	
Leading by Example	Sets high standards of behaviors, works hard, and leads by example in terms of punctuality, doing work, meeting deadlines, and optimization of time.

Creativity is often enacted in teams and teams that seek information, address differences of opinion and question problem-solving assumptions, engage in greater learning behavior (Hirst, Vaan Knippenberg and Zhou, 2009). Supervisors, by emphasizing team work, can increase the frequency of interactions between the team members (Mumford et al., 2002) thereby

leading to a greater understanding of the problem and to its creative solution (Hoegl, Weinkauf and Gemuenden, 2004). Team building behaviors also fulfill the need for relatedness. When employees perceive the presence of a cohesive work group, they feel more attached and related to it (Deci and Ryan, 2000).

Leading by example behaviors can satisfy an individual's need for competence. According to Bandura (1997), learning can take place vicariously by modeling and self-control processes. Individuals are more likely to perform a work after a visual demonstration of a successful behavior or through the transmission of examples of appropriate rules and thought processes (Shalley and Perry-Smith, 2001). Employees who work under expert supervisors are bound to be subjected to much more modeling experience which can enhance their competence and eventually motivation at work. Based on the above arguments, we hypothesize:

H1: R&D leader behaviors (task-oriented, recognizing and inspiring, leading by example, empowering and leading by example) will be positively related to creative performance behaviors.

Mediating Role of Psychological Capital

The emerging and relatively new construct of psychological capital can have a significant impact on creativity and serves as the foundation for this part of the study. Leaders can have an effect on efficacy through mastery experiences, vicarious learning and positive feedback (Bandura, 1997). Mastery experiences build on the philosophy of 'success builds confidence'. Supervisors can play a vital role in making their subordinates experience repeated success at work. A supervisor can break down a complex problem into simpler tasks, clearly define the roles and responsibilities of the employee and empower them to take job-related decisions thereby enhancing his/her chances of meeting success at work. Vicarious learning allows individuals to

process and learn from the success and mistakes of others and to selectively imitate their successful actions. Supervisors can inspire subordinates by setting high standards of performance themselves. Demonstrations of solutions can enhance the employee's observational experiences and can enhance his/her confidence to solve complex problems (Shalley and Perry-Smith, 2001).

Hope can be enhanced by focusing on goal design acceptance and commitment (through empowerment, inspiring behaviors), creative role modeling (through inspiring and leading by example behaviors), pathways generation (through empowering, problem solving, clarifying behavior), and through developing alternate pathways and skill of re-goaling and overcoming obstacles (through problem solving, clarifying, supporting behaviors) (Luthans, 2002; Luthans, Avey and Patera, 2008).

Optimism has been shown to be amenable to development through Schneider's (2001) three-step process, which includes leniency for the past, appreciation for the present, and opportunity seeing for the future (Avey, Luthans and Jensens, 2009). The employee who has a clear understanding of his/her work related matters has a more realistic explanatory style that attributes positive events to personal, permanent, and pervasive causes and interprets negative events in terms of external, temporary and situation-specific factors (Seligman, 1998).

By exhibiting acceptance of failure, supervisors can indicate to the employees that failure is accepted at workplace and there is no need to be upset about it. Positive feedback, encouragement, creating more meaning and identification in one's work, offering helpful career advice and independence can help enhance employee's resilience (Luthans et al., 2007). Resilience can also be enhanced by altering the perceived level of risk and generally fostering self-enhancement and development (Avey et al., 2009). Thus, we hypothesize:

H2: R&D leader behaviors (task-oriented, recognizing and inspiring, team building, empowering and leading by example) will be positively related to employee psychological capital.

Psychological Capital and Creativity

Psychological Capital provides us with a new human resource development approach to help employees build the critical resources they need in today's stress-filled work-place (Avey et al., 2009). *Self-efficacy* beliefs nourish intrinsic motivation by enhancing perceptions of self-competence (Bandura, 1997; Deci and Ryan, 2000). Self-efficacy is characterized by extra effort and tenacious perseverance in accomplishing a given task. Employees high on efficacy display (and continue to display) intrinsic motivation (Gong et al., 2009; Tierney and Farmer, 2002) even when faced with difficult situations. Such individuals tend to believe that they have the ability to deal with situations presented to them to arrive at success. As a result, these individuals are likely to view potential work hindrances as surmountable and challenges that are achievable rather than as disproportionately difficult.

Individuals with higher levels of *hope* have the agentic capacity to set and pursue goals in such a way that they stay motivated throughout the pursuant process (Avey et al., 2006). Hopeful individuals are more likely to have established functional goals, providing them with directed motivation to work towards said goals on a daily basis. They are capable of setting realistic but challenging goals and expectations and then reach out for those aims through self-directed determination, energy, and perception of internalized control (Snyder, 2002). Hopeful employees also possess the 'waypower' and are capable of generating alternative paths to their desired destinations should the original ones become blocked.

Optimistic individuals form an expectancy perspective and expect good things to happen to them leading to significant cognitive and behavioral implications (Carver and Scheier, 2003; Avey et al., 2006). Given the external attribution of negative events, when faced with negative outcome, the optimistic person will likely attribute the failure to external causes or to individuals around him and avoid reduction in their effort (Seligman, 1998). They continue to remain positive and confident about their future. Their optimistic explanatory style allows them to positively view and internalize the good aspects of their lives not only in the past and the present, but also into the future (Luthans et al., 2007).

Resilient individuals have a firm acceptance of reality, a deep belief, often buttressed by strongly held values, that life is meaningful, and an astounding ability to improvise and adapt to significant change (Avey et al., 2006; Masten, 2001). They use adversities as a 'springboard' to reach higher ground. Resilience is, also, characterized by a staunch view of reality (Coutu, 2002) that promotes emotional stability (Masten and Reed, 2002) and provides positive coping (Fredrickson, Tugade, Waugh and Larkin, 2003) potentially enhancing their exhibition of creative performance behaviors. Thus, we hypothesize:

H3: Employee psychological capital will be positively related to creative performance behaviors.

Since leader behaviors have been hypothesized to be positively related to employee creative performance behaviors, leader behaviors have been hypothesized to be positively related to employee psychological capital, and psychological capital has been hypothesized to be positively related to creative performance behaviors, we also hypothesize the mediating role of psychological capital for leader behavior-creative performance behavior relationship. We hypothesize that:

H4: Employee psychological capital will mediate the relationship between the R&D leader behaviors and creative performance behaviors.

The influence of psychological capital on creativity has been explored in the literature in a few previous studies (e.g. Gong et al., 2009; Rego, Sousa, Marques and e Cunha, 2012; Tierney and Farmer, 2002; Sweetman et al., 2011). The present research is different and unique from the above mentioned studies in the following respect: Gong et al. (2009) and Tierney and Farmer (2002) studied only the influence of self-efficacy in their studies; Sweetman et al. (2011) did an experimental study and provided zero-order correlations only as a show of support of their hypotheses; Rego et al. (2012) used a combined measure of creativity and did not differentiate between creative behaviors and outcomes. Moreover, none of the studies were conducted in India and in a R&D context.

METHOD

Sample and Data Collection

The research study was conducted in 11 R&D labs of India's largest civilian research organization. With 37 laboratories and more than 5,000 researchers, the organization is one of the world's largest collections of industrially oriented public research labs and is India's main producer of scientific and technical publications and patents (Dahlman, Dutz and Goel, 2007). The 11 labs were sampled from the 37 R&D labs such at least two labs operating in each of the major research domains of the organization (biological sciences, chemical sciences, physical sciences, and engineering sciences) were selected. Data were collected using a survey questionnaire that was administered to the scientists working in the sampled research labs. One of the researchers went and stayed at each laboratory for a period of 1 week. Survey was distributed to all the scientists who were present during the period the researcher visited the

laboratories. Anonymity of responses was ensured as respondents were not asked to write their names or any other identifiable information. Respondents were assured that the data will be kept confidential and only a consolidated report will be submitted to the management. Each respondent was given an envelope where he/she could seal the filled form and return the sealed envelope to the researcher. Name or any other specific details were not asked to be mentioned on the envelope.

One thousand two hundred and sixty surveys were distributed and 687 filled surveys were returned to the researcher (a response rate of 54.3%). Pruning for incomplete responses reduced the sample size to 496. All cases where subordinates had been associated with a senior for less than 2 years were dropped. It was decided, in consultation with scientists, that two years is a good enough period of time for a subordinate to have enough interactions with his/her supervisor and have a proper understanding of the supervisor's behaviors in order to give accurate feedback about supervisor's leadership. Twenty-five percent of the respondents were females. Five percent of the respondents had a graduate degree, 33% had post-graduate qualification and 62% had a PhD degree (or an equivalent qualification like a post-doctoral degree or a post-graduation degree in Medicine). The average job tenure was 13.4 years. Forty-one percent of the respondents were junior level scientists, 39% were middle-level scientists, and 20% were senior-level scientists.

Measures

Leader Behaviors

Leader behaviors were measured using the 39 item R&D leader behavior scale developed by Gupta and Singh (2011; in press). Scientists were asked to rate how frequently their immediate supervisors exhibited each behavior. The responses were measured using a 5-point Likert scale ranging from 1 "Not at all," to 5, "Great extent". Five first-order factors plus one second-order

factor showed good fit with the data (χ^2[df]=541[353]; CFI=0.99; RMSEA=0.033; SRMR=0.035; GFI=0.93).

Psychological Capital

A new scale was developed for this study on the basis of the works of Luthans et al. (2007), Tierney and Farmer (2002), Snyder et al. (1996), Wagnild and Young (1993) and Scheier and Carver (1985). Scales of Tierney and Farmer (2002), Snyder et al. (1996), Wagnild and Young (1993) and Scheier and Carver (1985) were administered to 30 professionals working in the various organizations in India who were asked to provide their responses on the scale items. An exploratory factor analysis was performed to check the psychometric properties of each individual scale. Items that were significantly loading (0.70 and above) on one major factor and which conceptually matched the definition of the constructs were included to form a set of 20 items. Next, the set of items was given to three experts (doctoral students and doctorate holders) to independently review the items and sort them according to the definitions of the four intended dimensions. This reduced the number of items to 15. All 15 items had good inter-rater reliability (0.67 and above) and were judged to be reasonable indicators of the four dimensions. Finally, a confirmatory factor analysis was performed to check for the fit of the scales with the data. Four first-order factors plus one second-order factor showed good fit with the data (χ^2[72]=145.52; CFI=0.99; RMSEA=0.046; SRMR=0.035; GFI=0.96). Sample item to measure hope included "I can think of many ways to reach my current work goals". Sample item to measure optimism included "I hardly ever expect things to go my way" (reverse-worded). Sample item to measure self-efficacy included "I feel that I am good at generating novel ideas." Sample item to measure resilience included "My belief in myself gets me though hard times." The responses were measured using a 5-point Likert scale ranging from 1, "Strongly disagree" to 5, "Strongly agree".

Creative Performance Behaviors

Creative performance behaviors were measured using a combination of scales given in Zhang and Bartol (2010) and Ramamoorthy, Flood, Slattery and Sardessai (2005). Zhang and Bartol (2010) tested their scale on a sample collected from a technology company in China while Ramamoorthy et al. (2005) tested their scale on an Indian sample. The scales were, therefore, considered to be appropriate to be used in this study. The responses were measured using a 5-point Likert scale ranging from 1, "Never," to 5, "Very Frequently". Sample items are "I spend considerable time trying to understand the nature of problem" (for problem identification), "I consult a wide variety of information when solving a problem" (for information search), "I engage in generating original solutions for problems" (for idea generation), and "I mobilize support for innovative ideas" (for mobilizing support). The data found support for a four first-order and one second-order factor (χ^2[df]=65.28[31]; CFI=0.99; RMSEA=0.054; SRMR=0.041; GFI=0.97).

Control Variables

Scientists age, gender, job tenure and job level were modeled as control variables in the study. Age was measured as a continuous variable. Gender was modeled as a categorical variable. Employee job tenure was measured as years in service and was modeled as a continuous variable. Job level was measured as a categorical variable. In government research labs, the grades of scientists are assigned as B, C, E1, E2, F, and G. B is the junior-most scientist and G is the senior-most scientist. Research fellows and scientist B were assigned code 0, scientists in grades C, E1 and E2 were assigned code 1 and scientists in grades F and G were assigned code 2.

Confirmatory Factor Analyses (CFA) for Discriminant and Convergent Validity

The study carried out a series of dimension-level confirmatory factor analyses to examine whether the three variables of the study capture distinct constructs versus common source effects. The three factor (R&D leader behaviors, psychological capital, creative performance behavior) model fitted the data well (χ^2[df]=128.76[62]; CFI=0.99; RMSEA=0.047; SRMR=0.039; GFI=0.96). The study tested three other models: (1) a two-factor model, where employees' psychological capital and creative behavior were merged into a single factor, did not fit the data satisfactorily (χ^2[df]=319.85[64]; RMSEA=0.09); (2) another two-factor model, where R&D leader behaviors and employees' psychological capital were merge into a single factor, also did not fit the data satisfactorily (χ^2[df]=1071.18[64]; RMSEA=0.18); (3) The single factor model also did not fit the data satisfactorily (χ^2[df]=3001.53[90]; RMSEA=0.26). These findings provided support for the discriminant validity of R&D leader behaviors, psychological and creative performance behaviors.

RESULTS

The study was conducted at the individual level of analysis. Pearson correlations among the variables were estimated to indicate the hypothesized relationships (refer Table 2). Greater the display of task-oriented, recognizing and inspiring, team building, empowering and leading by example behaviors by R&D leaders, greater is the perceived psychological capacities by subordinates and greater is the display of creative performance behaviors by them. As subordinates experienced more psychological capacity, they were willing to display greater levels of creative behaviors. The correlations were in the hypothesized directions and provided preliminary support for our hypotheses.

Table 2. Descriptive Statistics and Correlations

Dimensions	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Task-oriented	3.55	0.88	**0.94**												
2. Recognizing & Inspiring	3.57	0.97	0.76	**0.94**											
3. Team Building	3.88	0.94	0.69	0.67	**0.86**										
4. Empowering	3.77	0.82	0.55	0.59	0.54	**0.88**									
5. Leading by Example	4.05	0.86	0.69	0.67	0.56	0.49	**0.81**								
6. Optimism	4.22	0.67	0.23	0.21	0.20	0.17	0.19	**0.59**							
7. Self-efficacy	4.14	0.60	0.16	0.20	0.15	0.21	0.13	0.44	**0.80**						
8. Hope	4.14	0.63	0.16	0.19	0.16	0.20	0.17	0.36	0.48	**0.67**					
9. Resilience	4.26	0.59	0.20	0.22	0.17	0.20	0.16	0.44	0.60	0.50	**0.77**				
10. Problem Identification	4.08	0.64	0.17	0.15	0.09*	0.16	0.17	0.27	0.39	0.34	0.36	**0.74**			
11. Information Search	4.33	0.61	0.13	0.17	0.12	0.13	0.12	0.26	0.29	0.35	0.36	0.49	**0.75**		
12. Solution Generation	4.00	0.62	0.22	0.22	0.18	0.23	0.16	0.31	0.41	0.39	0.44	0.54	0.58	**0.78**	
13. Idea Promotion	3.72	0.74	0.26	0.26	0.19	0.24	0.12	0.37	0.43	0.32	0.41	0.37	0.32	0.52	**0.78**

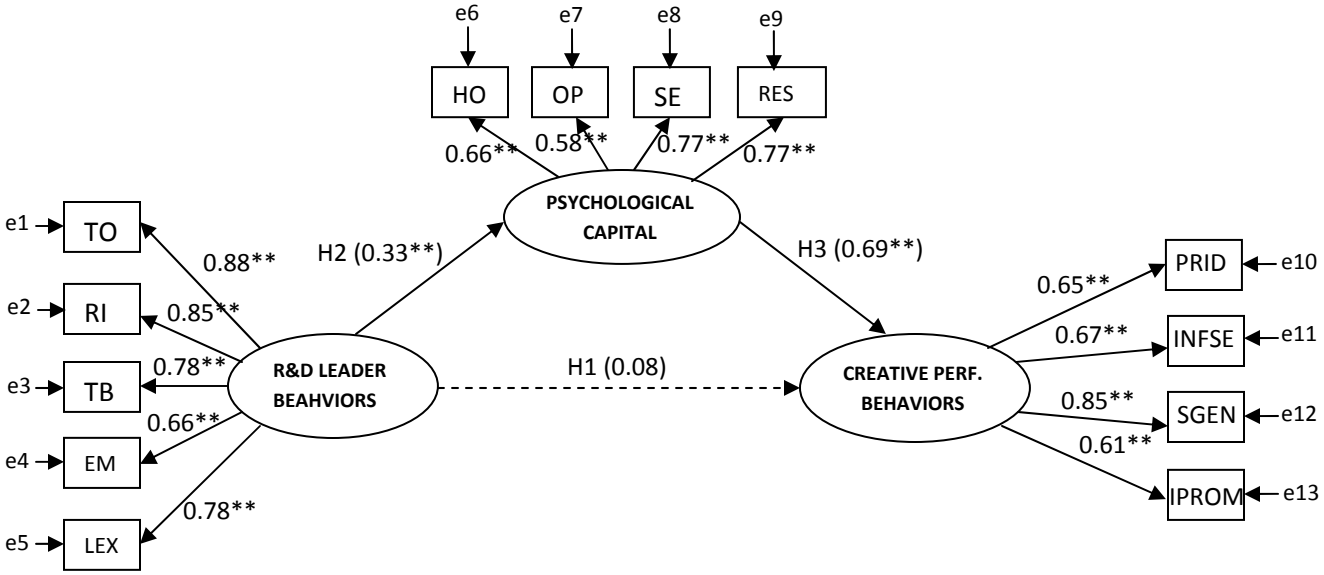
*p<0.05 (two-tailed); All other correlations significant at the 0.01 level (two-tailed)
Values in the diagonal are the reliability estimates; N=496

Latent variable structural equation modeling (LVSEM) was adopted to test the hypotheses. LVSEM tests the sequential relationships between a series of independent and dependent variables in a single analysis and allows us to specify measurement relationships, as well as structural relationships. It controls measurement errors, both random and systematic. Random errors occur because of difficulties in measuring the constructs accurately. Systematic errors occur because of factors like social desirability, common method bias (e.g. scale type, rater or context) and response bias (e.g. leniency, yea-saying or nay-saying). Systematic errors, like common method bias (Podsakoff, MacKenzie, Lee and Podsakoff, 2003), were controlled both procedurally and statistically. A procedure control was made by ensuring anonymity of respondents and the confidentiality of the responses collected from them. A statistical control was made using LVSEM, with all indicator variables loading on a latent factor. The advantage of LVSEM is that method bias is controlled in the measurement model by incorporating highly reliable and valid measurement instruments. A path analytic model of structural equation modeling was used to test the sequential relationship depicted in the hypotheses. Lisrel 8.52 software package was used to analyze the data. Path analytic hypothesized relationships using LVSEM are shown in Figure 1.

The structural model shows that all predicted paths, except for the direct path between R&D leader behaviors and creative performance behaviors, are significant. Thus, hypotheses 2 and 3 were supported while hypothesis 1 did not find support in the data. The fit indices of a full mediated model model has very good fit with the data (χ^2[df]=390.47[162]; CFI=0.96; RMSEA=0.053; SRMR=0.053; GFI=0.93). To calculate indirect effect of R&D leadership on creative behaviors, we multiplied the standardized path coefficients of the relationships (Barron and Kenny, 1986). The indirect effect of R&D leadership on creative performance behaviors is

0.24 which is significant at the 0.001 level. The results provided conclusive support for the mediating role of employees' psychological capital for the relationship between leadership and creative behaviors in the R&D context (as hypothesized in hypothesis 4).

Figure 1. Structural Equation Model for Predicting Employees' Creative Performance Behaviors (standardized path coefficients). The paths related to the control variables (gender, age, education, tenure, and job level) are not shown.



Legend:

1. TO-Task-oriented behavior; RI-Recognizing & Inspiring; TB-Team building; EM-Empowering; LEX-Leading by Example; HO-Hope; OP-Optimism; SE-Self-efficacy; RES-Resilience; PRID-Problem Identification; INFSE-Information search; SGEN-Solution Generation; IPROM-Idea Promotion
2. ——→ Significant effect; - - - - - - - → Non-significant effect
3. **p<0.001; N=496

DISCUSSION

Theoretical and Managerial Implications

The present study makes multiple contributions to both theory and practice. The study tested a conceptual model that links leadership in the R&D domain to positive psychology and creativity theory. Although a few studies have investigated relationships between leadership, psychological capital and employee creativity (e.g., Rego et al., 2012; Sweetman et al., 2011), these studies have happened in the western context and a careful and detailed identification of leader

behaviors in the R&D context has been surprisingly absent from consideration. Moreover, the studies face some conceptual and methodological limitations that have been highlighted earlier (in the literature review section). Taking care of the limitations of previous studies, the present work provides a rigorous analysis of the relationships between R&D leadership, psychological capital and creative performance behaviors. The findings suggest that the identified R&D leader behaviors (task-oriented, recognizing and inspiring, team building, empowering and leading by example) are positively related to employee psychological capital which, in turn, is positively related to creative behaviors. R&D leaders, who display the identified behaviors, are more likely to promote employees' creativity because employees develop higher psychological capital. This list of behaviors can be of immense help to practitioners who often wrestle with the task of identifying appropriate behaviors that can ensure leader effectiveness. These behaviors can be incorporated into the leadership training modules of R&D organizations. Development of training modules around these behaviors will lead to better return on investment on training for the R&D organizations and will make the training programs more useful for managers and employees in general.

The findings show that the psychological capital fully mediates the relationship between leadership and creativity in the R&D context, suggesting that employees' psychological capacities play a vital role in influencing their creativity at work. The findings of the study provide support to the existing body of research that has shown the value of psychological capital in impacting variables such as employee well-being (Avey et al., 2010), employee performance (Combs et al., 2010; Luthans et al., 2008) and organizational commitment (Larson and Luthans, 2006; Luthans et al., 2008).

The present study contributes to the R&D management literature by testing the conceptualized model in a R&D setting. Creative behaviors are expected in R&D organizations. R&D intensive departments and organizations, thus, become a very important context for creativity research. Examination of leadership influence on R&D professional's performance has been inadequate and controversial. While some argue that leadership is redundant in a R&D setting, others contend that leadership is essential even in a R&D setting (Zheng et al., 2010). This study makes important contribution by developing, testing and verifying a causal framework linking leadership to employee creative performance behaviors in the R&D context.

Having being conducted in the Indian cultural context, the present study contributes to the body of knowledge that exists on Indian employees, their needs and perceptions. The study identifies a set of leader behaviors that are considered to be important by Indian employees and that can potentially impact their psychological capacities and eventually performance. The results of the present work should provide important insights to anyone who is interested in studying leadership and its impact on employee creativity in the Indian cultural context.

Limitations and Future Studies

Although the findings of this study are in line with the developed theory, the study has some limitations that can be addressed in future research. Our research was cross-sectional, and so any inferences regarding causality are limited. Future studies should test the relationship between leadership and creativity through other study design, like longitudinal study, analysis of daily diary entries of scientists in order to provide a conclusive test of the directionality of the relationships. All responses on the scales are from self-report measures, and therefore, it is likely that method variance inflated the relationships among these variables. Though, we checked for the method variance using structural equation modeling approach, the possibility of this error

cannot be all together discounted. The present study tested the relationship between R&D leaders and employee creative performance behaviors only and not creative performance (which is essentially the goal of the management). While previous research studies have established a positive correlation between creative behaviors and creative outcomes (Montag et al., 2012), the relationships between leader behaviors, psychological capital and creative performance need to be empirically validated in future works.

An important area of future research is to further analyze other important mediating mechanisms through which leadership can influence employee creativity. Variables such as intrinsic motivation, justice perceptions, identification, affect, values and personal strengths and virtues) can be explored as possible mediating and moderating variables for the relationship. As teams become increasingly common as a unit of work organization, the testing of impact of leadership on team level creativity represents an important topic of research and a means by which organizations can develop performance advantages.

CONCLUSION

The management of R&D professionals has become increasingly important in the face of growing competitive pressures, as organizations constantly seek to optimize their research potential and achieve competitive advantage. The study identifies important leader behaviors that may impact subordinate creativity and explores the mediating role of psychological capital for the leadership-creative behavior relationship in the R&D context. Due to its detailed and rigorous quantitative analysis, this study yields some relatively specific suggestions for managers of employees whose job involves significant creative problem solving. Having being embedded in the Indian cultural context, the results of the present work should provide important insights to

anyone who is interested in studying leadership and its impact on employee creativity in the Indian R&D context.

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