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## Individual and Contextual Predictors of Creative Performance: The Mediating Role of Psychological Processes

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*ABSTRACT:* Studies on creativity have identified critical individual and contextual variables that contribute to individuals' creative performance. However, the psychological mechanisms through which these factors influence creative performance have not yet been systematically investigated. This study explored potential psychological processes that mediate the effects of various individual and contextual variables on the creative performance of individuals. The results, based on longitudinal, multisource data, show that underlying psychological processes (creative self-efficacy and creativity intention) completely mediated the effect of individual (motivation, personality, ability) and contextual factors (social influences from leaders and peers) on creative performance. This study informs the literature of potential psychological mechanisms through which individual and contextual factors influence the creative performance of individuals.

Creativity has been identified as a source of organizational innovation (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Woodman, Sawyer, & Griffin, 1993) and is thus regarded as a key factor for the high performance of organizations operating in uncertain and competitive environments (Oldham & Cummings, 1996). Scholars of creativity have long investigated personal dispositions and other individual characteristics that are associated with creativity (e.g., intelligence, cognitive style, personality characteristics; see Amabile, 1988). Relatively recently, creativity researchers have begun to examine contextual-situational factors that promote individual or team creativity (e.g., Amabile et al., 1996; Isaksen, Lauer, & Ekvall, 1999; Tierney, Farmer, & Graen, 1999; Woodman et al., 1993). Revealing individual and contextual factors that contribute to creativity bears practical sig-

nificance for managers who want to better tap into their employees' creative energy and encourage innovation in the workplace (Scott & Bruce, 1994).

With no doubt, individuals' creative performance should be understood as the outcome of a complex interchange between individuals and their context (Oldham & Cummings, 1996; Woodman et al., 1993). Existing studies have identified critical individual and contextual variables that contribute to individuals' creative performance and have isolated the ways the two sets of variables relate to each other in predicting creative performance. Nevertheless, the present literature does not offer an in-depth explanation of why these individual and contextual factors influence creativity. It is tautological to mention that a person produces creative outcomes because he or she is a creative person working in a creativity-prone environment, leaving the black box unopened. In fact, to interpret the results of their investigations of individual and contextual predictors of creative performance, many scholars have proposed mediating psychological processes such as psychological freedom, sensitivity to opportunities for improvement, increased motivation for pursuing new directions, and so forth (e.g., Hennessey & Amabile, 1998; Zhou & George, 2001). Nevertheless, the psychological mechanisms that explain the effect of various individual and contextual factors on creativity have not yet been systematically investigated. This study fills this gap in the literature by identifying and empiri-

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cally testing critical psychological processes that mediate the effects of stable personal dispositions (e.g., personality, motivation, ability) and social influences from leaders and peers on creative performance.

Adopting the most common definition (Amabile, 1988; Oldham & Cummings, 1996), I define *creativity* as the generation of novel or original ideas that are useful or relevant, and *creative performance* as the behavioral manifestation of creativity potential (e.g., presenting novel ideas, reframing a given problem). I begin with a brief review of previous studies that have examined individual and contextual factors related to creativity. I then identify critical psychological processes that may be affected by these individual and contextual factors and immediately precede creative performance, thereby operating as mediators between individual and contextual factors and the creative outcome. The present hypotheses were tested using longitudinal data collected from multiple sources over three time periods.

### **Individual and Contextual Factors in Creative Performance**

Researchers have attended to various individual-difference variables, including cognitive styles or abilities, motivational orientation, and personality traits pertinent to creativity. Studies have shown that creativity is associated with a particular cognitive process, such as divergent thinking (Tierney et al., 1999). Intrinsic motivation has also been recognized as a key predictor of individual creativity (Amabile, 1996) because the challenge and enjoyment of the work itself promote persistence, exploration, and experimentation that often lead to creative outcomes (Hennessey & Amabile, 1998). Finally, researchers have consistently reported a positive relationship between creativity-related personality traits (e.g., innovativeness, openness to experience) and creative performance (Flynn & Goldsmith, 1993; Gough, 1979; Oldham & Cummings, 1996).

On the other hand, some researchers of creativity have attended to the role of context in creativity. For example, Amabile and her colleagues (Amabile et al., 1996; Amabile & Gryskiewicz, 1989) have identified key environmental conditions that nurture creativity: challenging work, organizational encouragement,

work group support, freedom, absence of organizational impediments, supervisory encouragement, sufficient resources, and workload pressure. On the basis of studies revealing individual and contextual factors predicting creativity, some scholars have suggested frameworks integrating these factors. Glynn (1996), for instance, presented a comprehensive model to explain individual creativity and organizational innovation by using a host of individual (motivation, personality, expectations), job (novelty, challenge), and organizational (structure, culture, technology) variables.

Individual and contextual predictors of creativity have been empirically investigated in several studies. For example, Oldham and Cummings (1996) detected a four-way interaction among individual and contextual variables, in which creative performance was highest when employees with highly creative personalities work on complex, challenging tasks under supportive and noncontrolling supervision. Tierney et al. (1999) also reported significant interactions among employee characteristics (cognitive style, motivation), leader characteristics (motivation), and relational characteristics (leader-member exchange quality).

### **The Present Study**

As briefly reviewed earlier, creative performance is influenced by various individual and contextual factors and their interactions (e.g., Oldham & Cummings, 1996; Scott & Bruce, 1994). In interpreting these results, scholars have often suggested that personal dispositions and contextual factors increase creative performance through their impact on psychological processes, such as increased attention to learning and improvement, confidence in one's creative abilities, and willingness or motivation to pursue novel efforts in a given setting (Anderson & West, 1998; Oldham & Cummings, 1996; Redmond, Mumford, & Teach, 1993; Zhou & George, 2001).

Nevertheless, systematic conceptualization and empirical investigation of the psychological processes that have been proposed to mediate the influence of individual and contextual factors on creativity have not yet been done. The present study extends the literature by identifying and testing key psychological processes that mediate the effect of these factors on creative per-

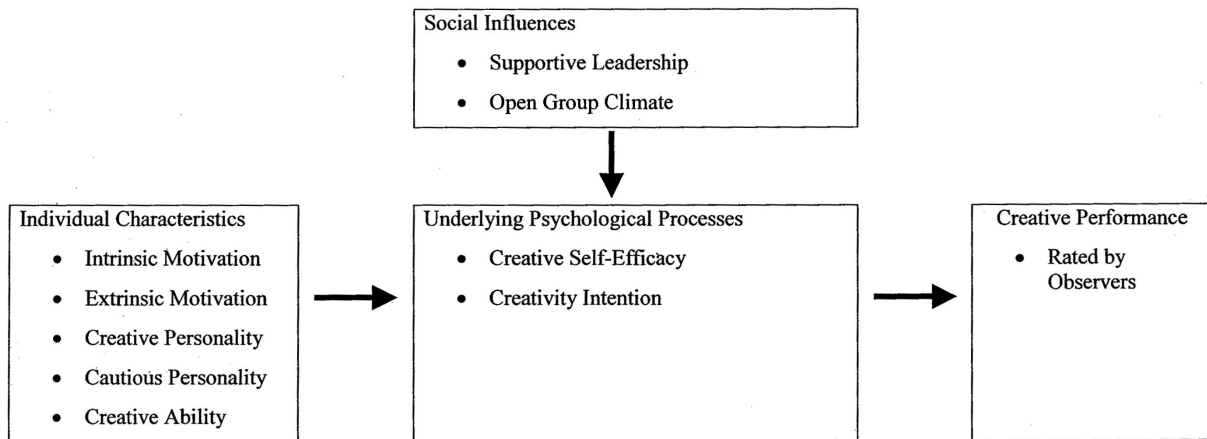


Figure 1. Conceptual framework of the present study.

formance. Figure 1 summarizes the three sets of predictors examined in this study and their hypothesized relationships with respect to creative performance. In the sections that follow I discuss each cluster of predictors and advance hypotheses explaining their relationships.

**Individual Characteristics**

Scholars have long believed that the source of creativity is individuals’ voluntary exploration of fresh alternatives based on intrinsic task interest (Rogers, 1954) and that this voluntary effort is encouraged by any freedom and spontaneity inherent in the situation (Amabile, 1988). From this perspective, rewards and extrinsic motivation impose situational constraints that reduce freedom and distract people’s attention from the task itself (Amabile, 1996). However, in contrast to this prevailing belief, recent studies by Eisenberger and his colleagues (Eisenberger & Rhoades, 2001; Eisenberger, Rhoades, & Cameron, 1999) have shown that extrinsic motivation can actually increase creativity when the reward is contingent on creativity. These studies indicate that extrinsic motivation can increase creativity by enhancing self-determination and intrinsic task interest (Eisenberger et al., 1999). In sum, there is substantial theoretical reason to believe that both intrinsic and extrinsic motivation contribute to creativity.

Numerous studies have reported that having a creative personality promotes creative activities (Flynn & Goldsmith, 1993; Oldham & Cummings, 1996).

Gough (1979) also showed that negatively weighed items in his creative personality scale were negatively related to various creativity measures. In this study, these negative items were labeled as *cautious personality*. I expect to find positive and negative influences of creative and cautious personalities, respectively, with regard to creative performance.

Another critical individual characteristic is creativity-relevant skills, particularly cognitive styles or problem-solving skills beneficial to creative performance (Amabile, 1988; Woodman et al., 1993). For instance, studies have shown that the Kirton (1976) Adaptor–Innovator Scale captures the cognitive orientation pertinent to creativity, in that innovators are more creative than adaptors (Tierney et al., 1999). Building on this line of research, this study attends to *creative ability*, that is, skills or competencies relevant to creative performance, such as the ability to generate new ideas or look at problems from novel perspectives. The actual level of abilities relevant to creativity may be a critical precondition of creative performance.

**Contextual Factors**

This study examines two proximal sources of social influence, the leader and peers. Many authors have acknowledged the importance of leadership in encouraging creativity (e.g., Amabile et al., 1996; Redmond et al., 1993). The literature has consistently shown that open, participative, noncontrolling, and supportive leaders engender more creative outcomes than directive and controlling leaders do (Amabile et al., 1996;

Axtell, Holman, Unsworth, Wall, & Waterson, 2000; Oldham & Cummings, 1996). Specifically, supportive leadership involves leader behaviors such as encouraging open interactions and seeking ideas from and providing feedback to members, which facilitate creative performance of followers.

Peer group members may also affect individuals' creative performance. As an immediate social surrounding, the group exerts substantial influence on individuals. *Group climate* reflects group members' perceptions of the group and peer members. *Open group climate* entails members' perceptions of mutual openness and expectations for sharing ideas among members (Amabile et al., 1996, p. 1160). Boss, Koberg, and Rohan (2001) found that open sharing of problems and responsibilities within the team was associated with increased creativity of hospital workers. A nonthreatening group environment renders diverse ideas and competing viewpoints acceptable and allows for explorations of alternative approaches without threat of reprisal (participative safety; Anderson & West, 1998).

### Mediating Role of Underlying Psychological Processes

Thus far, I have identified several key individual and contextual factors that have been found to influence creative performance. This section introduces a new set of variables that have not been investigated in previous studies. Specifically, I attend to psychological processes that may mediate the relationships of stable individual dispositions and contextual influences with creative performance. To theoretically isolate psychological processes immediately preceding creative performance, I draw on the *theory of planned behavior* (Ajzen, 1991), in which human behavior is determined by perceived behavioral control and intention. Intention is, in turn, predicted by subjective norms, attitudes toward the behavior, and perceived behavioral control. Perceived behavioral control (or, more generally, self-efficacy belief with regard to the task to be performed) and intention (or motivation specifically directed to the behavior) represent two key psychological readiness factors (i.e., "can" and "will"), providing a favorable condition for actual performance of the behavior in many situations (e.g., Taylor & Todd, 1995).

In the present context, I propose that creative performance can be directly predicted by creative self-

efficacy and creativity intention. *Creative self-efficacy* reflects the role of perceived behavioral control ("the perceived ease or difficulty of performing the behavior," Ajzen, 1991, p. 188) in the context of creative performance. In other words, it refers to a person's belief that he or she can successfully perform creative behavior in a particular setting (Bandura, 1997). *Creativity intention* reflects the degree of motivation an individual has to engage in creative behavior within a given setting. According to Ajzen, intention is an indication "of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior" (p. 181). Thus, the following relationships are hypothesized:

Hypothesis 1. Creative self-efficacy is positively associated with creative performance.

Hypothesis 2. Creativity intention is positively associated with creative performance.

Both creative self-efficacy and creativity intention are oriented toward the specific situation and task at hand (e.g., developing creative products in research-and-development teams, presenting creative ideas in the classroom) and thus are expected to mediate the effect of more general personal dispositions on creative performance. Personal dispositions such as motivation, personality, and ability may set the overall inclination for a person to be creative. However, even when a person holds stable dispositions that favor creativity in general, his or her intention to engage in creative behavior may vary in different situations (cf. domain-specific innovativeness; Flynn & Goldsmith, 1993). For example, an engineer who is highly oriented toward creative solutions in his or her development project can totally neglect new ways of dealing with personal financial issues. In contrast, an employee who loves routine and simplicity in his or her assembly-work job may want to engage in creative activities during his or her leisure time. Thus, although stable personal dispositions (motivation, personality, and ability) tend to determine the overall likelihood of a person's being creative across situations, a person's creative self-efficacy and creativity intention in a given setting (e.g., in class, at work, at home) may constitute a more direct predictor of his or her creative performance in that setting.

More specifically, I propose that creative self-efficacy is influenced by a person's creative ability and

creative or cautious personality and directly influences his or her creative performance, thus mediating these individual dispositions' effects on creative performance. Although individuals' creative self-efficacy largely relies on their actual possession of creative ability, their personality may also affect their level of creative self-efficacy; even with the same creative ability, a cautious person may develop a lower level of creative self-efficacy than a person with a creative personality.

Hypothesis 3. Creative self-efficacy will mediate the effects of cautious-creative personality and creative ability on creative performance.

On the other hand, creativity intention may be influenced by all of the three individual characteristics (motivation, personality, and ability) because a person's inclination toward a specific behavior can be shaped by general motivational orientation and personality characteristics (Amabile, 1996; Oldham & Cummings, 1996) as well as by plausibility of the behavior based on the present ability (Larrick, 1993).

Hypothesis 4. Creativity intention will mediate the effects of intrinsic-extrinsic motivation, cautious-creative personality, and creative ability on creative performance.

These psychological processes are also hypothesized to mediate the effects of social influences on creative performance. Deci and Ryan (1985) maintained that rather than serving as the direct determinant of behavior, contextual factors influence behavior through the psychological meaning (*functional significance*) that individuals attach to them. Accordingly, the same context may have different impacts on human behavior depending on how individuals construe and respond to it. It is thus expected that the effects of social factors on creative performance are mediated by psychological process variables that reflect the person's appraisal of the situation.

Specifically, social surroundings favorable to creative behavior (supportive leadership, open group climate) may promote both creative self-efficacy and creativity intention. Prior studies have revealed that a person's self-efficacy belief is malleable and can be reinforced by social support (Bandura, 1997; Lindsley, Brass, & Thomas, 1995). Also, in Ajzen's (1991) the-

ory of planned behavior, subjective norms regarding the behavior constitute an important predictor of behavioral intention. Therefore, social support for creative behavior from one's leader and peers may positively influence both creative self-efficacy and creativity intention, which in turn directly predict creative performance within that setting.

Hypothesis 5. Creative self-efficacy will mediate the effects of supportive leadership and open group climate on creative performance.

Hypothesis 6. Creativity intention will mediate the effects of supportive leadership and open group climate on creative performance.

### Method

#### Data Collection Procedure and Participants

Data were collected from undergraduate students taking an introductory course in organizational behavior at a North American business school. Participation was voluntary and rewarded with gift certificates offered through a draw. The course involved a total of 28 instructors teaching 430 students composing 14 sections (each section was taught by 2 instructors). The classes met twice a week for sessions of 2-hr each during the 13-week semester. Throughout the semester, less than one fourth of class time was spent on lecture. Instead, the majority of class time was devoted to exercises and discussions. For this reason, the course required intense participation from the students, and instructors encouraged students to contribute to the class by offering examples, personal points of view, and questions for discussion.

The students completed the survey instruments for the present study three times, at the 4th week (Time 1; T1), the 8th week (Time 2; T2), and the 12th week (Time 3; T3) of the semester. The instructors offered their evaluation of each and every student's creative performance at the 12th week (T3). Of the 430 students, 386 students (response rate = 89.8%) offered data for the present study by participating in at least one of the three waves of data collection (the sample sizes for T1, T2, and T3 were 349, 344, and 331, respectively). Women composed 51.6 % of the present

sample. The average age and year at the university were, respectively, 19.8 years and 2.1 (1 = freshmen, 2 = sophomore, 3 = junior, 4 = senior).

### Measures

The questionnaires used for each wave of data collection assessed different sets of variables. Specifically, the T1 questionnaire assessed personal dispositions such as personality (creative personality, cautious personality) and task motivation (intrinsic motivation, extrinsic motivation). The T2 questionnaire measured the creative ability of participants and social influences from the leaders and peers (supportive leadership, open group climate). Finally, the T3 questionnaire collected underlying psychological processes (creative self-efficacy, creativity intention). At T3, the creative performance of each student participant was evaluated by two instructors per student. The items used to measure each construct are described later. Each scale included multiple items and showed acceptable internal consistencies. A 7-point Likert-type scale was used as the response format for all items.

**Intrinsic and extrinsic motivation (T1).** Participants' task motivation was measured by two scales appearing in the Work Preference Inventory (Amabile, Hill, Hennessey, & Tighe, 1994). The intrinsic motivation scale included four items ( $\alpha = .83$ ) that assessed the degree to which respondents enjoyed the challenge of the work at hand. Sample items were "I enjoy tackling problems that are completely new to me" and "I enjoy trying to solve complex problems." The extrinsic motivation scale had four items ( $\alpha = .76$ ) that measured the extent to which participants relied on external incentives as the impetus for their work. This scale included items such as "I am strongly motivated by the grades I can earn" and "As long as I can do what I enjoy, I'm not that concerned about exactly what grades or awards I can earn" (reverse coded). Each item was followed by a 7-point scale ranging from 1 (*not at all true*) to 7 (*absolutely true*).

**Creative and cautious personality (T1).** To measure participants' personality characteristics related to creativity, Gough's (1979) creative personality scale was adapted. This scale included a series of adjectives

depicting personal characteristics, and participants were asked to rate the degree to which each adjective accurately describes them. Of the 30 items in the original scale, I chose 7 adjectives that clearly capture personality characteristics related to creativity and cautiousness. The creative personality scale included four items (*inventive, creative, imaginative, innovative*) that showed high internal consistency ( $\alpha = .87$ ). The cautious personality scale comprised three adjectives (*cautious, commonplace, conventional*) with acceptable reliability ( $\alpha = .72$ ). A factor analysis demonstrated that these two scales are clearly distinguishable, with high factor loadings to corresponding factors (greater than .55) and low cross loadings (less than .16). Moreover, these two personality scales were negatively and significantly correlated with each other ( $r = -.24, p = .001$ ).

**Creative ability (T2).** Drawing on the literature enumerating creativity-related skills (e.g., Amabile, 1988; Axtell et al., 2000), I developed a five-item index ( $\alpha = .73$ ) to obtain participants' self-reported assessments of their creativity-relevant skills. Sample items were "I am able to generate new ideas," "I appreciate and accept different perspectives," and "I can present creative solutions for a given problem."

**Supportive leadership (T2).** The extent to which instructors supported students' participation and ideas was measured by three items ( $\alpha = .74$ ), including "Instructors regularly encourage students to participate in the class," "Instructors explicitly seek students' ideas or comments throughout the class," and "Instructors frequently and properly reinforce students who participate throughout the class."

**Open group climate (T2).** The extent to which active participation and open sharing of ideas were expected in the class was assessed by a three-item measure ( $\alpha = .73$ ), including the items "In this class, open and active participation is a norm," "Classmates encourage each other to participate actively," and "As a group, we feel that each one of us needs to contribute to class exercise and discussion."

**Creative self-efficacy (T3).** Participants' self-efficacy with regard to using their creativity in the classroom setting was assessed by a four-item measure

( $\alpha = .71$ ). Example items include “I feel confident that I can introduce new ideas to the class in a convincing manner,” and “I feel nervous when I present different views to classmates” (reverse coded).

**Creativity intention (T3).** Participants’ intention to exert creative effort during the class was measured by a two-item scale ( $\alpha = .83$ ), including the items “I am strongly motivated to offer new and constructive ideas to the class” and “I am willing to use and practice my creativity during this class.” The distribution of this two-item measure was slightly negatively skewed, but it was not significantly different from a continuous, normal distribution (Kurtosis test,  $p = .48$ ).

**Creative performance (T3).** At the end of the semester (T3), each of the two instructors responsible for the same class independently evaluated their students’ level of creative performance on a 7-point scale ranging from 1 (*very little*) to 7 (*quite a lot*). In the evaluation sheet prepared for instructors, creativity was defined as “the extent to which this particular student (1) is open to and actively listens to others’ ideas, (2) generates and presents new/fresh ideas, alternative explanations, different perspectives, or other creative solutions, and (3) integrates multiple perspectives or combines ideas or materials from different modules in a constructive manner.” The interrater agreement of the two instructors’ ratings of creative performance was acceptable (effective reliability of judges = .70; see Rosenthal & Rosnow, 1991, pp. 51–52).

## Results

Table 1 presents means, standard deviations, and intercorrelations between the study variables. Although the present study used design features that might reduce common method variance, such as the three-wave longitudinal design and the outcome measure reported by two external evaluators (Podsakoff & Organ, 1986), all predictors were based on self-report data from the same source. To examine whether common method variance was a substantial threat to the present study, Harman’s one-factor test was performed (Podsakoff & Organ, 1986). Factor analysis of the 32 items composing the nine scales rated by the student

participants was conducted using principal-components analysis. This procedure produced nine factors, and each item was loaded to its respective factors with factor loadings ranging between .54 and .92. This clear factor structure indicates that the nine scales reported by students were empirically distinct and that the confounding from common method variance was not serious in the present data.

The framework in Figure 1 and the hypotheses advanced here were tested by confirmatory structural equation modeling (SEM) analysis using the EQS program (Bentler, 1995). SEM is an appropriate procedure for the present study because it estimates relative impacts of multiple predictors on multiple outcomes that are linked by more than two causal steps, controlling for measurement errors (Bollen, 1989). In the present data, the overall missing data rate for the study variables amounted to 18%; therefore, 82% ( $N = 317$ ) of the total sample ( $N = 386$ ) was used as the actual sample in the SEM procedures described here.

## Measurement Model

In the present data, nine scales rated by students were measured using 32 items, and an additional variable (instructor-rated creative performance) was provided by two instructors’ rating of each student. Overall, a full measurement model could be created from 34 data points (or items) that indicated 10 latent factors. Given the current sample size, however, it would not be desirable to build a full measurement model including all 34 indicators. Instead, the number of indicators per latent construct was limited to 2. Thus, when the measure included more than two items, a factor analysis of scale items was conducted using principal-component analysis, specifying a two-factor solution (without this requirement, all measures produced a single factor) to obtain two subscales, each representing distinct within-scale variance. Two creativity ratings offered by two instructors composed two indicators of creative performance.

To estimate the measurement model with the latent factors as have been specified, I allowed covariances between each latent variable and every other latent variable in the model. The statistical test of this measurement model is equivalent to a confirmatory factor analysis of all study variables. This model fitted the data well,  $\chi^2(125) = 162.12$ ,  $p < .001$ ; comparative fit

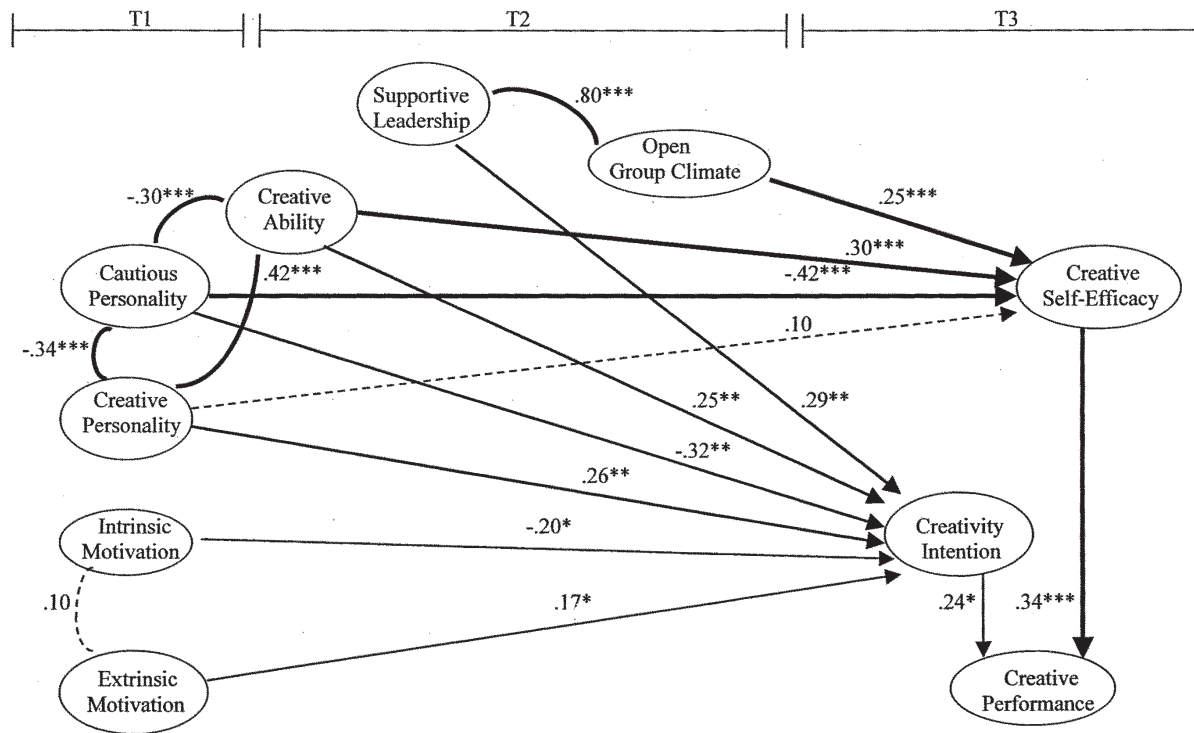
**Table 1.** Means, Standard Deviations, and Intercorrelations Among Variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1. Intrinsic Motivation (T1)	4.93	1.11	—									
2. Extrinsic Motivation (T1)	5.11	1.56	.05	—								
3. Creative Personality (T1)	4.90	1.17	.24***	-.07	—							
4. Cautious Personality (T1)	4.04	1.14	-.17**	.04	-.24***	—						
5. Creative Ability (T2)	5.17	0.79	.23***	.14*	.30***	-.19**	—					
6. Supportive Leadership (T2)	6.19	0.72	.13*	.10	.09	-.06	.28***	—				
7. Open Group Climate (T2)	5.67	0.86	.05	.11*	.04	.01	.19***	.47***	—			
8. Creative Self-Efficacy (T3)	5.11	1.12	.17**	.06	.29***	-.33***	.43***	.22***	.20**	—		
9. Creativity Intention (T3)	5.28	1.23	.04	.03	.12*	-.06	.13*	.11	.16**	.23***	—	
10. Creative Performance (T3)	4.39	1.61	.11*	.17**	.13*	-.16**	.19***	.17**	.12*	.35***	.11*	—

Note. T1 = Time 1; T2 = Time 2; T3 = Time 3.

\* $p < .05$ . \*\* $p < .01$  \*\*\* $p < .001$ .





**Figure 2.** Longitudinal structural model of creative performance. T1 = Time 1; T2 = Time 2; T3 = Time 3. Thicker lines represent statistically more significant results. Dotted lines represent statistically nonsignificant results. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

index (CFI) = .98; goodness-of-fit index (GFI) = .95; root-mean-square error of the approximation (RMSEA) = .031, and thus it was used in the testing of all of the structural models discussed here.

### Structural Model and Hypothesis Testing

The present hypotheses suggest that three sets of variables (stable personal dispositions, social influences, and underlying psychological processes) influence creative performance and that underlying psychological processes mediate the effects of the other two clusters of variables on creative performance. Using the aforementioned measurement model, a structural model was tested incorporating every path based on Hypotheses 1 through 6. This initial model showed a good fit to the present data,  $\chi^2(151) = 252.01$ ; CFI = .94; GFI = .93; RMSEA = .046. In this initial model, however, because of a very high correlation between

open group climate and supportive leadership, neither was significantly associated with creative self-efficacy or creativity intention. Taking this multicollinearity into account, I removed the less significant paths, and only the path from open group climate to creative self-efficacy and another from supportive leadership to creativity intention were kept in the final model. This slightly revised model showed a model fit comparable to that of the initial model,  $\chi^2(153) = 278.54$ ; CFI = .92; GFI = .92; RMSEA = .051. Figure 2 displays this final model and estimates of its parameters. The figures along the paths represent standardized path coefficients.

Although the proposed model fits the data well, the possibility still exists that other models may provide an equally good or better fit to the data. Accordingly, I identified and tested two alternative structural models based on plausible alternative hypotheses. The first alternative model (direct-effect-only model) was created

by removing the paths from individual characteristics and social influences to psychological processes and adding direct paths from these variables to creative performance,  $\chi^2(156) = 476.53$ ; CFI = .80; GFI = .86; RMSEA = .081. The second alternative model (direct-and-indirect-effect model) was created by adding direct paths from individual characteristics and social influences to creative performance in addition to their indirect paths via psychological processes,  $\chi^2(146) = 313.00$ ; CFI = .90; GFI = .91; RMSEA = .060.

Although a commonly applied criterion for model comparison is statistical significance of the change in chi-square, this criterion is applicable only when nested models are compared. To facilitate the comparison of the two alternative models and the proposed model that are not nested to each other, I used the Akaike information criterion (AIC): For the two models from the same data, the model with the smaller AIC is to be preferred. AICs of the present model, the first alternative model, and the second alternative model were -27.46, 164.53, and 21.00, respectively. This comparison clearly demonstrates that the present model performed better than the other two alternative models.

Overall, the SEM results summarized in Figure 2 support the present hypotheses. Creative self-efficacy and creativity intention directly influenced creative performance (Hypotheses 1 and 2 were supported), mediating the effects of seven individual and contextual variables examined. Confirming the mediational hypotheses (Hypotheses 3 and 4), individual characteristics influenced creative performance through their impacts on creative self-efficacy and creativity intention. Of interest, extrinsic motivation and intrinsic motivation had opposite effects on creativity intention ( $\beta = .17, p = .018$ , and  $\beta = -.20, p = .028$ , respectively). Creative personality significantly increased creativity intention ( $\beta = .26, p = .008$ ), but not creative self-efficacy ( $\beta = .10, p = .17$ ). In contrast, cautious personality showed significant effects on both psychological process variables as hypothesized. Creative ability was also positively associated with both psychological process variables.

The effects of social influence variables on creative performance were also mediated by underlying psychological processes (Hypotheses 5 and 6 were supported). Instructors' supportive leadership behavior influenced students' creative performance by enhancing their creativity intention ( $\beta = .29, p = .003$ ), and the positive effect of an open group climate on creative

performance was mediated by creative self-efficacy ( $\beta = .25, p = .001$ ).

## Discussion

The present study examined the effects of various individual, contextual, and psychological process variables on creative performance and their interrelationships. It identified a set of psychological processes that explain a plausible mechanism through which individual characteristics and contextual factors influence individuals' creative performance. The analysis of longitudinal, multisource data showed that underlying psychological processes completely mediated the effects of individual characteristics and social influences on creative performance. This study informs the literature of potential psychological mechanisms through which the person and the social context affect creative performance. It also suggests several interesting implications for further research on creativity as discussed later.

This study provides empirical evidence that extrinsic motivation increases creative performance through its effect on creativity intention. In fact, controlling for other predictors, only extrinsic motivation (but not intrinsic motivation) was positively related to creativity intention. This pattern indicates that, contrary to the prevalent belief, extrinsic motivation may not unilaterally destroy creativity. As Eisenberger and Rhoades (2001) suggested, the key moderator of the relationship between extrinsic motivation and creativity might be the reward contingency. Extrinsic motivation per se may neither increase nor decrease creativity. Instead, people with high extrinsic motivation may display high creative performance when reward criteria involve creativity, whereas the same people may stick to conventional approaches when the situation signals that efficiency, rather than creativity, will be rewarded. Given that creativity is explicitly sought and encouraged in most contemporary work and educational settings (Amabile, 1996), extrinsic motivation may often increase rather than decrease the creative performance of individuals.

An alternative explanation of this finding may involve the type of creativity involved. The present measure of creative performance was based on expressed or public creativity observed by two instructors. Ap-

parently, the present dependent measure reflects the “responsive or expected creativity” that was demanded by the situation (Unsworth, 2001), and thus it might be more likely to be influenced by a person’s extrinsic motivation. This narrow operationalization indeed ignores other types of creativity such as proactive or contributory creativity, which are triggered by internal drivers and voluntary efforts rather than by external expectations (Unsworth, 2001). These latter types of creativity might be better predicted by intrinsic task motivation. Nevertheless, in current organizational and educational settings, creativity is often elicited by the task and expected in many situations (e.g., quality circles, brainstorming sessions, focus groups, case discussions). Perhaps this kind of expected creativity may benefit more from individuals’ extrinsic motivation than from intrinsic motivation as shown in this study. Future studies should examine different types of creativity that may be facilitated or hindered by different motivational (intrinsic vs. extrinsic) or goal orientations (performance vs. learning) that people bring into the situation.

This study examined two opposing personality types that may underlie various creativity-related personality characteristics such as innovativeness, open information processing, and tolerance for ambiguity (Flynn & Goldsmith, 1993; Gough, 1979). Factor analysis indicates that being cautious and being creative constitute two independent personality characteristics. Of interest, only cautious personality, not creative personality, was a significant predictor of creative self-efficacy ( $\beta = -.42, p = .001$ , and  $\beta = .10, p = .095$ , respectively). This suggests the possibility that the inhibitory effect of being cautious with respect to a person’s creativity-related efficacy belief is greater than the facilitative effect of being a creative-type personality, particularly in the case of expressed creativity, in which cautious people experience difficulty in presenting their ideas to others. This interpretation corresponds to the research on brainstorming showing that the group setting itself imposes barriers to individual creativity due to evaluation apprehension experienced by members (Paulus & Yang, 2000). Therefore, to improve the creative performance of individuals in a group setting, it may be important to reduce the restraining forces residing within individuals, such as being cautious, being hesitant, being introverted, or having a tendency to self-censor ideas. Future studies might examine the

effect of group composition in terms of members’ personality characteristics on group performance in brainstorming or group-level creativity.

Despite numerous studies of individual and contextual factors predicting creativity (Axtell et al., 2000; Oldham & Cummings, 1996; Scott & Bruce, 1994), an in-depth exploration of why these variables influence creativity has not yet been conducted systematically. This study has expanded the literature by identifying and testing psychological processes that explain a mechanism through which various individual and contextual factors increase or decrease creative performance. The results reveal that personal dispositions and social surroundings indirectly influence creative performance by shaping critical psychological processes rather than directly influencing creative performance. This mediational pattern resonates with many researchers’ speculations regarding the potential influence of individual and contextual factors on psychological states that may be directly responsible for creativity (Amabile, 1988; Redmond et al., 1993). This study highlights the need for investigating more proximal, situation-specific predictors that may be more directly related to creativity in a particular setting than general individual and contextual factors. Further research can be targeted to the role of additional psychological process variables such as psychological freedom (Amabile, 1996) or increased attention or sensitivity to improvements or original ideas (Zhou & George, 2001).

Although the present design features, such as three-wave longitudinal data and the criterion reported by multiple external observers, improve the internal validity of the findings, caution is warranted in generalizing the results to other settings, particularly the workplace. To understand creativity in organizational settings, researchers may need to take into account other types of psychological processes, such as confidence in one’s ideas (e.g., value addition, implementability) and comparisons of costs and benefits of sharing ideas in terms of potential gains and potential image risks. Moreover, additional individual and contextual variables may operate in the workplace, such as task characteristics, empowerment, amount of resources, organizational climate, and other organizational impediments or facilitators (Amabile et al., 1996; Isaksen et al., 1999). Thus, a natural extension of the present study would be to identify distinct psychological processes responsible for creative performance in organizations and test the po-

tential impact of various organizational contextual factors on these psychological processes.

The present focus on psychological processes provides a process-based explanation of how and why some factors contribute to individual creativity whereas others do not. Indeed, the nature of the relationships between person and context and their impact on critical psychological processes may vary depending on the distinct nature of the individual and contextual variables under consideration. Conceptually, clear theorizing and testing of the relationships between various individual and contextual factors with regard to underlying psychological processes of creativity will provide an enriched understanding of the creative processes engaged in by individuals, teams, and organizations. In a practical sense, this improved understanding of creative processes will also promote the effectiveness of training and other interventions designed to increase creativity in organizations by revealing the mediating psychological processes that should be targeted as an intermediate outcome of these interventions.

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