

Competence Drives Interest or Vice Versa? Untangling the Bidirectional Relationships between Creative Self-Efficacy and Intrinsic Motivation for Creativity in Shaping Employee Creativity

Tingting Chen^a , Tae-Yeol Kim^b , Yaping Gong^c and Yongyi Liang^d 

^aLingnan University; ^bChina Europe International Business School (CEIBS); ^cThe Hong Kong University of Science and Technology; ^dJinan University

ABSTRACT Research has examined creative self-efficacy and intrinsic motivation for creativity as important antecedents to employee creativity, but little is known about how the two antecedents influence each other to foster employee creativity. This study proposes two theoretical possibilities. First, by enhancing resilience, creative self-efficacy can promote intrinsic motivation for creativity, which in turn boosts employee creativity. Task difficulty further strengthens creative self-efficacy's effect on intrinsic motivation for creativity and employee creativity (via resilience). Second, by fostering creative process engagement, intrinsic motivation for creativity can promote creative self-efficacy, which in turn boosts employee creativity. Task variability further amplifies the effect of intrinsic motivation for creativity on creative self-efficacy and employee creativity (via creative process engagement). Results from two experiments and two field studies largely supported the hypothesized relationships. We extend the creativity literature by untangling the interrelationships between creative self-efficacy and intrinsic motivation for creativity in shaping employee creativity.

Keywords: creative process engagement, creative self-efficacy, employee creativity, intrinsic motivation for creativity, resilience, task difficulty, task variability

Address for reprints: Yongyi Liang, School of Management, Jinan University, 601 West Huangpu Avenue, Guangzhou 510632, China (yongyi_liang@foxmail.com).

The second author and the third author contributed equally to this paper.

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INTRODUCTION

Creativity scholars (Amabile, 1996; Amabile and Pratt, 2016; Tierney et al., 1999; Tierney and Farmer, 2002, 2004) have extensively examined creative self-efficacy and intrinsic motivation for creativity^[1] as antecedents to employee creativity, defined as generating new and useful ideas (George, 2007; Oldham and Cummings, 1996; Zhou and Hoever, 2014). Creative self-efficacy – the belief that one is capable of producing creative outcomes (Tierney and Farmer, 2002, p. 1138) – reflects a ‘can-do’ factor, whereas intrinsic motivation for creativity – engaging in a creative task for its satisfaction, enjoyment, and intellectual fulfilment (Amabile, 1993; Tierney et al., 1999) – represents a ‘want-to-do’ factor.

Creative self-efficacy and intrinsic motivation for creativity have been typically studied in separation from each other. As an important extension to the prior studies, a meta-analytic study showed that creative self-efficacy and intrinsic motivation for creativity exert parallel and independent effects on creativity (Liu et al., 2016). Intriguingly, existing literature also presents disparate theoretical inferences implying that one factor serves as an underlying mechanism for explaining the other factor’s effect on creativity. For example, creative self-efficacy affects creativity because it ‘may also reflect intrinsic motivation [for creativity] to engage in creative activities’ (Gong et al., 2009, p. 766, see also Lua et al., 2024 for a review). Likewise, intrinsic motivation for creativity enhances creativity through satisfying creativity task mastery and competence challenge (Amabile, 1993; Gong et al., 2017; Malka and Chatman, 2003), which overlaps with creative self-efficacy.

Despite the valuable insights, one question remains unanswered: do the two factors have bi-relationships or exhibit a directional relationship where one precedes the other (but not vice versa) in leading to creativity? Our first objective is to tackle this directionality question. By doing so, we join the two streams of studies, namely, one examining their independent, parallel effects on creativity (e.g., Liu et al., 2016) while the other hints at their causal relationships in leading to creativity (e.g., Amabile, 1993; Gong et al., 2009; Lua et al., 2024). We thus provide new theoretical insight into the roles that creative self-efficacy and intrinsic motivation for creativity play in influencing creativity.

Furthermore, drawing on self-efficacy theory (Bandura, 1986, 1989, 1997; Gist and Mitchell, 1992) and intrinsic motivation theory (Amabile, 1996; Oldham and Cummings, 1996), we theorize two differential mediating mechanisms to unpack how creative self-efficacy affects intrinsic motivation for creativity, and vice versa, respectively. First, self-efficacy theory recognizes the difficulties and obstacles inherent in the creative pursuit and argues that efficacy beliefs enhance individuals’ perseverance levels in the face of difficulties and obstacles (Bandura, 1982, 1997). Creative self-efficacy is beneficial to creativity because it cultivates ‘resilience against failure threats’ (Liu et al., 2016, p. 238). Resilience refers to making positive adjustments to and bouncing back from adversity (Raetze et al., 2022; Sutcliffe and Vogus, 2003), rendering engaging in challenging creative activities intellectually fulfilling and intrinsically satisfying (see Stephens et al., 2013). That is, creative self-efficacy enhances creativity through the serial mediating effects of resilience and intrinsic motivation for creativity.

Second, according to intrinsic motivation theory, for intrinsically motivated individuals, their effort and engagement are based on the enjoyment and enthusiasm derived from the process of performing (Grant, 2008), which increases variation in ideas and task strategies (Amabile et al., 2005). These individuals are process-focused (Amabile, 1993; Grant, 2008; Ryan and Deci, 2000), suggesting that intrinsic motivation for creativity facilitates creative process engagement (Amabile, 1983; Grant, 2008; Zhang and Bartol, 2010). In turn, creative process engagement enhances learning and creative problem-solving abilities (Zhang and Bartol, 2010), thus boosting self-efficacy beliefs, and subsequent employee creativity.

Importantly, examining differential mediators for the two directions of their interrelationships allows investigating critical contingencies. As mentioned, on the one hand, self-efficacy theory (Bandura, 1982, 1997; Tierney and Farmer, 2011) suggests that creative self-efficacy fosters resilience in the face of difficulties. Accordingly, this relationship would be stronger when individuals are working on more (rather than less) difficult tasks. On the other hand, intrinsic motivation theory (Amabile, 1993, 1996; Grant, 2008; Ryan and Deci, 2000) argues that intrinsically motivated employees tend to gather diverse information, identify a problem from various perspectives, and create a variety of alternatives for the sake of curiosity and intellectual fulfilment. Such a tendency would be stronger when they encounter exceptional and non-routine tasks and must explore different and variable methods or procedures for doing their work. Working on high-variability tasks with abundant opportunities to explore different alternatives, employees with high intrinsic motivation for creativity are more likely to pursue their inner drive to engage in creative processes. Accordingly, we investigate the moderating effects of task difficulty and task variability – the two distinct task dimensions in the task contingent model that determines the factor of work-unit structure (Van de Ven and Delbecq, 1974) – on the two directions of the serial mediation effects. Our study provides a nuanced understanding of how task characteristics shape the directional relationships between creative self-efficacy and intrinsic motivation for creativity and vice versa, and the magnitude of these relationships.

Our research also offers significant practical implications. Not everyone is high on both creative self-efficacy and intrinsic motivation for creativity. The knowledge of the directional relationship between creative self-efficacy and intrinsic motivation for creativity in shaping individual creativity provides organizations and managers with valuable insights into employee selection and motivation for effectively enhancing their creativity. For instance, if creative self-efficacy has a stronger effect on intrinsic motivation for creativity compared to the reverse relationship in shaping employee creativity, managers can prioritize the selection of employees with high creative self-efficacy or focus on boosting their ‘can-do’ motivation for creativity. Particularly when faced with high (vs. low) task difficulty, managers should focus on building creative self-efficacy since it fosters resilience, intrinsic motivation for creativity, and ultimately enhances employee creativity. On the other hand, for high (vs. low) task variability, managers should build intrinsic motivation for creativity since it elicits creative process engagement that boosts creative self-efficacy and then enhances employee creativity.

THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

From Creative Self-Efficacy to Intrinsic Motivation for Creativity

Self-efficacy theory argues that creative self-efficacy belief supplies people with the confidence that they are capable of performing creative tasks (Tierney and Farmer, 2002, 2011). People with high creative self-efficacy find themselves capable of addressing creative challenges, thus feeling fascinated and enjoyable in creative tasks, despite possible obstacles and setbacks (Csikszentmihalyi, 1990). This argument has received indirect empirical support, such that people who feel they are competent in performing a task would develop intrinsic enjoyment and interest in that task (Van den Broeck et al., 2016).

Hypothesis 1a: Creative self-efficacy has a positive effect on intrinsic motivation for creativity.

Furthermore, we draw on self-efficacy theory to propose that resilience is an important mechanism explaining the effect of creative self-efficacy on intrinsic motivation for creativity. According to self-efficacy theory (Bandura, 1982, 1989), efficacy beliefs determine perseverance in the face of difficulties, obstacles, and setbacks. People who have high self-efficacy are more likely to navigate difficulties and setbacks with tenacity and exercise personal agency by persisting in their efforts embracing challenges as opportunities for learning, and adjusting strategies to overcome such challenges, the hallmark of resilience (Raetz et al., 2022; Sutcliffe and Vogus, 2003). Specifically, self-efficacy theory holds a unique assumption regarding obstacles in creative pursuits. As highlighted by Bandura (1989), ‘early rejection is the rule, rather than the exception, in... creative endeavors’ (p. 1176). Overcoming such difficulties and obstacles with perseverance and resilience becomes crucial in navigating the creative journey. A high creative self-efficacy fosters a positive view of obstacles inherent in creative tasks and a willingness to learn from handling the challenges of trial-and-error experimentation (Tierney and Farmer, 2011), which depicts a high resilience. Conversely, employees with low creative self-efficacy have self-doubt about their capabilities to handle obstacles encountered in creative tasks and are less likely to work through and bounce back from adversity.

In turn, resilience – a growth-focused perspective of adversity – makes employees remain positive about their creative work activities and continue to exert efforts despite obstacles and setbacks (Fredrickson, 2003; Stephens et al., 2013; Sutcliffe and Vogus, 2003). Employees with high resilience see adversity as temporary and bounce back and grow from it, and they cultivate positive attitudes toward the challenges (Stephens et al., 2013), which can foster intrinsic enjoyment and interest in task activities (Deci and Ryan, 1980; Ryan and Deci, 2000). For example, software developers with a high creative self-efficacy in our sample are likely to be resilient in addressing challenges raised by clients and colleagues, and such a resilient and learning approach toward the difficulties helps them grow through handling these challenging tasks, boosting their enjoyment and interest in the task activities.

Hypothesis 1b: Creative self-efficacy has a positive indirect effect on intrinsic motivation for creativity via resilience.

From Intrinsic Motivation for Creativity to Creative Self-Efficacy

According to intrinsic motivation theory (Gagné and Deci, 2005; Ryan and Deci, 2017), people who are intrinsically motivated to work on creative tasks find putting effort into such tasks volitional and enjoyable. They ‘experience a desire to learn, pursue their interests, and explore their curiosities’ and become immersed in and deeply engaged in such learning processes (Grant and Berry, 2011, p. 75). As a result, when working on creative tasks, intrinsically motivated people enjoy engaging in self-directed learning and knowledge acquisition to reduce the discrepancy between what they know and what they need to know (Di Domenico and Ryan, 2017; Ryan and Deci, 2017). That is, people with high intrinsic motivation for creativity would be able to learn better and develop relevant expertise and skills in creative tasks that can enhance their creative self-efficacy (Van Knippenberg and Hirst, 2020).

Hypothesis 2a: Intrinsic motivation for creativity has a positive effect on creative self-efficacy.

Furthermore, building on intrinsic motivation theory (Amabile, 1993; Grant, 2008; Ryan and Deci, 2000), we propose that creative process engagement is an important process linking intrinsic motivation for creativity to creative self-efficacy. Creative process engagement is defined as engaging in the processes of problem identification, information searching and encoding, and idea and alternative generation (Zhang and Bartol, 2010). Intrinsic motivation theory holds that intrinsically motivated individuals engage in an activity ‘for its inherent satisfactions’ (Ryan and Deci, 2000, p. 56). These people tend to explore diverse ideas to satisfy their curiosity and intellectual needs, leading to increased variation in task strategies and ideas (Amabile et al., 2005). Specifically, when employees have high intrinsic motivation for creativity, they are ‘process focused’ (Grant, 2008, p. 48) because engaging in creative processes is inherently enjoyable for them and is the goal they pursue. That is, intrinsic motivation for creativity can facilitate individuals to engage in a flexible, divergent, and exploratory learning process that increases variation of information, task strategies, and alternatives (Liu et al., 2016). On the contrary, employees with low intrinsic motivation for creativity lack the impetus to engage in effortful creative processes.

In turn, engaging in creative processes enables employees to repeatedly practice and use their creative-related skills, enhancing creative self-efficacy (Gist and Mitchell, 1992; Tierney and Farmer, 2011). Specifically, through creative process engagement, employees develop a better understanding of the creative problems from multiple and new angles, obtain a wide range of information, identify the associations among the information, and generate diverse alternative solutions (Zhang and Bartol, 2010), which can help employees develop their domain-relevant knowledge and foster the belief about their ability to produce creative outcomes for the creative tasks (Amabile, 1996; Tierney and Farmer, 2002). As an example, IT solution consultants in our sample who had high intrinsic motivation for creativity engaged in various creative processes such as actively communicating with clients to better

understand their problems, searching for diverse industrial information, and utilizing new information to refine their solutions. Such exploratory learning and experimentation can satisfy their curiosity and intellectual needs. Subsequently, it enables them to embrace opportunities for continuous learning and competence development, and thus enhancing their efficacy belief in handling creative tasks.

Hypothesis 2b: Intrinsic motivation for creativity has a positive indirect effect on creative self-efficacy via creative process engagement.

From Creative Self-Efficacy and Intrinsic Motivation for Creativity to Employee Creativity: The Serial Mediation Effects

Creative self-efficacy and intrinsic motivation for creativity exert unique effects on employee creativity (for a review and meta-analytic study, see Liu et al., 2016). On the one hand, creative self-efficacy entails the ‘motivation for the can do for creativity’ (Liu et al., 2016, p. 238; Tierney and Farmer, 2002). Efficacious employees can feel a high feasibility (the ‘how’ of action) of tasks and have a high expectancy to produce creative outcomes (Bandura, 2001, 2012; Gong et al., 2020). On the other hand, intrinsic motivation for creativity captures ‘the unique motivational force for the want to do for creativity’ (Liu et al., 2016, p. 238). Intrinsically motivated employees have a strong inner drive, which explains the reasons (the ‘why’ of action) they are highly engaged in creative tasks. Integrating Hypotheses 1 and 2 with this reasoning, we expect two sets of indirect effects:

Hypothesis 3a: Creative self-efficacy has a positive indirect effect on employee creativity via intrinsic motivation for creativity.

Hypothesis 3b: Creative self-efficacy has a positive indirect effect on employee creativity serially via resilience and intrinsic motivation for creativity.

Hypothesis 4a: Intrinsic motivation for creativity has a positive indirect effect on employee creativity via creative self-efficacy.

Hypothesis 4b: Intrinsic motivation for creativity has a positive indirect effect on employee creativity serially via creative process engagement and creative self-efficacy.

Moderators for the Indirect Links

Thus far, we draw on self-efficacy theory and intrinsic motivation theory to delineate the different processes underlying the two directions of the relationship between creative self-efficacy and intrinsic motivation for creativity in shaping employee creativity. Both theories suggest a learning perspective but different aspects of learning processes. Self-efficacy theory suggests that people with high self-efficacy achieve high creativity through

exercising personal agency to adopt a resilient and learning approach toward the obstacles and difficulties in creative pursuit. To extend this line of reasoning, we expect the effect of creative self-efficacy on resilience, and the serial mediation effect, to be stronger when work tasks are difficult.

In contrast, intrinsic motivation theory suggests that people with high intrinsic motivation for creativity harvest high creativity through channelling their intrinsic interest into creative process engagement, which involves exploratory learning and experimentation and thus increases variability in information, task strategies, and alternatives. We thus expect the effect of intrinsic motivation for creativity on creative process engagement, and the serial mediation effect, to be stronger when the tasks provide abundant room for exploring various alternative methods and procedures. We theorize that task difficulty and task variability – the two task characteristics in the task contingent model (Van de Ven and Delbecq, 1974) – moderate the relationship between creative self-efficacy and resilience, and the relationship between intrinsic motivation for creativity and creative process engagement, respectively.

Specifically, we propose that task difficulty enhances the relationship between creative self-efficacy and resilience. Task difficulty refers to ‘the analyzability of the work itself and the extent to which there is a known procedure that specifies the sequence of steps to be followed in performing the task’ (Van de Ven and Delbecq, 1974, p. 183). Creativity-related tasks have variations in difficulty levels. High task difficulty depicts a lack of standard routines or an established body of knowledge guiding employees to perform their work. Employees often need to spend considerable time and effort resolving work difficulties, and it is not easy to turn to others for answers. They need to use a trial-and-error approach to problem-solving yet have difficulty in predicting which alternatives will succeed (Perrow, 1967; Van de Ven and Delbecq, 1974). When working on such challenging tasks, creative self-efficacy should be vital and hence helpful in boosting resilience. This efficacy belief sustains the confidence necessary to persistently solve creative task problems and learn from the problem-solving process despite the difficulties and setbacks.

However, there are instances where the level of task difficulty of creativity-related tasks is relatively lower. For example, employees who have colleagues with prior work experience in similar projects may encounter a lower level of task difficulty. In such cases, employees would encounter fewer work challenges and setbacks because they can seek advice from colleagues with previous experiences. Thus, creative self-efficacy is less useful, and its effect on resilience should not be as strong or influential as when task difficulty is relatively higher. That is, the relationship between creative self-efficacy and resilience would be stronger when task difficulty is higher rather than lower. Subsequently, task difficulty can also strengthen the positive serial mediation role of resilience and intrinsic motivation for creativity in the relationship between creative self-efficacy and employee creativity. We thus hypothesize that:

Hypothesis 5a: Task difficulty moderates the relationship between creative self-efficacy and resilience, such that this relationship is stronger when task difficulty is higher rather than lower.

Hypothesis 5b: Task difficulty moderates the serial mediation effects of resilience and intrinsic motivation for creativity in the relationship between creative self-efficacy and employee creativity, such that this serially mediated relationship is stronger when task difficulty is higher rather than lower.

We expect that task variability enhances the relationship between intrinsic motivation for creativity and creative process engagement. Task variability refers to the stability and uniformity of work inputs and outputs (Van de Ven and Delbecq, 1974). Variability ranges from standard products/services to customer-specific (Collins and Hull, 1986). Creativity-related tasks may also vary in levels of variability. Employees working on high variability tasks often encounter exceptional and non-routine cases and must explore different methods or procedures for doing their work and meeting customer expectations (Perrow, 1967). When working on high-variability tasks, employees with high intrinsic motivation for creativity are more likely to pursue their inner drive to engage in the creative processes due to the abundant opportunities to explore different alternatives provided by high task variability.

By contrast, some creativity-related tasks involve less customer-specific components and less exceptional encounters, and thus are featured by a relatively lower level of task variability. For example, some programmers in our samples who were involved in generating solutions for customers received task requirements from product managers and carried out coding work using standardized approaches. In such cases, these programmers perform more routinized, repetitive work compared to product managers; they tend to follow standard guidelines to increase efficiency (Collins and Hull, 1986). In such conditions, even employees with high intrinsic motivation for creativity are less likely to engage in creative processes because of the limited opportunities to do so. Thus, task variability can strengthen the positive relationship between intrinsic motivation for creativity and creative process engagement, and the serial mediation role of creative process engagement and creative self-efficacy in the relationship between intrinsic motivation for creativity and employee creativity.

Hypothesis 6a: Task variability moderates the relationship between intrinsic motivation for creativity and creative process engagement, such that this relationship is stronger when task variability is higher rather than lower.

Hypothesis 6b: Task variability moderates the serial mediation effects of creative process engagement and creative self-efficacy in the relationship between intrinsic motivation for creativity and employee creativity, such that this serially mediated relationship is stronger when task variability is higher rather than lower.

OVERVIEW OF STUDIES

We tested our hypotheses using a multi-method approach. We first tested the bidirectional relationships of creative self-efficacy and intrinsic motivation for creativity in

affecting creativity (Hypotheses 1a, 2a, 3a, and 4a) using two pre-registered experimental studies (Studies 1a and 1b)^[2] and a field study (Study 2), respectively. In the two experiments, the participants worked on the same creative task that required them to generate ideas to solve a business problem. We manipulated creative self-efficacy and then measured intrinsic motivation for creativity as the mediator in Study 1a, and we manipulated intrinsic motivation for creativity and then measured creative self-efficacy as the mediator in Study 1b. After that, we used the Consensual Assessment Technique to assess creativity (Amabile, 1996) as the dependent variable. In Study 3, we tested the full model depicted in Figure 1. Approvals from the Institutional Review Board were obtained for these three studies. For all three studies, we informed the participants that their participation was voluntary and that their responses would be handled with confidentiality and used for research purposes only. Appendices A–C in Supporting Information provide details of measurement items, pre-registration, and supplementary analyses.

STUDY 1A: METHOD

Participants and Procedures

The participants were 212 students recruited from business-related majors in universities located in South China. We introduced our study by explaining that we were studying how people solve business problems (Grant and Berry, 2011) and that we were recruiting participants to attend a one-hour online session with 12 US\$ cash compensation. In this sample, 78.8 per cent were female and an average age of 20.73 ($SD = 1.82$). We started

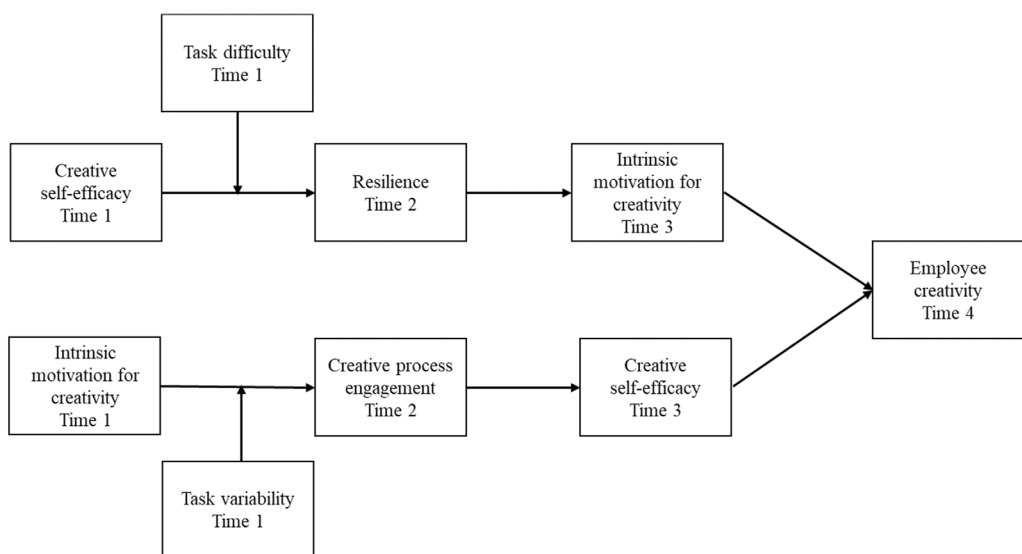


Figure 1. Research model linking creative self-efficacy and intrinsic motivation for creativity to employee creativity

the experiment by informing the participants that they would help Jimmy Crunchy, a food manufacturing and retailing company, come up with ideas for marketing a new product. The participants were then randomly assigned to one of the two experimental conditions (high vs. low creative self-efficacy).

Manipulation of creative self-efficacy. The participants were told that we were conducting a study for Jimmy Crunchy and had received feedback from previous participants that having the ability to produce creative outcomes is important to perform this study satisfactorily. Then, they were invited to complete a short test for creative ability by providing a description of a doodle picture (Han et al., 2014). The doodle creativity task is unrelated to the main creative task we used in the experiment to avoid the practice effect. After submitting the description, we told the participants that we used artificial intelligence to quickly analyse their creative ability based on their descriptions. Following prior experimental research on self-efficacy (Bandura, 1997; Bandura and Locke, 2003), we used false feedback to prime the participants into a state of high or low creative self-efficacy. The participants in the high vs. low creative self-efficacy conditions were told that they were at a high (70 per cent or above) or a low (30 per cent or below) percentile rank in creative ability compared to all the past participants in our database (a bogus normative group).

The task. After the manipulation, all participants of the two experimental conditions were presented with the same instruction about the creative task adapted from Berg and Yu (2021). We told the participants that Jimmy Crunchy developed a new bakery product made with cricket flour. Cricket flour is a dry powder that can replace regular flour in food with the same taste. This ingredient offered many benefits, such as being nutritious and helping resolve the challenge of increasing food supply without harming the environment. Nevertheless, consumers were not eager to eat insect-based foods. The participants were asked to spend 20 minutes generating ideas for marketing the new bakery product developed by Jimmy Crunchy. After the experiment was completed, we provided a debriefing to all participants. We informed the participants that we did not use artificial intelligence to analyse their creative ability based on their description of the doodle picture and that we simply randomly allocated them into two groups and provided false feedback on their creative ability ($N = 107$ for the high creative self-efficacy condition; $N = 105$ for the low creative self-efficacy condition).

Measures

Creative self-efficacy. After the manipulation, the participants were asked to rate their creative self-efficacy for this creative task using Tierney and Farmer's (2002) three-item scale ($\alpha = 0.83$, 1 = *Strongly disagree*, 7 = *Strongly agree*) for a manipulation check.

Intrinsic motivation for creativity. After submitting the ideas, the participants were asked to rate their intrinsic motivation for creativity for this creative task ($\alpha = 0.90$) using Tierney et al.'s (1999) five-item scale (1 = *Strongly disagree*, 6 = *Strongly agree*).

Creativity. To rate the creativity of the participant's ideas, we recruited three independent experts who were doctoral students in the marketing major. The only

information we gave to the raters was that the participants were asked to generate ideas for marketing the new bakery product made by cricket flour at Jimmy Crunchy, a food manufacturing and retail company. The raters were blind to the participants' demographics and to the study hypotheses, experimental design, and manipulation. Creativity was defined to raters as 'Overall degree to which the idea is both novel and useful', which they evaluated on a 7-point scale (1 = *Extremely low*, 7 = *Extremely high*). The interrater agreement across the three raters was high ($ICC(1) = 0.60$; $ICC(2) = 0.82$, median $r_{wg} = 0.92$), and thus we averaged their ratings into a measure of the overall creativity of each participant's ideas.

Manipulation check. Our false feedback significantly impacted our creative self-efficacy manipulation check. That is, the participants in the high creative self-efficacy condition reported higher creative self-efficacy than the ones in the low creative self-efficacy condition (Mean = 5.26, $SD = 0.84$ for the high creative self-efficacy group, Mean = 4.72, $SD = 1.19$ for the low creative self-efficacy group, $t(210) = 3.80$, $p < 0.001$).

STUDY 1A: RESULTS

Table 1 presents the means, standard deviations, and correlations in each condition. The correlation between intrinsic motivation for creativity and creativity was positive in the low creative self-efficacy condition ($r = 0.21$, $p = 0.03$) and was non-significant in the high creative self-efficacy condition ($r = 0.10$, $p = 0.32$). These results imply that the high creative self-efficacy condition may substitute for the effect of intrinsic motivation for creativity on creativity (Van Knippenberg and Hirst, 2020; Zhou and Hoever, 2014). That is, in the low creative self-efficacy condition, intrinsic motivation for creativity played an important role in driving creativity. However, in the high creative self-efficacy condition, intrinsic motivation for creativity was not significantly related to creativity. The effect of intrinsic motivation for creativity on creativity might be substituted by the high creative self-efficacy condition, which enabled the participants to adopt non-conforming views and deviate from routine and standard approaches for handling the creative task (Liu et al., 2016).

The results of path analyses show that the creative self-efficacy manipulation had a positive effect on intrinsic motivation for creativity ($b = 0.38$, $p < 0.001$). Meanwhile, intrinsic motivation for creativity had a positive effect on creativity after taking the creative self-efficacy manipulation into account ($b = 0.13$, $p = 0.02$). In addition, the bootstrapping results showed that the indirect effect of the creative self-efficacy manipulation on creativity via intrinsic motivation for creativity was significant (indirect effect = 0.05, 95% BC CI = [0.01, 0.11]). These results supported Hypotheses 1a and 3a.

STUDY 1B: METHOD

Participants and Procedures

The participants were 209 students recruited from business-related majors in the same universities as Study 1a. This sample is independent of the sample of Study 1a. In this

Table I. Means, standard deviations, and correlations by condition in studies 1a and 1b

	<i>Variable</i>	<i>M</i>	<i>SD</i>	<i>1</i>	<i>2</i>	<i>3</i>
Condition (Study 1a)						
Low creative self-efficacy (N = 105)	1. Age	20.70	1.78			
	2. Gender ^a	0.20	0.40	−0.06		
	3. Intrinsic motivation for creativity	4.49	0.89	−0.16	−0.17	
	4. Creativity	2.66	0.67	0.03	−0.17	0.21*
High creative self-efficacy (N = 107)	1. Age	20.77	1.86			
	2. Gender ^a	0.22	0.42	0.04		
	3. Intrinsic motivation for creativity	4.87	0.71	0.05	0.06	
	4. Creativity	2.96	0.58	−0.09	−0.19*	0.10
Condition (Study 1b)						
Low intrinsic motivation for creativity (N = 105)	1. Age	20.71	1.92			
	2. Gender ^a	0.30	0.46	−0.14		
	3. Creative self-efficacy	4.99	1.15	0.17	0.00	
	4. Creativity	2.70	0.90	0.04	−0.18	0.11
High intrinsic motivation for creativity (N = 104)	1. Age	21.81	2.36			
	2. Gender ^a	0.23	0.42	−0.01		
	3. Creative self-efficacy	5.50	0.97	0.09	0.15	
	4. Creativity	3.04	0.82	0.14	0.02	0.22*

^aGender: 1 = male; 0 = female.
*p < 0.05.

sample, 73.7 per cent were female and had an average age of 21.26 (*SD* = 2.21). The participants were randomly assigned to one of the two experimental conditions (high vs. low intrinsic motivation for creativity). We used the same procedure as described in Study 1a unless otherwise indicated.

Manipulation of intrinsic motivation for creativity. We followed Grant and Berry’s (2011) procedures to manipulate the high vs. low intrinsic motivation for creativity conditions. The participants were told that we were conducting two studies for Jimmy Crunchy, and that we had received feedback from previous participants that they liked to have a choice instead of being randomly assigned to one of the two studies. The first study was ‘A snack study that has been rated by past participants as an extremely enjoyable task to generate creative ideas, with average ratings of 6.73 on a seven-point “creativity and enjoyment” scale’. The second study was ‘A flour study that has been rated by past participants as a relatively boring task to generate creative ideas, with average ratings of 2.3 on a seven-point “creativity and enjoyment” scale’. After selecting one study, the participants in the high intrinsic motivation

for creativity condition were told ‘Thank you for selecting the snack study. You will work on this study’. The participants in the low intrinsic motivation for creativity condition were told ‘Unfortunately, the snack study that you chose is full. We need you to participate in the flour study’. In short, the manipulation of high intrinsic motivation for creativity lets the participants work on an interesting and preferred task, whereas the manipulation of low intrinsic motivation for creativity forces the participants to work on a boring task. Two aspects, namely, task interest and free choice differentiated the high vs. low conditions of intrinsic motivation for creativity (Grant and Berry, 2011; Shin and Grant, 2019).

We recruited 250 students for this experiment. Among them, 209 selected the ‘interesting’ task and 41 selected the ‘boring’ task. For the 41 participants who chose the boring task, they may be primed into an ‘ambivalent’ intrinsic motivation for creativity state. The instruction in the high intrinsic motivation for creativity condition may make them feel that they would be forced to work on an interesting task that they did not select whereas the instruction in the low intrinsic motivation for creativity condition may make them feel that they would work on a boring task that they selected. For this reason, before we conducted the experiment, we had pre-registered that the participants who selected the boring task would be regarded as failing to pass our selection question, and thus excluded them from the analyses. Prior studies, indeed, suggested that not all people prefer interesting over boring tasks (Sansone et al., 1992; Yeager et al., 2014). We thus remained only the 209 participants who chose the interesting task. In the end, 104 students participated in the high intrinsic motivation for creativity condition, and 105 in the low intrinsic motivation for creativity condition. Upon completing the task, we informed the participants that we assigned half to the boring study randomly, not because the interesting study was full.

Measures

After the manipulation, the participants were asked to rate their intrinsic motivation for creativity with the same scale used in Study 1a ($\alpha = 0.89$) for a manipulation check. Our random assignment for the interesting and preferred vs. boring and forced task significantly impacted our intrinsic motivation for the creativity manipulation check. That is, the participants in the interesting and preferred task condition reported higher intrinsic motivation for creativity than the ones in the boring and forced task condition (Mean = 5.50, $SD = 0.97$ for the high creative self-efficacy group, Mean = 4.99, $SD = 1.15$ for the low creative self-efficacy group, $t(207) = 5.84$, $p < 0.001$).

After submitting the ideas, the participants were asked to rate their creative self-efficacy for this creative task with the same scale used in Study 1a ($\alpha = 0.90$). We asked the same three independent experts who rated the creativity in Study 1a to rate the creativity of the participant’s ideas. The high interrater agreement across the three raters ($ICC(1) = 0.68$; $ICC(2) = 0.86$, median $r_{wg} = 0.92$) justified the average of their ratings into a measure of the overall creativity of each participant’s ideas.

STUDY 1B: RESULTS AND DISCUSSION

Table I presents the means, standard deviations, and correlations in each condition. The correlation between creative self-efficacy and creativity was positive in the high intrinsic

motivation for creativity condition ($r=0.22$, $p=0.03$) but non-significant in the low intrinsic motivation for creativity condition ($r=0.11$, $p=0.26$). These results imply that the low intrinsic motivation for creativity condition may act as an inhibitor to the effect of creative self-efficacy on creativity (Zhou and Hoever, 2014). That is, in the high intrinsic motivation for creativity condition, creative self-efficacy could drive creativity. However, creative self-efficacy's effect on creativity was inhibited by the low intrinsic motivation for creativity condition, which forced the participants to work on a boring task unworthy of their creative capabilities.

The results of path analyses revealed that the intrinsic motivation for creativity manipulation had a positive effect on creative self-efficacy ($b=0.50$, $p<0.001$). Meanwhile, creative self-efficacy had a positive effect on creativity after taking intrinsic motivation for creativity into account ($b=0.13$, $p=0.02$). In addition, the bootstrapping results showed that the indirect effect of the intrinsic motivation for creativity manipulation on creativity via creative self-efficacy was significant (indirect effect = 0.06, 95% BC CI = [0.01, 0.15]). These results supported Hypotheses 2a and 4a.

In summary, with an experimental design that manipulated high and low levels of creative self-efficacy and intrinsic motivation for creativity in two independent samples, respectively, Studies 1a and 1b provided causal inferences. Specifically, Study 1a supported the directional effect of creative self-efficacy on intrinsic motivation for creativity and then creativity; Study 1b supported the directional effect of intrinsic motivation for creativity on creative self-efficacy and then creativity. Despite these encouraging findings, these two studies involved student samples. Moreover, we could not test the directional effects by controlling for the reversed directional effects in the experimental studies. Therefore, we replicate our findings with a field study and a cross-lagged design using employee samples (i.e., repeatedly measuring creative self-efficacy and intrinsic motivation for creativity at Time 1 and Time 2) to strengthen our confidence in the validity and generalizability of the findings.

STUDY 2: METHOD

Participants and Procedure

We collected data from technical professionals and their direct supervisors of two high-tech companies in China. The major task of the technical professionals was to provide software and telecommunication product design and development services to clients, which involved creativity. Technical professionals need to understand clients' needs and exercise creativity during product development and service processes to develop solutions for clients. With the assistance of the human resource department, we distributed online questionnaires to 664 employees and 121 direct supervisors.

Following Podsakoff et al.'s (2012) suggestions, we conducted surveys with a three-wave (an approximately one-month time interval) and multi-source design to reduce concerns with common method variance. At Time 1, employees reported their demographics (i.e., age, gender, education, organizational tenure, and tenure with the current supervisor), creative self-efficacy, and intrinsic motivation for creativity. We received 555 responses from employees

(response rate = 83.6 per cent). At the same time, we received creativity ratings of 559 employees from 115 supervisors (response rate = 95.0 per cent). At Time 2, employees rated their creative self-efficacy and intrinsic motivation for creativity. Of those who responded at Time 1, we received responses from 514 employees (attrition rate = 7.4 per cent). At Time 3, supervisors again rated employee creativity. Of those rated at Time 1, we received creativity ratings of 484 employees provided by 104 supervisors (attrition rate = 9.6 per cent).

The final sample included 421 matched responses from 421 employees and 103 supervisors (overall response rate for employees = 63.4 per cent; overall response rate for supervisors = 85.1 per cent). All participants completed our questionnaires with more than two seconds per item (Aguinis et al., 2021). Among the 421 employees, the average age was 31.70 years ($SD = 5.72$), 76.72 per cent were men, 92.40 per cent had at least a bachelor's degree, the average organizational tenure was 64.44 months ($SD = 53.38$), and the average tenure with the supervisor was 36.47 months ($SD = 33.26$). Among the 103 supervisors who rated employee creativity, the average age was 35.24 years ($SD = 3.96$), 97.09 per cent were men, 99.03 per cent had at least a bachelor's degree, and the average organizational tenure was 107.17 months ($SD = 54.62$).

We then investigated the potential impact of attrition. For employee-reported variables, including demographics, we examined the differences between the two groups of employees (1 = those who completed the questionnaires at both time points; 2 = those who only responded to the Time 1 questionnaire). Similarly, for employee creativity rated by supervisors, we examined the differences between the two groups of employees (1 = those who received supervisory ratings at both time points; 2 = those who only received supervisory ratings at Time 1). We found no significant differences between the two groups in any demographic and focal variables. Therefore, there were no systematic biasing effects due to attrition.

Measures

We translated the original scales in English into Chinese following Brislin's (1986) back-translation procedure. Responses were indicated on a seven-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*) except for creative self-efficacy, which was measured on a five-point Likert scale (1 = *Strongly disagree*, 5 = *Strongly agree*). We measured creative self-efficacy and intrinsic motivation for creativity simultaneously at both time points using the same source (i.e., employees). To reduce common method variance, we followed Podsakoff et al.'s (2012) recommendations to use different numbers of scale points for measuring creative self-efficacy (five-point) and intrinsic motivation for creativity (seven-point), and we separated the items of these two variables in different sections of the questionnaire.

Creative self-efficacy. Employees reported their creativity self-efficacy at Time 1 and Time 2 using Tierney and Farmer's (2002) three-item scale. Employees rated the extent to which they agreed with the three items describing their current work state. A sample item is 'I have confidence in my ability to solve problems creatively'. Cronbach's alphas were 0.74 and 0.84 for Time 1 and Time 2, respectively.

Intrinsic motivation for creativity. We assessed employees' intrinsic motivation for creativity at Time 1 ($\alpha = 0.92$) and Time 2 ($\alpha = 0.94$) using Tierney et al.'s (1999) five-item scale.

Employees rated the extent to which they agreed with the five items describing their experiences at work (Shin and Zhou, 2003). An example item is ‘I am currently engaged in my tasks because I enjoy coming up with new ideas for products’.

Employee creativity. Supervisors rated employees’ creativity at Time 1 ($\alpha = 0.92$) and Time 3 ($\alpha = 0.92$) using Farmer et al.’s (2003) four-item scale. An example item is ‘This employee seeks new ideas and ways to solve problems’.

Control variable. We controlled for the company dummy to partial out its possible confounding effects.

Analytical Strategies

Our data had a nested structure because employees were rated by supervisors. We thus assessed our models using TYPE = COMPLEX and ESTIMATOR = MLR in the ANALYSIS command in conjunction with the CLUSTER options of the VARIABLE command in Mplus (Muthén and Muthén, 2017) for all analyses. With these model specifications, the MLR standard errors are computed using a sandwich estimator. Such adjusted standard errors can account for non-independence in nested data due to individuals’ clustering within supervisory groups. This approach is suitable for examining single-level models with a nested data structure (Li et al., 2020; Schaubroeck et al., 2017; Wu et al., 2016). To compare the estimated models, we calculated the chi-square differences using the Satorra–Bentler scaled approach (Satorra and Bentler, 2001, 2010). We assessed the significance of the indirect effects using the 95% bootstrapped bias-corrected confidence intervals (95% BC CI) (with 5000 bootstrap samples).

Measurement Models

We first examined four levels of measurement invariance – namely, configural (equal form), metric (equal factor loadings), scalar (equal intercepts), and residual invariance (equal residual variances) (Vandenberg and Lance, 2000) – for each of the three variables measured twice (i.e., creative self-efficacy and intrinsic motivation for creativity, which were measured at Time 1 and Time 2, and employee creativity, which was measured at Time 1 and Time 3) using Mplus 8.10. Notably, residual invariance is ‘rarely enforced in practice because it reflects a level of restriction that is usually unrealistic to expect’ (Little et al., 2007, pp. 358–59). We allowed error terms of the same item to correlate with each other across the two waves (Finkel, 1995). To evaluate model fit, we used the comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). As shown in Table II, scalar invariance for these three variables can be assumed based on ΔCFIs (–0.01) (Cheung and Rensvold, 2002; Diestel, 2022).

In addition, we conducted confirmatory factor analyses (CFAs) to examine whether the studied variables were distinctive at each time point. Table II shows that at Time 1, a three-factor model (creative self-efficacy, intrinsic motivation for creativity, and employee creativity) had an acceptable fit. Similarly, at Time 2, a two-factor model

Table II. Model fit indices for CFAs and measurement invariance in study 2

	χ^2	df	CFI	TLI	RMSEA	SRMR	ΔCFI
Measurement Equivalence							
Creative self-efficacy (T1 & T2)							
Configural equivalence	5.473	5	0.999	0.998	0.015	0.014	
Metric equivalence	6.063	7	1.000	1.000	0.000	0.020	0.001
Scalar invariance	11.471	9	0.997	0.994	0.026	0.022	-0.003
Residual invariance	29.109	12	0.976	0.970	0.058	0.057	-0.021
Intrinsic motivation for creativity (T1 & T2)							
Configural equivalence	99.060	29	0.965	0.946	0.076	0.030	
Metric equivalence	103.184	33	0.965	0.953	0.071	0.031	0.000
Scalar invariance	111.750	37	0.963	0.955	0.069	0.032	-0.002
Residual invariance	138.117	42	0.953	0.949	0.074	0.055	-0.010
Employee creativity (T1 & T3)							
Configural equivalence	57.590	15	0.954	0.914	0.082	0.031	
Metric equivalence	60.400	18	0.954	0.929	0.075	0.039	0.000
Scalar invariance	67.792	21	0.949	0.932	0.073	0.046	-0.005
Residual invariance	63.132	25	0.959	0.954	0.060	0.038	0.010
CFA, T1: Three-factor model ^a	174.654	51	0.948	0.933	0.076	0.029	
CFA, T2: Two-factor model ^b	57.231	19	0.977	0.966	0.069	0.020	

Note: N = 421 (with 103 clusters). T1: Time 1; T2: Time 2; T3: Time 3.

^aCreative self-efficacy, intrinsic motivation for creativity, and employee creativity.

^bCreative self-efficacy and intrinsic motivation for creativity.

(creative self-efficacy and intrinsic motivation for creativity) had a satisfactory fit. Taken together, the results supported (a) measurement equivalence of the same variables across measurement occasions and (b) the distinctiveness of the studied variables at Time 1 and Time 2.

STUDY 2: RESULTS AND DISCUSSION

Table III shows the descriptive statistics for the study variables. As expected, creative self-efficacy and intrinsic motivation for creativity were positively correlated, both

Table III. Means, standard deviations, and correlations in study 2

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Age	31.70	5.72											
2. Gender ^a	0.77	0.42	0.02										
3. Education ^b	1.96	0.33	0.02	-0.12*									
4. Organizational tenure (month)	64.44	53.38	0.65**	-0.05	0.00								
5. Tenure with leader (month)	36.47	33.26	0.29**	0.03	0.04	0.48**							
6. Creative self-efficacy, T1	3.77	0.59	0.12*	0.16**	-0.07	0.09	0.04	0.74					
7. Intrinsic motivation for creativity, T1	5.48	1.01	0.13**	0.15**	-0.09	0.09	0.09	0.61**	0.92				
8. Employee creativity, T1	4.75	1.30	0.06	0.07	0.10*	0.07	0.13**	0.07	0.02	0.92			
9. Creative self-efficacy, T2	3.94	0.66	0.07	0.20**	-0.04	0.00	0.05	0.53**	0.42**	0.16**	0.84		
10. Intrinsic motivation for creativity, T2	5.62	0.99	0.10*	0.13**	-0.01	0.05	0.10	0.48**	0.53**	0.14**	0.77**	0.94	
11. Employee creativity, T3	4.85	1.22	0.12*	0.13*	0.11*	0.09	0.11*	0.12*	0.12*	0.63**	0.24**	0.27**	0.92

Note: N = 421. Cronbach's alphas are shown on the diagonal in boldface. T1: Time 1; T2: Time 2; T3: Time 3.
^aGender: 1 = male; 0 = female.
^bEducation: 1 = junior colleague or below; 2 = bachelor's; 3 = master's or above.
*p < 0.05; **p < 0.01.

within measurement occasions ($r=0.61$, $p<0.001$ at Time 1; $r=0.77$, $p<0.001$ at Time 2, respectively) and across measurement occasions ($r=0.48$ between Time 1 creative self-efficacy and Time 2 intrinsic motivation for creativity, $p<0.001$; $r=0.42$ between Time 1 intrinsic motivation for creativity and Time 2 creative self-efficacy, $p<0.001$, respectively).

Cross-Lagged Effects of Creative Self-Efficacy and Intrinsic Motivation for Creativity

To examine the cross-lagged effects, we specified (a) a covariance between Time 1 creative self-efficacy and Time 1 intrinsic motivation for creativity and a covariance between the error terms for Time 2 creative self-efficacy and Time 2 intrinsic motivation for creativity, (b) auto-regression (i.e., stability) effects for the two variables (Time 1 creative self-efficacy $\rightarrow$ Time 2 creative self-efficacy and Time 1 intrinsic motivation for creativity $\rightarrow$ Time 2 intrinsic motivation for creativity), and (c) cross-lagged effects between the two variables (i.e., Time 1 creative self-efficacy $\rightarrow$ Time 2 intrinsic motivation for creativity and Time 1 intrinsic motivation for creativity $\rightarrow$ Time 2 creative self-efficacy). Table IV summarizes the results.

We specified the models in a stepwise manner following previous studies (Matthews et al., 2014; Zablah et al., 2016). In Model 1, we included covariances and the stability effects only. The results showed that both creative self-efficacy and intrinsic motivation for creativity exhibit stability effects from Time 1 to Time 2 ($B=0.41$, $p<0.001$; $B=0.38$, $p<0.001$, respectively). In Model 2, we added the cross-lagged effect of Time 1 creative self-efficacy on Time 2 intrinsic motivation for creativity. In Model 3, we extended Model 1 by adding the cross-lagged effect of Time 1 intrinsic motivation for creativity on Time 2 creative self-efficacy. In Model 4, we added both cross-lagged effects to Model 1, resulting in a saturated model (Little et al., 2007). Of the four models, Model 4 shows the best fit based on the results of chi-square difference tests (see Table IV). The cross-lagged effect of Time 1 creative self-efficacy on Time 2 intrinsic motivation for creativity was significant ($B=0.41$, $p<0.001$), as was the cross-lagged effect of Time 1 intrinsic motivation for creativity on Time 2 creative self-efficacy ($B=0.10$, $p=0.01$). These results support Hypothesis 1a and 2a.

To explore the relative magnitude of the two cross-lagged effects, we followed Zablah et al. (2016) and constrained the two effects to be equal (Model 5). A chi-square difference test showed a significant decrease in fit in Model 5 compared with Model 4 ($\Delta\chi^2 9.45$, $df=1$, $p=0.002$). This result combined with the results of Models 4 indicates that the cross-lagged effect of Time 1 creative self-efficacy on Time 2 intrinsic motivation for creativity was stronger than the cross-lagged effect of Time 1 intrinsic motivation for creativity on Time 2 creative self-efficacy.

Indirect Effects on Employee Creativity

To test the indirect effects, we first added supervisor-rated employee creativity at Time 1 as a control variable and employee creativity at Time 3 as a dependent variable to the cross-lagged model (Model 6 in Table IV). We found that employee creativity exhibited stability from Time 1 to Time 3 ($B=0.55$, $p<0.001$), and Time 1 creative self-efficacy

Table IV. Results of cross-lagged and indirect-effect models in study 2

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>
<i>Model description</i>	<i>Stability effects only</i>	<i>Stability and CSE → IM effects</i>	<i>Stability and IM → CSE effects</i>	<i>Cross-lagged model</i>	<i>CSE → IM & IM → CSE effects set to equal</i>	<i>Cross-lagged and indirect-effect model</i>
Model path estimate						
T1CSE → T2CSE	0.41** (0.06)	0.59** (0.05)	0.31** (0.06)	0.49** (0.06)	0.36** (0.06)	0.49** (0.06)
T1IM → T2IM	0.38** (0.05)	0.27** (0.05)	0.51** (0.05)	0.37** (0.06)	0.47** (0.04)	0.37** (0.06)
T1CSE → T2IM		0.51** (0.10)		0.41** (0.09)	0.16** (0.03)	0.41** (0.09)
T1IM → T2CSE			0.16** (0.04)	0.10* (0.04)	0.16** (0.03)	0.10* (0.04)
T1CR → T3CR						0.55** (0.05)
T1CSE → T3CR						−0.06 (0.10)
T1IM → T3CR						0.02 (0.07)
T2CSE → T3CR						0.03 (0.12)
T2IM → T3CR						0.22** (0.09)
χ^2 (df)	38.39 (4)	9.32 (3)	23.14 (3)	3.93 (2)	13.53 (3)	13.51 (5)
$\Delta\chi^2$ (df) ^a	26.65** (2)	4.18* (1)	14.68** (1)		9.45** (1)	
CFI	0.88	0.98	0.93	0.99	0.96	0.98
TLI	0.80	0.95	0.84	0.98	0.92	0.94
RMSEA	0.14	0.07	0.13	0.05	0.09	0.06
SRMR	0.16	0.05	0.07	0.03	0.04	0.05

Note: N = 421 (with 103 clusters). Unstandardized regression coefficients are reported with standard errors in parentheses. Abbreviations: T1CSE, Time 1 creative self-efficacy; T2CSE, Time 2 creative self-efficacy; T1IM, Time 1 intrinsic motivation for creativity; T2IM, Time 2 intrinsic motivation for creativity; T1CR, Time 1 employee creativity; T3CR, Time 3 employee creativity.
^aSatorra–Bentler scaled chi-square difference compared with Model 4.
*p < 0.05; **p < 0.01.

and Time 1 intrinsic motivation for creativity were not significantly related to Time 3 employee creativity ($B = -0.06$, $p = 0.56$; $B = 0.02$, $p = 0.82$). Time 2 intrinsic motivation for creativity was significantly related to Time 3 employee creativity ($B = 0.22$, $p = 0.01$). The bootstrapping results showed that the indirect effect from Time 1 creative self-efficacy to Time 2 intrinsic motivation for creativity and then to Time 3 employee creativity was positive (indirect effect = 0.09, 95% BC CI = [0.03, 0.20]), in support of Hypothesis 3a. However, Time 2 creative self-efficacy was also not significantly related to Time 3 employee creativity ($B = 0.03$, $p = 0.80$), thus failing to support Hypothesis 4a regarding the indirect effect of intrinsic motivation for creativity on employee creativity through creative self-efficacy.

As a supplementary analysis, we excluded Time 1 employee creativity and the company dummy as control variables and re-analysed the data. We also conducted additional

analyses with demographics (i.e., age, gender, education, organizational tenure, and tenure with leader) as control variables. We found that the statistical conclusions remained unchanged.

Taken together, the findings of the relative magnitude of cross-lagged effects and the indirect effects on employee creativity show that the sequential path of Time 1 creative self-efficacy → Time 2 intrinsic motivation for creativity → Time 3 employee creativity is stronger than the sequential path of Time 1 intrinsic motivation for creativity → Time 2 creative self-efficacy → Time 3 employee creativity. Considering the stability and cross-lagged effects, it is more likely that creative self-efficacy channels its effect to employee creativity through intrinsic motivation for creativity than the other way around. To enhance the generalizability of these findings, and examine the underlying processes of the bidirectional relationships between creative self-efficacy and intrinsic motivation for creativity and the contingencies, we conducted Study 3 with a different sample.

STUDY 3: METHOD

Participants and Procedure

We conducted a four-wave survey among full-time employees and their direct supervisors working at the Research and Development (R&D) Department in two Chinese companies. The first company was a leading cloud computing service provider, and the other was specialized in noise control material technology and solutions. With the assistance of human resource managers from these two companies, we distributed online questionnaires to the employees and their direct supervisors who worked on advanced technologies and converted them into useful solutions for clients. These jobs involved creativity, and thus were relevant to our research. We provided a cash allowance of RMB 15 (approximately 2.15 USD) to the participants who completed each wave of surveys as a token of appreciation to motivate them to participate in this study.

At Time 1, a total of 763 employees and 144 direct supervisors were invited. Employees reported creative self-efficacy, intrinsic motivation for creativity, resilience, creative process engagement, task difficulty and variability, while supervisors rated each subordinate's creativity. We also asked the participants to report their demographics (i.e., age, gender, education, organizational tenure, and tenure with the current supervisor). A total of 582 employees completed their questionnaires (response rate = 76.3 per cent), and 128 supervisors provided creativity ratings to 694 employees (response rate = 88.9 per cent). We obtained a matched sample including 536 employees and 123 supervisors. We then distributed the subsequent waves of questionnaires to these participants who provided consent to participation. At Time 2, we received responses from 476 employees (attrition rate = 11.2 per cent), who reported resilience and creative process engagement. At Time 3, we received responses from 448 employees (attrition rate = 16.4 per cent), who reported creative self-efficacy and intrinsic motivation for creativity. At Time 4, we received responses from 108

supervisors (attrition rate = 12.2 per cent), who rated 468 employees' creativity. All participants completed our questionnaires with more than two seconds per item (Aguinis et al., 2021). We then investigated the potential impact of attrition. For focal variables and demographics, we examined the differences between the two groups of employees (1 = those who were retained in the final matched sample; 2 = those who were only retained in the Time 1 matched sample). The results show that there was no significant difference between the two groups, suggesting that no systematic bias due to attrition occurred.

The final sample included 370 matched responses from 370 employees and 104 supervisors across the four waves (overall response rate for employees = 48.5 per cent; overall response rate for supervisors = 72.2 per cent). Among the 370 employees, the average age was 30.75 years ($SD = 5.83$), 64.32 per cent were men, 59.2 per cent had at least a bachelor's degree, the average organizational tenure was 44.14 months ($SD = 40.43$), and the average tenure with the supervisor was 31.72 months ($SD = 32.66$). Among the 104 supervisors who rated employee creativity, the average age was 37.49 years ($SD = 4.94$), 80.5 per cent were men, 69.2 per cent had at least a bachelor's degree, and the average organizational tenure was 93.01 months ($SD = 55.79$).

Measures

We translated the original scales in English into Chinese following Brislin's (1986) back-translation procedure. Responses were indicated on a seven-point Likert scale (1 = *Strongly disagree*, 7 = *Strongly agree*) except for intrinsic motivation for creativity, which was measured on a six-point Likert scale (1 = *Strongly disagree*, 6 = *Strongly agree*). We adopted the same scales used in Study 2 to measure creative self-efficacy (Time 1 $\alpha = 0.87$; Time 3 $\alpha = 0.91$) and intrinsic motivation for creativity (Time 1 $\alpha = 0.90$; Time 3 $\alpha = 0.94$). We measured employee creativity using Oldham and Cummings' (1996) three-item scale (Time 1 $\alpha = 0.90$; Time 4 $\alpha = 0.96$). We used different scale formats for creative self-efficacy and intrinsic motivation for creativity from Study 2 (creative self-efficacy: five-point; intrinsic motivation for creativity: seven-point) and a different scale of employee creativity to triangulate our findings. We also followed Study 2 to control for the company dummy and to use the same analytical strategies.

Resilience. Employees reported their resilience using Stephens et al.'s (2013) five-item scale at Time 1 ($\alpha = 0.91$) and Time 2 ($\alpha = 0.94$). A sample item is 'I bounce back when I confront setbacks at work'.

Creative process engagement. Employees reported their creative process engagement using Zhang and Bartol's (2010) 11-item scale at Time 1 ($\alpha = 0.93$) and Time 2 ($\alpha = 0.96$). A sample item is 'I think about the problem from multiple perspectives'.

Task difficulty and variability. At Time 1, employees reported task difficulty and variability using Van de Ven and Delbecq's (1974) scales. The task difficulty scale has seven items, and a sample item is 'During the course of my work, I often come across specific difficult problems that I do not know how to solve immediately' ($\alpha = 0.76$). The task variability scale has seven items, and a sample item is 'In doing my job from

day to day, I generally have to adopt different methods or procedures to do my work' ($\alpha = 0.79$).

Control variable. We controlled for the company dummy to partial out its possible confounding effects.

Analyses and Measurement Models

Similar to Study 2, the data in Study 3 had a nested structure because employees were rated by supervisors. We thus used the same analytic approaches as Study 2 to test hypotheses. Also, in line with Study 2, we first examined four levels of measurement invariance. As shown in Table V, scalar invariance can be assumed for creative self-efficacy, intrinsic motivation for creativity, resilience, and creative process engagement; and partial scalar invariance can be assumed for employee creativity (Byrne et al., 1989; Cheung and Rensvold, 2002). Results of confirmatory factor analyses (CFAs) are shown in Table V. At Time 1, a seven-factor model (creative self-efficacy, intrinsic motivation for creativity, resilience, creative process engagement, task difficulty, task variability, and employee creativity) had an acceptable fit. In addition, a two-factor model at Time 2 (resilience and creative process engagement) and a two-factor model at Time 3 (creative self-efficacy and intrinsic motivation for creativity) had a satisfactory fit.

STUDY 3: RESULTS AND DISCUSSION

Table VI shows the descriptive statistics for the studied variables. Creative self-efficacy and intrinsic motivation for creativity were positively correlated, both within measurement occasions ($r = 0.58$, $p < 0.001$ at Time 1; $r = 0.65$, $p < 0.001$ at Time 3, respectively) and across measurement occasions ($r = 0.60$ between Time 1 creative self-efficacy and Time 3 intrinsic motivation for creativity, $p < 0.001$; $r = 0.38$ between Time 1 intrinsic motivation for creativity and Time 3 creative self-efficacy, $p < 0.001$, respectively).

Cross-Lagged Effects and Indirect Effects on Employee Creativity

We followed the same procedures used in Study 2 to test the cross-lagged effects. When we included covariances, auto-regression effects, and cross-lagged effects in both directions (Model 4 of Table VII), the cross-lagged effect of Time 1 creative self-efficacy on Time 3 intrinsic motivation for creativity was significant ($B = 0.34$, $p < 0.001$), supporting Hypothesis 1a. However, the cross-lagged effect of Time 1 intrinsic motivation for creativity on Time 3 creative self-efficacy was not significant ($B = 0.08$, $p = 0.36$). Model 4 was not significantly better than Model 2 in which the cross-lagged effect of Time 1 intrinsic motivation for creativity on Time 3 creative self-efficacy was not included ($\Delta\chi^2 0.93$, $df = 1$, $p = 0.34$). These results suggested that Hypothesis 2a was not supported. Moreover, Model 5 constrained the two cross-lagged effects to be equal and showed a significant decrease in fit compared with Model 4 ($\Delta\chi^2 5.27$, $df = 1$, $p = 0.02$).

Table V. Model fit indices for CFAs and measurement invariance in study 3

	χ^2	df	CFI	TLI	RMSEA	SRMR	ΔCFI
Measurement Equivalence							
Creative self-efficacy (T1 & T3)							
Configural equivalence	9.175	5	0.992	0.977	0.048	0.025	
Metric equivalence	10.629	7	0.993	0.986	0.037	0.044	0.001
Scalar invariance	11.469	9	0.995	0.992	0.027	0.043	0.002
Residual invariance	20.450	12	0.984	0.981	0.044	0.050	−0.011
Intrinsic motivation for creativity (T1 & T3)							
Configural equivalence	68.492	29	0.978	0.966	0.061	0.029	
Metric equivalence	74.283	33	0.977	0.969	0.058	0.040	−0.001
Scalar invariance	84.246	37	0.974	0.968	0.059	0.041	−0.003
Residual invariance	147.506	42	0.941	0.937	0.082	0.088	−0.033
Resilience (T1 & T2)							
Configural equivalence	125.792	29	0.955	0.930	0.095	0.035	
Metric equivalence	135.085	33	0.952	0.935	0.091	0.043	−0.003
Scalar invariance	144.378	37	0.950	0.939	0.089	0.044	−0.002
Residual invariance	171.236	42	0.939	0.935	0.091	0.061	−0.011
Creative process engagement (T1 & T2)							
Configural equivalence	474.682	197	0.935	0.924	0.062	0.043	
Metric equivalence	494.921	207	0.933	0.925	0.061	0.051	−0.002
Scalar invariance	517.500	217	0.930	0.925	0.061	0.055	−0.003
Residual invariance	627.159	228	0.907	0.906	0.069	0.080	−0.023
Employee creativity (T1 & T4)							
Configural equivalence	10.993	5	0.995	0.984	0.057	0.015	
Metric equivalence	27.176	7	0.981	0.960	0.088	0.100	−0.014
Partial metric equivalence ^a	11.389	6	0.995	0.988	0.049	0.016	0.000
Partial scalar invariance ^b	14.851	7	0.993	0.985	0.055	0.020	−0.002
Partial residual invariance ^c	26.703	9	0.984	0.973	0.073	0.030	−0.009
CFA, T1: Seven-factor model ^d	327.130	168	0.965	0.956	0.051	0.058	
CFA, T2: Two-factor model ^e	267.150	103	0.949	0.941	0.066	0.035	
CFA, T3: Two-factor model ^f	22.367	19	0.996	0.995	0.022	0.020	

Note: N = 370 (with 104 clusters). T1: Time 1; T2: Time 2; T3: Time 3; T4: Time 4.

^aFactor loadings of Item 3 free.

^bFactor loadings and intercepts of Item 3 free.

^cFactor loadings, intercepts, and residual variances of Item 3 free.

^dCreative self-efficacy, intrinsic motivation for creativity, resilience, creative process engagement, task difficulty, task variability, and employee creativity. In this model, we used the three sub-dimensions as indicators for creative process engagement. For each of other variables with more than three items, we created three parcels by sequentially averaging the items with the highest and lowest loadings (Landis et al., 2000).

^eResilience and creative process engagement.

^fCreative self-efficacy and intrinsic motivation for creativity.

Table VI. Means, standard deviations, and correlations in study 3

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Age	30.75	5.83																	
2. Gender ^a	0.64	0.48	0.10																
3. Education ^b	1.60	0.51	-0.04	-0.02															
4. Organizational tenure	44.14	40.43	0.41**	0.01	0.16**														
5. Tenure with leader	31.72	32.66	0.30**	0.09	0.15**	0.72**													
6. Creative self-efficacy, T1	5.26	1.02	0.15**	0.23**	-0.01	0.04	0.06	0.87											
7. Intrinsic motivation for creativity, T1	4.91	0.82	0.14**	0.19**	-0.01	0.12*	0.09	0.58**	0.90										
8. Resilience, T1	5.68	0.94	0.16**	0.15**	0.07	0.08	0.12*	0.70**	0.47**	0.91									
9. Creative process engagement, T1	5.35	0.87	0.12*	0.25**	0.01	0.08	0.10	0.78**	0.64**	0.69**	0.93								
10. Task difficulty, T1	3.93	0.95	-0.08	0.19**	-0.06	-0.03	0.02	0.17**	0.02	0.04	0.17**	0.76							
11. Task variability, T1	4.28	0.98	0.07	0.11*	0.13*	0.09	0.13*	0.40**	0.33**	0.37**	0.42**	0.16**	0.79						
12. Employee creativity, T1	4.99	1.14	0.01	0.05	0.08	0.13*	0.08	0.12*	0.15**	0.12*	0.13*	0.01	0.08	0.90					
13. Resilience, T2	5.65	0.96	0.18**	0.15**	0.06	0.13*	0.13*	0.60**	0.41**	0.74**	0.58**	0.08	0.36**	0.13*	0.94				
14. Creative process engagement, T2	5.44	0.89	0.11*	0.26**	0.02	0.14**	0.15**	0.60**	0.52**	0.54**	0.67**	0.13*	0.41**	0.15**	0.71**	0.96			
15. Creative self-efficacy, T3	5.36	0.99	0.14**	0.32**	0.01	0.08	0.09	0.59**	0.38**	0.41**	0.52**	0.23**	0.39**	0.18**	0.51**	0.62**	0.91		
16. Intrinsic motivation for creativity, T3	4.85	0.79	0.20**	0.16**	0.08	0.15**	0.16**	0.60**	0.52**	0.54**	0.58**	0.10	0.38**	0.20**	0.65**	0.69**	0.65**	0.94	
17. Employee creativity, T4	5.10	1.22	-0.01	0.12*	0.02	0.10	0.10	0.23**	0.21**	0.24**	0.24**	0.06	0.15**	0.66**	0.27**	0.28**	0.24**	0.33**	0.96

Note: N = 370. Cronbach's alphas are shown on the diagonal in boldface. T1: Time 1; T2: Time 2; T3: Time 3; T4: Time 4.

^aGender: 1 = male; 0 = female.

^bEducation: 1 = junior colleague or below; 2 = bachelor's; 3 = master's or above.

*p < 0.05; **p < 0.01.

Table VII. Results of the models of cross-lagged between creative self-efficacy and intrinsic motivation for creativity and indirect-effect on employee creativity in study 3

	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>	<i>Model 6</i>
<i>Model description</i>	<i>Stability effects only</i>	<i>Stability and CSE → IM effects</i>	<i>Stability and IM → CSE effects</i>	<i>Cross-lagged model</i>	<i>CSE → IM & IM → CSE effects set to equal</i>	<i>Cross-lagged and indirect-effect model</i>
Model path estimate						
T1CSE → T3CSE	0.43** (0.05)	0.57** (0.05)	0.33** (0.07)	0.53** (0.07)	0.43** (0.05)	0.53** (0.07)
T1IM → T3IM	0.44** (0.06)	0.23** (0.05)	0.50** (0.06)	0.25** (0.06)	0.35** (0.05)	0.25** (0.06)
T1CSE → T3IM		0.36** (0.04)		0.34** (0.05)	0.26** (0.03)	0.34** (0.05)
T1IM → T3CSE			0.23** (0.08)	0.08 (0.09)	0.26** (0.03)	0.08 (0.09)
T1CR → T4CR						0.67** (0.05)
T1CSE → T4CR						0.08 (0.06)
T1IM → T4CR						−0.01 (0.06)
T3CSE → T4CR						−0.03 (0.08)
T3IM → T4CR						0.28** (0.07)
χ^2 (df)	78.79 (4)	5.00 (3)	66.77 (3)	4.32 (2)	10.51 (3)	10.38 (5)
$\Delta\chi^2$ (df) ^a	85.16** (2)	0.93 (1)	83.23** (1)		5.27* (1)	
CFI	0.77	0.99	0.80	0.99	0.98	0.99
TLI	0.59	0.99	0.53	0.98	0.95	0.97
RMSEA	0.23	0.04	0.24	0.06	0.08	0.05
SRMR	0.15	0.04	0.11	0.03	0.04	0.04

Note: N = 370 (with 104 clusters). Unstandardized regression coefficients are reported with standard errors in parentheses. Abbreviations: T1CSE, Time 1 creative self-efficacy; T3CSE, Time 3 creative self-efficacy; T1IM, Time 1 intrinsic motivation for creativity; T3IM, Time 3 intrinsic motivation for creativity; T1CR, Time 1 employee creativity; T4CR, Time 4 employee creativity.
^aSatorra–Bentler scaled chi-square difference compared with Model 4.
*p < 0.05; **p < 0.01.

We then tested the indirect effects on employee creativity by adding Time 4 employee creativity as a dependent variable to the cross-lagged model while controlling for Time 1 employee creativity (Model 6 in Table VII). Time 3 intrinsic motivation for creativity was significantly related to Time 4 employee creativity ($B = 0.28$, $p < 0.001$). The bootstrapping results showed that the indirect effect from Time 1 creative self-efficacy to Time 3 intrinsic motivation for creativity and then to Time 4 employee creativity was positive (indirect effect = 0.094, 95% BC CI = [0.046, 0.156]), in support of Hypothesis 3a. However, Time 3 creative self-efficacy was not significantly related to Time 4 employee creativity ($B = -0.03$, $p = 0.73$), thus failing to support Hypothesis 4a regarding the indirect effect of intrinsic motivation for creativity on employee creativity through creative self-efficacy.

Serial Indirect Effects and Conditional Serial Indirect Effects

To test the serial indirect effects, we added T2 resilience and creative process engagement as mediators for the effect of T1 intrinsic motivation for creativity on T3 creative self-efficacy and the effect of T1 creative self-efficacy on T3 intrinsic motivation for creativity based on Model 6 of Table VII. We also controlled T1 resilience and creative process engagement. Table VIII presents the results of serial mediation effects. Models 1 and 3 show that T1 creative self-efficacy was significantly related to T2 resilience ($B=0.16$, $p=0.01$) and T2 creative process engagement ($B=0.17$, $p=0.004$), respectively. Model 6 shows that T2 resilience and creative process engagement were significantly related to T3 intrinsic motivation ($B=0.21$, $p<0.001$; $B=0.31$, $p<0.001$, respectively), which was significantly related to T4 employee creativity as shown in Model 7 ($B=0.20$, $p=0.02$). In addition, the bootstrapping results showed that the indirect effect of Time 1 creative self-efficacy $\rightarrow$ T2 resilience $\rightarrow$ Time 3 intrinsic motivation for creativity $\rightarrow$ Time 4 employee creativity was positive (indirect effect = 0.007, 95% BC CI = [0.001, 0.019]), in support of Hypothesis 3b. We also found that the indirect effect of Time 1 creative self-efficacy $\rightarrow$ T2 creative

Table VIII. Results of models of serial indirect effects and conditional serial indirect effects in study 3

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Model description	T2RE	T2RE	T2CPE	T2CPE	T3CSE	T3IM	T4CR
T1CSE	0.16** (0.06)	0.16* (0.06)	0.17** (0.06)	0.15** (0.06)	0.33** (0.07)	0.11** (0.04)	0.04 (0.07)
T1IM	0.05 (0.06)	0.05 (0.06)	0.15* (0.07)	0.14* (0.07)	-0.06 (0.08)	0.14** (0.06)	-0.02 (0.07)
T1RE	0.59** (0.07)	0.58** (0.08)					
T1CPE			0.43** (0.06)	0.42** (0.06)			
T1CR							0.67** (0.05)
T1TD		0.01 (0.03)					
T1TVA				0.09* (0.04)			
T1CSE $\times$ T1TD		0.05* (0.02)					
T1IM $\times$ T1TVA				-0.01 (0.04)			
T2RE					0.02 (0.10)	0.21** (0.04)	0.09 (0.09)
T2CPE					0.47** (0.08)	0.31** (0.04)	0.08 (0.08)
T3CSE							-0.05 (0.08)
T3IM							0.20* (0.09)
R ²	0.543	0.545	0.477	0.489	0.463	0.567	0.475

Note: N = 370 (with 104 clusters). Unstandardized regression coefficients are reported with standard errors in parentheses. Abbreviations: T1CSE, Time 1 creative self-efficacy; T1IM, Time 1 intrinsic motivation for creativity; T1RE, Time 1 resilience; T1CPE, Time 1 creative process engagement; T1CR, Time 1 employee creativity; T1TD, Time 1 task difficulty; T1TVA, Time 1 task variability; T2RE, Time 2 resilience; T2CPE, Time 2 creative process engagement; T3CSE, Time 3 creative self-efficacy; T3IM, Time 3 intrinsic motivation for creativity; T4CR, Time 4 employee creativity. * $p < 0.05$; ** $p < 0.01$.

process engagement → Time 3 intrinsic motivation for creativity → Time 4 employee creativity was positive (indirect effect = 0.010, 95% BC CI = [0.002, 0.028]).

In parallel, Model 3 of Table VIII shows that T1 intrinsic motivation for creativity was significantly related to T2 creative process engagement ($B=0.15$, $p=0.02$), which was significantly related to T3 creative self-efficacy ($B=0.47$, $p<0.001$) (Model 5). However, T3 creative self-efficacy was not significantly related to T4 employee creativity ($B=-0.05$, $p=0.55$) (Model 7). These results failed to support Hypothesis 4b regarding the serial indirect effect of Time 1 intrinsic motivation for creativity on employee creativity. We also found that Time 1 intrinsic motivation for creativity was not significantly related to Time 2 resilience ($B=0.05$, $p=0.42$) (Model 1), which was not significantly related to Time 3 creative self-efficacy ($B=0.02$, $p=0.83$) (Model 5).

Lastly, we tested the moderating effects of task difficulty and variability. We centred the moderators and Time 1 creative self-efficacy/intrinsic motivation for creativity to reduce multicollinearity (Aiken and West, 1991). We then created the interaction term of Time 1 creative self-efficacy and Time 1 task difficulty, and we added the paths from Time 1 task difficulty and the interaction term to Time 2 resilience. Similarly, we then created the interaction term of Time 1 intrinsic motivation and Time 1 task variability, and added the paths from Time 1 task variability and the interaction term to Time 2 creative process engagement.

As shown in Model 2 of Table VIII, the interaction effect of Time 1 creative self-efficacy and Time 1 task difficulty on Time 2 resilience was positive and significant ($B=0.05$, $p=0.02$). Figure 2 plots the relationship at the high and low levels of task

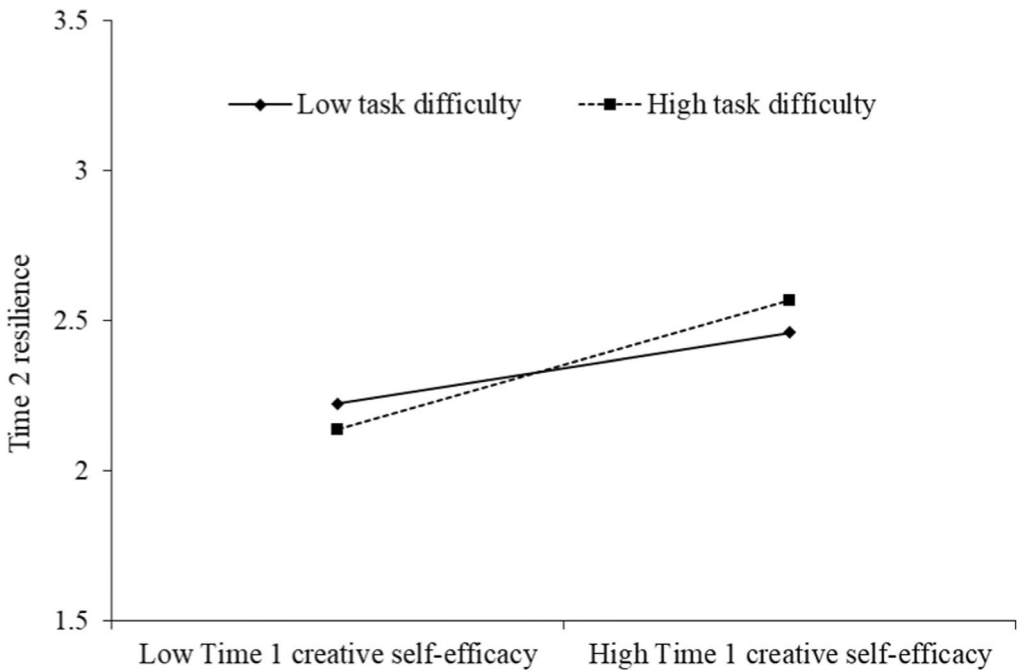


Figure 2. The moderating effect of task difficulty on the effect of time 1 creative self-efficacy on time 2 resilience

difficulty, defined as one standard deviation above and below its mean (Aiken and West, 1991). Time 1 creative self-efficacy had a significant relationship with Time 2 resilience when task difficulty was higher (simple slope = 0.21, $p = 0.003$), but this relationship was not significant when task difficulty was lower (simple slope = 0.12, $p = 0.07$). These results provide support for Hypothesis 5a. We then tested the conditional serial indirect effects. The path of Time 1 creative self-efficacy $\rightarrow$ Time 2 resilience $\rightarrow$ Time 3 intrinsic motivation for creativity $\rightarrow$ Time 4 employee creativity was significant when task difficulty was higher (indirect effect = 0.009, 95% BC CI = [0.001, 0.023]), but was not significant when task difficulty was lower (indirect effect = 0.005, 95% BC CI = [0.000, 0.016]). These results provide support for Hypothesis 5b.

Model 4 of Table VIII shows that the interaction effect of Time 1 intrinsic motivation for creativity and Time 1 task variability on Time 2 creative process engagement was not significant ($B = -0.01$, $p = 0.86$), failing to support Hypothesis 6a. These results also failed to support Hypothesis 6b regarding the moderating effect of task variability on the serial mediation path of Time 1 intrinsic motivation for creativity $\rightarrow$ Time 2 creative process engagement $\rightarrow$ Time 3 creative self-efficacy $\rightarrow$ Time 4 employee creativity.

GENERAL DISCUSSION

This research aims to disentangle the interrelationship between creative self-efficacy and intrinsic motivation for creativity in shaping employee creativity. Through three studies, we have uncovered several nuanced findings. Examining the bidirectional relationships between creative self-efficacy and intrinsic motivation for creativity, our results indicate that both directions of the relationships were positive across Studies 1a, 1b, and 2. However, in Study 3, although we also observed a positive effect of creative self-efficacy on intrinsic motivation for creativity, the reverse was non-significant. Additionally, in the two field studies (Studies 2 and 3) where both directions of the relationships were simultaneously examined, we consistently identified that the influence of creative self-efficacy on intrinsic motivation for creativity was stronger in magnitude compared to the reverse direction.

Regarding the mediation effects, in the two experimental studies (Studies 1a and 1b), when examining the two directions of the mediated relationships separately, we found that creative self-efficacy was positively and indirectly associated with creativity through intrinsic motivation for creativity. Additionally, intrinsic motivation for creativity was found to be positively and indirectly related to creativity through creative self-efficacy. In both field studies (Studies 2 and 3), where the two directions of the mediated relationships were examined simultaneously, we observed a positive indirect relationship between creative self-efficacy and employee creativity through intrinsic motivation for creativity. However, the indirect relationship between intrinsic motivation for creativity and employee creativity through creative self-efficacy was non-significant due to the non-significant relationship between creative self-efficacy and creativity.

The results from Study 3 further reveal the serial mediation and moderated serial mediation effects. Creative self-efficacy was found to have a positive relationship with employee creativity, mediated sequentially through resilience and intrinsic motivation for creativity. Notably, the relationship between creative self-efficacy and resilience, as well as the entire serial mediation pathway, was stronger when tasks were more difficult. In contrast, the relationship between intrinsic motivation for creativity and employee creativity, serially mediated through creative process engagement and creative self-efficacy, was not statistically significant. This lack of significance was due to the non-significant association between creative self-efficacy and employee creativity. However, there was a positive and significant indirect relationship between intrinsic motivation for creativity and creative self-efficacy through creative process engagement. Additionally, contrary to expectations, task variability did not moderate the relationship between intrinsic motivation for creativity and creative process engagement, nor the overall serial mediation relationship. As we elaborate next, our study offers new insights into the roles of creative self-efficacy and intrinsic motivation for creativity in shaping employee creativity.

Theoretical Implications

First, our study is among the first to theoretically and empirically discern the interrelationship between creative self-efficacy and intrinsic motivation for creativity, two major theoretical perspectives on creativity. The significant effect of creative self-efficacy on intrinsic motivation for creativity, found in our three studies, elucidates that the creative journey can start from the ‘can-do’ motivation for creativity, fuelling intrinsic interest in creative tasks. A critical implication of this finding is that for employees who have higher creative self-efficacy, their intrinsic interest in creative tasks will ensue (Amabile and Pratt, 2016). However, the proposed effect of intrinsic motivation for creativity on creative self-efficacy, which reflects the romantic philosophical tradition of viewing intrinsic interest as the starting point and creativity as beginning with people’s exploration of their intrinsic interests (Eisenberger and Shanock, 2003), yielded mixed results across the three studies. These mixed findings suggest that creative self-efficacy is more likely to precede intrinsic motivation for creativity rather than the other way around. These results provide initial evidence for the distinctions between creative self-efficacy and intrinsic motivation for creativity. For instance, individuals may experience intrinsic enjoyment, fun, and interest in a task after gaining a sense of competence in creative pursuits. On the contrary, developing efficacy beliefs involves complex cognitive processes of self-persuasion (Bandura, 1989). The processes through which intrinsic motivation for creativity influences creative self-efficacy can be indirect, such as through creative process engagement, as we have discovered. This indirect pathway may explain the less consistent findings observed.

Second, our findings shed light on a critical ambiguity concerning the directionality of the relationship between creative self-efficacy and intrinsic motivation for creativity, that is, whether the two variables have bi-directional relationships or a directional relationship where one induces the other (but not vice versa) in leading to creativity. The former suggests that both variables mediate the effect of the other on creativity and thus have

parallel, proximal effects on creativity. By contrast, the latter suggests that one variable affects creativity through the mediating effect of the other but not the other way around. In this case, one factor has a more distal effect while the other has a more proximal effect on creativity. Consequently, the effects of the two variables on creativity are not parallel, thus challenging the findings of previous research (Liu et al., 2016).

To answer this directionality question, we used a cross-lagged design for the relationship between creative self-efficacy and intrinsic motivation for creativity in the two field studies to unpack their different effects on employee creativity. Both studies in our research showed that intrinsic motivation for creativity, but not creative self-efficacy, was positively related to subsequent employee creativity. These findings revealed their nuanced differences and refined the understanding of the independent and parallel effects on employee creativity as found in Liu et al.'s (2016) meta-analysis. Our rigorous research design is not just a methodological improvement, but also provides new insights into the directional relationship between creative self-efficacy and intrinsic motivation for creativity in shaping employee creativity. Intrinsic motivation for creativity is a more proximal predictor of employee creativity; and, comparatively speaking, creative self-efficacy has a more distal effect on employee creativity, which can be mediated through intrinsic motivation for creativity, as our findings show.

A third contribution of our study pertains to the theoretically driven serial mediation and moderation effects. By drawing on self-efficacy theory and intrinsic motivation theory in an integrated model, we provide an enhanced understanding of the impact of creative self-efficacy and intrinsic motivation for creativity on creativity. Both theories provide a learning-oriented perspective for understanding the effects of these factors on creativity, albeit focusing on different aspects of the learning process. On the one hand, self-efficacy theory acknowledges the presence of difficulties and obstacles in creative pursuits. Individuals with high creativity self-efficacy achieve greater creativity by exercising personal agency and adopting a resilient and learning-oriented approach to working through obstacles and difficulties in their creative endeavours. On the other hand, intrinsic motivation theory suggests that individuals with high intrinsic motivation for creativity generate higher levels of creativity through active engagement in the creative process. Such creative process engagement entails exploratory learning and experimentation, leading to increased variability in information, task strategies, and alternative solutions. Integrating these two theories helps us discern the unique underlying mechanism to link creativity self-efficacy and intrinsic motivation for creativity, and vice versa and the distinctive contingencies that shape the magnitude of the two directional relationships.

Specifically, in line with the central tenet of self-efficacy theory (Bandura, 1986, 1989, 1997; Gist and Mitchell, 1992), our findings demonstrate that creative self-efficacy can enhance employees' resilience in creative pursuit: They have a growth-focused attitude toward adversities and exercise personal agency in navigating difficulties and setbacks with perseverance (Liu et al., 2016; Tierney and Farmer, 2011). Extending these arguments, we further revealed that being able to bounce back and learn from challenges and setbacks can engender a sense of intrinsic enjoyment in employees, thereby enhancing their creativity. Furthermore, we uncovered that the impact of creative self-efficacy on resilience, as well as the subsequent

effects on intrinsic motivation for creativity and employee creativity, were more pronounced when tasks were more difficult. Creative endeavours have long been acknowledged by researchers as inherently laden with obstacles and setbacks. For instance, the trial-and-error nature of creativity renders it both risky and demanding (Ng and Wang, 2019; Tierney and Farmer, 2011). We thus corroborate the significance of creative self-efficacy in bolstering employee resilience, stimulating their intrinsic interest in creativity, and fostering creativity, particularly under high task difficulty.

Meanwhile, in line with intrinsic motivation theory (Amabile, 1996; Oldham and Cummings, 1996), our findings indicate that employees with high levels of intrinsic motivation for creativity are more inclined to engage in creative processes. This inclination is due to their focus on the creative process itself and their perception that creative process engagement is inherently enjoyable (Grant, 2008). Expanding upon these observations, we additionally discovered that creative process engagement positively influences employees' creative self-efficacy. Therefore, although the direct effect of intrinsic motivation for creativity on creative self-efficacy was not consistently found across our three studies, the mediating role of creative process engagement may account for this potentially distal relationship.

Nevertheless, contrary to our initial expectation, we did not find a significant moderating effect of task variability on the relationship between intrinsic motivation for creativity and creative process engagement. We speculate that task variability can present both opportunities and expectations for creativity, which can either enhance or substitute the effects of intrinsic motivation for creativity on creative process engagement (Van Knippenberg and Hirst, 2020). On the one hand, task variability provides employees with the opportunity and room to explore alternative methods and procedures. Individuals with high intrinsic motivation for creativity thus are more likely to engage in creative processes. On the other hand, task variability may also create a strong situational demand that necessitates exploration for task completion. Even individuals with low intrinsic motivation for creativity are inclined to respond to this task demand by engaging in exploration (Van Knippenberg and Hirst, 2020). Due to the potential coexistence of these enhancing and substituting effects that offset each other, task variability may not show a significant moderating effect.

Practical Implications

Our study also provides two useful practical implications. First, we found that the impact of creative self-efficacy on intrinsic motivation for creativity and, subsequently, on employee creativity is more pronounced than the influence of intrinsic motivation for creativity on creative self-efficacy and employee creativity. This finding suggests that managers seeking to enhance employee creativity should primarily focus on boosting creative self-efficacy. For instance, they can prioritize the selection of employees who have strong 'can-do' motivation. Furthermore, managers often want to know how to boost intrinsic motivation, but managerial tools commonly used in organizations (e.g., rewards) trigger extrinsic motivation and may undermine intrinsic motivation (Amabile, 1983). Our results suggest that enhancing employees' creative self-efficacy is an effective way to boost intrinsic motivation for creativity.

Second, when working on very difficult tasks involving a lack of established knowledge to guide work procedures and unpredictability of which alternatives will lead to success, creative self-efficacy is useful for boosting creativity through enhancing resilience and intrinsic motivation for creativity. To enhance employee efficacy beliefs on creative tasks, managers can engage in social persuasion (e.g., telling employees that they can be creative) and work to create small wins (e.g., helping employees experience progress in creative tasks).

Limitations and Future Research Directions

The study's findings need to be interpreted with its limitations in mind. First, in our two field studies, employees had a relatively long average organizational tenure (64 months in Study 2 and 44 months in Study 3) and a relatively long average tenure with a leader (36 months in Study 1 and 32 months in Study 2). Employees who work in an organization and with a leader for a relatively longer period may have more stable creative self-efficacy and intrinsic motivation for creativity. We thus encourage future research to use a sample of newcomers with relatively shorter organizational tenures and tenures with a leader. During job transitions, newcomers strive to adapt to the new working environment. These participants may experience more fluctuations in creative self-efficacy and intrinsic motivation for creativity and afford a valuable opportunity to constructively replicate and extend our findings.

Second, in Studies 1a and 1b with an experimental design, we measured, rather than manipulated, the mediators (i.e., creative self-efficacy and intrinsic motivation for creativity), compromising the benefits of an experiment to establish causal mediation relationships (Pirlott and Mackinnon, 2016; Stone-Romero and Rosopa, 2011). To overcome this limitation, future studies are encouraged to adopt alternative approaches such as moderation-of-process designs (Pirlott and Mackinnon, 2016; Spencer et al., 2005). In addition, our two experimental studies relied on student samples, raising the concern of the ecological validity of our findings. Our field studies should partially mitigate this concern. Nevertheless, it would be valuable to conduct a field experiment with a sample of employees working in the organizational context to ensure both internal validity and external validity in one single study design.

Third, we did not examine the possible dual moderating effects of task variability as an enhancer and as a substitute. On the one hand, task variability may provide opportunities to explore various alternatives, thus enhancing the relationship between intrinsic motivation for creativity and creative process engagement. On the other hand, task variability may convey the expectation that all employees should explore various alternatives for task completion, thus substituting for the effect of intrinsic motivation for creativity on creative process engagement. An intriguing avenue for future research lies in examining this double-edged effect to gain deeper insights into how task characteristics interact with intrinsic motivation for creativity in shaping creativity-related processes and performance. Also, future research would benefit by examining other task characteristics such as task uncertainty, job autonomy, and task significance as boundary conditions to moderate the relationship between creative self-efficacy and intrinsic motivation for creativity, and vice versa.

CONCLUSION

Joining the two streams of studies with one examining the independent, parallel effects of creative self-efficacy and intrinsic motivation for creativity on creativity and the other hinting at their causal relationships in leading to creativity, we examine the issue of directionality in the relationship between these two key predictors of creativity. We reveal the insight that it is more likely that people who feel they are competent in creative tasks will then develop an intrinsic interest in these tasks; in turn, they perform creatively. These effects are stronger when tasks are more (vs. less) difficult. This research sheds light on the interrelationship between creative self-efficacy and intrinsic motivation for creativity in shaping employee creativity.

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NOTES

- [1] Although general self-efficacy and intrinsic motivation are relevant to creativity (e.g., Grant and Berry, 2011; Liao et al., 2010), in this study we focused on creative self-efficacy and intrinsic motivation for creativity due to their specificity to the creative domain and higher predictive power for creativity (Shin and Zhou, 2003; Tierney and Farmer, 2002, 2011; Zhang and Bartol, 2010).
- [2] Based on G*Power analysis, with a medium effect size (Cohen's $d=0.50$), power of 90%, an alpha of 0.05, and an equal number of participants across the two conditions (i.e., high vs. low creative self-efficacy in Study 1a and high vs. low intrinsic motivation for creativity in Study 1b), a total sample size of 172 or 86 participants per condition is indicated. In anticipation of data screening and hence potential exclusions, we targeted slightly more participants during our recruitment process, following previous research (e.g., Wong et al., 2023).

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