Organizational Behavior and Human Decision Processes xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Organizational Behavior and Human Decision Processes

journal homepage: www.elsevier.com/locate/obhdp

Motivational mechanisms of employee creativity: A meta-analytic examination and theoretical extension of the creativity literature

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ARTICLE INFO

Article history:
Received 6 September 2014
Revised 16 July 2016
Accepted 2 August 2016
Available online xxxx

Keywords:
Creativity
Intrinsic motivation
Creative self-efficacy
Prosocial motivation

ABSTRACT

Drawing on the componential theory of creativity, social cognitive theory, and prosocial motivation theory, we examined intrinsic motivation, creative self-efficacy, and prosocial motivation as distinct motivational mechanisms underlying creativity. Results from a meta-analysis of 191 independent samples ($N = 51,659$) documented in the relevant literature revealed that intrinsic motivation, creative self-efficacy, and prosocial motivation each had unique explanatory power in predicting creativity, and that the three motivational mechanisms functioned differently as mediators between contextual and personal factors and creativity. The relationships of intrinsic motivation and creative self-efficacy with creativity also were found to be contingent upon sample characteristics and methodological factors (i.e., national culture, creativity measure, intrinsic motivation and creative self-efficacy measures, and publication status). Our findings highlight the need to develop a more fine-grained theory of motivation and creativity. Implications for theoretical extensions and future research are discussed.

1. Introduction

Employee creativity plays a critical role in enhancing organizational productivity and efficiency and helping organizations to survive and thrive in the face of today's dramatically changing environment (Gilson, 2008; Zhou & Hoever, 2014). Over the past 30 years, studies of creativity predictors and underlying motivational mechanisms have been published in top journals at an increasing rate, and have generated valuable knowledge for researchers and practitioners. Amabile (1983, 1996) advanced perhaps the most widely used theory of creativity, the componential theory of creativity, that suggests that intrinsic motivation is a primary motivational mechanism undergirding the relationships between personal and contextual factors and employee creativity. Unlike domain- and creativity-relevant skills that also may facilitate one's creativity, intrinsic motivation is more variable and subject to the influence of one's work environment (Amabile, 1988, 1996). Thus, even a highly creative employee may not perform creatively if s/he operates in a work environment detrimental to one's intrinsic motivation (Amabile, 1983; Shalley, Zhou, & Oldham, 2004). Building on the componential theory of creativity and providing a comprehensive review of empirical creativity research, Shalley et al. (2004) posited that contextual and personal characteristics may impact creativity through their effects on employees' intrinsic motivation.

One's motivation, however, is not just intrinsic but has other manifestations too (Grant, 2008; Tierney & Farmer, 2002). Different types of motivation may simultaneously mediate the effects of contextual and personal factors on creativity, and the studies that have examined the mediation effect of intrinsic motivation have actually generated mixed results. For example, Zhang and Bartol (2010) reported that intrinsic motivation functioned as a mediator that fully linked empowering leadership to employee creativity. Shin and Zhou (2003) found that intrinsic motivation only partially mediated the link between transformational leadership and employee creativity. Yet, Shalley and Perry-Smith (2001) found no mediation effect of intrinsic motivation for the effect of expected evaluation on creativity. Importantly, while Shalley et al. (2004) have stressed the notion that intrinsic motivation may underlie creativity, they also have noted that there may be alternative motivational mediating mechanisms through which contextual and personal factors can affect creativity. This notion was seconded by George (2007, p. 445), who maintained that "rather than assume that intrinsic motivation underlies creativity, researchers need to tackle this theorized linkage more directly and in more depth."

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http://dx.doi.org/10.1016/j.obhdp.2016.08.001
0749-5978/

Parallel to the stream of motivational research concerning intrinsic motivation and creativity, another stream of motivational research has drawn on social cognitive theory (Bandura, 1997, 2001) to conceptualize and test creative self-efficacy as an alternative motivational mediating mechanism that connects contextual and personal factors to employee creativity. Although creative self-efficacy has been demonstrated to be a significant predictor of creativity (Tierney & Farmer, 2002, 2004), scholars also have reported mixed findings regarding the mediating role of creative self-efficacy. For example, creative self-efficacy was demonstrated to mediate the effects of personal attributes (e.g., learning-goal orientation) and contextual factors (e.g., transformational leadership) on creativity (Gong, Huang, & Farh, 2009). Yet in another study, creative self-efficacy was found to only partially mediate the association between transformational leadership and employee creativity (Wang, Tsai, & Tsai, 2014), and no mediation effect of creative self-efficacy was found regarding this association by Akinlade (2014).

More recently, prosocial motivation has been conceptualized and verified as a new motivational construct conducive to employee creativity (Grant, 2008). Researchers also have found that prosocial motivation amplifies the positive relationship between intrinsic motivation and creativity (Grant & Berry, 2011; Li & Bai, 2015). While little empirical research has examined the mediation effect of prosocial motivation for creativity, recent conceptual work on prosocial motivation makes a convincing case that personal and contextual antecedents may affect prosocial motivation and subsequently, creativity (Bolino & Grant, 2016; Grant & Berg, 2011), suggesting this is a promising line of inquiry.

Notably, these three streams of motivational research on creativity have proceeded largely in separation from each other. Primary studies and previous meta-analyses have not investigated how each type of motivation contributes to creativity above and beyond the others. This is problematic given the high correlations among these three types of motivation. Existing meta-analyses on creativity look at one or a few antecedents of creativity at a time, examining the roles of mood (Baas, De Dreu, & Nijstad, 2008; Davis, 2009), stress (Byron, Khazanchi, & Nazarian, 2010), rewards (Byron & Khazanchi, 2012), personality (Feist, 1998), intrinsic motivation (de Jesus, Rus, Lens, & Imaginário, 2013), and organizational climate (Hunter, Bedell, & Mumford, 2007), and testing potential moderators of the relationships between creativity and related variables (e.g., creative person, process, product, and environment in Ma (2009), and self- and non-self-report measures of creativity in Ng and Feldman (2012)). While these meta-analyses made valuable contributions to the creativity literature, they did not shed much light on whether multiple motivational mechanisms may function differently or similarly in linking contextual and personal factors to creativity.

Thus, to advance the literature on motivation and creativity, a meta-analysis that *simultaneously* takes into account the mediational roles of the three motivational mechanisms for creativity is surely needed. More specifically, this meta-analytic investigation is intended to provide a fine-grained, quantitative summary of the distinct roles of intrinsic motivation, creative self-efficacy, and prosocial motivation for creativity not only by demonstrating that they simultaneously contribute to creativity (Hypotheses 1–3), but also by showing that contextual and personal antecedents can have differential relationships with them (Hypotheses 4–8). Such a quantitative review and examination of 191 independent samples including 51,659 individuals in primary studies, while correcting for statistical biases that may be associated with any single primary study, will provide insights that no single primary study can offer.

Moreover, the three motivational constructs' effect sizes differ across primary studies, and these differences may be because their impacts depend on sample characteristics or methodological factors. Past meta-analyses on creativity (e.g., Baas et al., 2008; Byron & Khazanchi, 2012; Byron et al., 2010; de Jesus et al., 2013; Hunter et al., 2007; Ng & Feldman, 2012) have revealed that the relationships between certain antecedents and creativity are contingent on sample and methodological aspects of primary studies (e.g., sample characteristics, rater source, and publication status). In their recent review of the creativity literature, Zhou and Hoever (2014, p. 354) pointed out that a fruitful future creativity research direction is to "explicate hidden actor and contextual factors that are not part of the research model in a focal study but nevertheless are characteristics of the sampled actors or contexts, so as to facilitate the integration of different research efforts through meta-analyses and reviews." Accordingly, to develop a clearer understanding of the functioning of the three motivational mechanisms, this study also explores whether they may have stronger or weaker relationships with creativity depending on sample (i.e., individualism and cultural tightness; exploratory research questions 1–6) and methodological (i.e., creativity measure, intrinsic motivation measure, creative self-efficacy measure, and publication status; exploratory research questions 7–9) characteristics.

2. Theoretical background and hypotheses

As a behavioral construct, creativity, the generation of novel and useful ideas, is triggered by one's motivation (Amabile, 1996). Hence, understanding the motivational underpinnings of creativity is one of the long-standing goals of creativity research (Amabile & Pillemer, 2012). We contend that the three motivational mechanisms, intrinsic motivation, creative self-efficacy, and prosocial motivation, produce distinct motivational forces toward boosting one's creativity. Intrinsic motivation refers to the degree to which people engage in an activity primarily because they find the activity itself to be interesting, enjoyable, and challenging (Amabile & Pillemer, 2012). Creative self-efficacy is defined as "a self-belief that one has the ability to produce creative outcomes" (Tierney & Farmer, 2002, p. 1138). Prosocial motivation reflects one's desire to expend effort to benefit other people (Grant, 2008).

The componential theory of creativity indicates that intrinsic motivation propels one to devote their efforts to creative processes by enticing one to be interested in and enjoy one's work (i.e., want-to motivational force) (Amabile, 1988, 1996). In contrast, social cognitive theory emphasizes the premise that creative self-efficacy encourages one to engage in creative processes and maintain one's level of involvement by allowing one to believe in one's ability to successfully accomplish these processes (i.e., can-do motivational force) (Bandura, 1997, 2001; Tierney & Farmer, 2002). Moreover, integrating the componential theory of creativity and prosocial motivation theory, Grant and colleagues have conceptualized that at the creative stages that determine the usefulness of creative outcomes, prosocial motivation will be critical for one's creativity (i.e., motivational force prompting one to focus on the novel discoveries that are useful for others) (Bolino & Grant, 2016; Grant & Berg, 2011). Next we review relevant literatures and develop hypotheses regarding the unique contributions of the three motivational factors to employee creativity.

2.1. The unique effect of intrinsic motivation on creativity

Researchers have contended that "the primary function of intrinsic motivation is the control of attention" (Zhang & Bartol,

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2010, p. 112). That is, the higher the intrinsic motivation, the more employees' attention will be directed toward being creative. When people are intrinsically motivated, they will delve into their work and spend more time and effort to collect novel information, understand problems, and generate creative solutions (Ryan & Deci, 2000). In the presence of low intrinsic motivation, individuals will lack cognitive flexibility and tend to adhere to routines and conventions (Amabile, Barsade, Mueller, & Staw, 2005). Several conceptual pieces have highlighted intrinsic motivation as a primary motivational precursor of creativity (e.g., Hennessey & Amabile, 2010; Shalley et al., 2004). The positive influence of intrinsic motivation on creativity also has been shown by a number of empirical studies (e.g., Shin & Zhou, 2003; Zhang & Bartol, 2010). In sum, in contrast to creative self-efficacy as the source of motivation for the *can do* for creativity (Tierney & Farmer, 2002) and to prosocial motivation as the source of motivation for the *usefulness* of creative ideas, we argue that intrinsic motivation yields the unique motivational force for the *want to do* for creativity (Amabile, 1996; Deci & Ryan, 2012). That is, even when employees believe that they can achieve creative outcomes (i.e., high creative self-efficacy) and are willing to propose new ideas conducive to others (i.e., high prosocial motivation), the lack of intrinsic motivation (i.e., not being interested in and enjoying job tasks) will keep them from fully and persistently engaging in these creative processes. Therefore,

Hypothesis 1. Controlling for creative self-efficacy and prosocial motivation, intrinsic motivation makes a unique contribution to creativity.

2.2. The unique effect of creative self-efficacy on creativity

Even if people enjoy their work (i.e., have high intrinsic motivation) and are willing to concentrate on the novel ideas that are useful for others (i.e., have prosocial motivation), social cognitive theory and research suggest that without sufficient creative self-efficacy, one may still fail to generate creative outcomes (Bandura, 1997; Tierney & Farmer, 2002). Indeed, social cognitive theory emphasizes that unless people believe they can produce desired results and forestall detrimental ones by their actions, they will not invest ample time and resources in their work (Bandura, 2001). Creative processes require trial and error and unremitting learning (Tierney & Farmer, 2011). Creatively self-efficacious employees adhere more to the process of challenging established routines and standards and adopting nonconforming views and behaviors (Tierney & Farmer, 2004). Enhanced creative self-efficacy also leads employees to cultivate a strong and sustainable resilience against failures and threats (Tierney & Farmer, 2002) and maintain a mastery goal orientation toward learning (Tierney & Farmer, 2011). As such, even when faced with setbacks and risks, those who score higher on creative self-efficacy are still less prone to withdraw their creative efforts or disengage from creative processes. In contrast, employees suffering from low creative self-efficacy appear to have reduced cognitive persistence and are more reluctant to keep discovering and processing new knowledge, which prevents them from being creative. An increasing number of empirical studies have shown a positive relationship between creative self-efficacy and creativity (e.g., Gong et al., 2009; Tierney & Farmer, 2004). Hence,

Hypothesis 2. Controlling for intrinsic motivation and prosocial motivation, creative self-efficacy makes a unique contribution to creativity.

2.3. The unique effect of prosocial motivation on creativity

Prosocial motivation theory suggests that "prosocially motivated employees will be driven to develop ideas that are useful to the coworkers, supervisors, clients, or customers who benefit from their efforts" (Grant & Berry, 2011, p. 78). Prosocial motivation leads one to take others' perspectives, and thus to focus on the discoveries that are useful to others (Grant, 2011). Creative self-efficacy allows one to choose to initiate and stay the course for creative outputs (Tierney & Farmer, 2002, 2004), and "interest attracts people to new, unfamiliar things, many of these things will turn out to be trivial" (Silvia, 2008: 58). Yet, it is prosocial motivation that prompts people to consider others' needs and adopt the novel ideas that are more useful to others. The above theorizing suggests that over and beyond intrinsic motivation and creative self-efficacy, prosocial motivation may make a unique contribution to one's creativity by directing one to concentrate on the usefulness of discoveries in particular. Given that prosocial motivation research is still emerging, scholars have not examined prosocial motivation together with intrinsic motivation and creative self-efficacy simultaneously. Yet, empirical evidence from different cultures has shown that both intrinsic motivation and prosocial motivation are imperative for one's creativity. For example, in three studies, using both field and lab data collected in the U.S., Grant and Berry (2011) demonstrated that intrinsic motivation and prosocial motivation have unique contributions to creativity. Also, in a lab study of Chinese college students, Li and Bai (2015) found that one achieved the highest level of creativity in the presence of both high intrinsic motivation and prosocial motivation. Thus,

Hypothesis 3. Controlling for intrinsic motivation and creative self-efficacy, prosocial motivation makes a unique contribution to creativity.

2.4. The mediating role of intrinsic motivation

To further shed light on the different functions of the three motivational factors, this meta-analysis also examines how they may function differently to translate contextual and personal factors onto creativity. The componential theory of creativity (Amabile, 1983) and Shalley et al.'s (2004) review of creativity studies both indicated that contextual and personal factors have parallel influences on one's creativity. More specifically, Oldham and Cummings (1996) argued that employees were creative when they worked on jobs with certain features beneficial to creativity, possessed appropriate creativity-relevant personal characteristics, and were supervised in a supportive, non-controlling fashion. In addition, previous creativity studies have provided consistent and strong evidence that the job characteristics of job autonomy (e.g., Volmer, Spurk, & Niessen, 2012) and job complexity (e.g., Oldham & Cummings, 1996), the personality characteristics of openness to experience (e.g., Furnham, 1999) and conscientiousness (e.g., Furnham, Zhang, & Chamorro-Premuzic, 2005), and the leadership factor of supportive leadership (e.g., Shalley & Gilson, 2004) are all significantly associated with creativity. Self-determination theory (Deci & Ryan, 2012), social cognitive theory (Bandura, 2001), and prosocial motivation theory (Grant & Berg, 2011) also suggest that the aforementioned contextual and personal factors are antecedents of the three motivational mechanisms. Yet, while all three motivational variables likely act as mediators, various creativity-relevant predictors may have differentially strong relationships with these mediators. To develop a parsimonious model regarding the distinct roles of the three motivational mechanisms for creativity, we concentrate on contextual

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or personal antecedents that are expected to have the strongest relationships with one of the three mediators in each mediation hypothesis below.

Job autonomy and openness to experience should be more strongly related to intrinsic motivation than creative self-efficacy or prosocial motivation. As discussed later, social cognitive theory has long stated that "the most effective way of developing a strong sense of efficacy is through mastery experience" (Bandura, 1990, p. 327). Mastery experience arises when one successfully accomplishes challenging tasks (Bandura, 1997). In the workplace, external leadership influence has been identified as the most robust source of employee prosocial motivation and behavior (Bolino & Grant, 2016). While job autonomy and openness to experience may relate to creative self-efficacy and prosocial motivation, they don't seem to directly and strongly help one successfully accomplish challenging tasks (Bandura, 1990) or fuel one's desire for helping others (Bolino & Grant, 2016). Nevertheless, as argued below, the self-determination literature clearly indicates that these two antecedents directly and strongly satisfy one's need for autonomy, the primary source of intrinsic motivation (Deci & Ryan, 2000; Gagné & Deci, 2005; Ryan & Connell, 1989). Self-determination theory stresses the notion that the most effective way to fuel one's intrinsic motivation is to satisfy one's need for autonomy (Deci & Ryan, 2012; Gagné & Deci, 2005). As summarized by Ryan and Deci (2000), "most of the research on the effects of environmental events in intrinsic motivation has focused on the issue of autonomy versus control" (p. 70). Researchers also demonstrated that the formulation of different types of motivation (from high extrinsic motivation to high intrinsic motivation) lie along a continuum of relative autonomy (Ryan & Connell, 1989). Both job autonomy and openness to experience have been found to exert robust influence on intrinsic motivation (e.g., Joo, Jeung, & Yoon, 2010; Komarraju, Karau, & Schmeck, 2009).

2.4.1. Job autonomy

Job autonomy reflects the extent to which a job allows freedom, independence, and discretion (Humphrey, Nahrgang, & Morgeson, 2007). Self-determination theory maintains that the need for autonomy is a fundamental human need; satisfying one's need for autonomy contributes most to one's intrinsic motivation (Deci & Ryan, 2000). A growing number of studies have demonstrated that when people experience a sense of self-determination (i.e., volition and freedom from orders and restrictions), they are inclined to be autonomously motivated and thus engage in an activity for its own sake (Reeve, Nix, & Hamm, 2003; Silva et al., 2010). In other words, "intrinsically motivated behavior represents the prototype of self-determined activities" (Deci & Ryan, 2000, p. 234). In contrast, to the extent that people feel controlled and constrained by the external environment, a shift in their perceived locus of causality for the behavior from internal to external is prompted. As a result, their intrinsic motivation will be undermined. Accordingly, it stands to reason that when a job leads employees to experience freedom, independence, and discretion, their need for autonomy will be satisfied and their intrinsic motivation toward the job will then be boosted. Taking together the above arguments and evidence and our Hypothesis 1, we hypothesize:

Hypothesis 4. Job autonomy is more positively related to intrinsic motivation (than to prosocial motivation or creative self-efficacy), which in turn leads to creativity.

2.4.2. Openness to experience

People who are open to experience are inclined to embrace new experiences, enjoy variety, and initiate change (Costa & McCrae, 1992). Self-determination theory suggests that when people actively seek out opportunities for new experiences, variety, and initiate change, their need for autonomy is more likely to be satisfied (Deci & Ryan, 1985). When people's need for autonomy is fulfilled, they will be proactive in seeking personal enjoyment from their jobs and thus become intrinsically motivated (Deci & Ryan, 2012). In contrast, individuals who are low on openness to experience may be resistant to change and be reluctant to proactively seek new experiences in the workplace. Consequently, they may experience less autonomy need satisfaction and engage in their jobs because of external rewards or pressures. Our contention has received support in a study conducted in an educational setting. In this study, using data from 308 undergraduates, Komarraju et al. (2009) found that students' openness to experience was significantly associated with their intrinsic motivation. Overall, building on the above theorizing and our Hypothesis 1, we propose:

Hypothesis 5. Openness to experience is more positively related to intrinsic motivation (than to prosocial motivation or creative self-efficacy), which in turn leads to creativity.

2.5. The mediating role of creative self-efficacy

Job complexity and conscientiousness should be more strongly associated with creative self-efficacy than intrinsic motivation or prosocial motivation. As stated earlier, self-determination theory suggests that when one's job and personality are supportive of autonomy, one is intrinsically motivated (Deci & Ryan, 2000). Job complexity, reflecting the level of challenge and difficulty in one's job, should lead employees to experience more of a sense of challenge than autonomy (Deci & Ryan, 1985; Humphrey et al., 2007). Conscientious people are more achievement-oriented than autonomy-oriented (Barrick & Mount, 1991). Prosocial motivation is most apt to emerge in the presence of jobs that underscore interpersonal interactions and connections (i.e., the extent to which jobs are interdependent) and in those that have a prosocial personality (Grant, 2007; Penner, Fritzsche, Craiger, & Freifeld, 1995). Complex jobs do not necessarily allow one to experience an increased number of interpersonal interactions and connections. Social cognitive theory indicates that mastery experience (i.e., achieving challenging tasks effectively) is the most influential way to promote one's self-efficacy (Bandura, 1990, 2001). Previous studies indicate that job complexity and conscientiousness make a substantial contribution to one's completion of challenging tasks (Barrick, Stewart, & Piotrowski, 2002; Chen & Liang, 2015).

2.5.1. Job complexity

Job complexity is the extent to which a job is mentally challenging and difficult to perform (Humphrey et al., 2007). Job complexity may significantly contribute to one's creative self-efficacy by cultivating one's mastery experience (Bandura, 2001). Complex jobs are challenging and demand high cognitive investment (Campbell, 1988). As job complexity increases, one will need to contemplate and choose among a variety of cognitive processes to respond to the challenges that arise in trying to perform the job. As a result, when employees accomplish complex jobs, they are more likely to gain mastery experience (Bandura, 1991). In contrast, completing routine and simple jobs may lead employees to doubt their abilities to be creative (Tierney & Farmer, 2002). Even if employees can easily complete mundane jobs, they are not as likely to feel excited and satisfied and they may even develop aversive emotional states (e.g., boredom, dissatisfaction, frustration) (Fried & Ferris, 1987). The positive influence of job complexity on creative self-efficacy has been verified by studies across diverse

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cultures. For example, using field data from two different U.S. firms, Tierney and Farmer (2002) showed that job complexity was significantly related to creative self-efficacy. Also, Chen and Liang (2015) reported a positive correlation between job complexity and creative self-efficacy using field data from four high-tech companies in China. In line with the above theorizing and Hypothesis 2, we propose:

Hypothesis 6. Job complexity is more positively related to creative self-efficacy (than to intrinsic motivation or prosocial motivation), which in turn leads to creativity.

2.5.2. Conscientiousness

Conscientious people tend to be hardworking, persistent, and achievement-oriented, which leads to superior task performance (Barrick et al., 2002). The Big Five (McCrae & John, 1992) personality taxonomy is the most established framework for studying the relationship between employees' personality and their motivation and behavior (Barrick & Mount, 1991; Judge, Heller, & Mount, 2002). Among the Big Five personality traits, conscientiousness is thought to be the most relevant for one's task performance (e.g., Komarraju et al., 2009). As reiterated by social cognitive theory, the experience of mastery accrues from performing tasks effectively (Bandura, 1997). A large body of work has revealed a positive relationship between conscientiousness and task performance across a range of jobs (e.g., Barrick & Mount, 1991; Dudley, Orvis, Lebiecki, & Cortina, 2006). Therefore, because of their high performance, conscientious employees are apt to accumulate rich mastery experience and develop a strong efficacious belief in their ability to be creative. In contrast, because they do not gain sufficient mastery experience from performing their job successfully, less conscientious employees may not be confident enough to engage in creative processes which are typically associated with challenges and risks. The above theorizing and our Hypothesis 2 lead to the following hypothesis:

Hypothesis 7. Conscientiousness is more positively related to creative self-efficacy (than to intrinsic motivation or prosocial motivation), which in turn leads to creativity.

2.6. The mediating role of prosocial motivation

Supportive leadership should be more strongly related to prosocial motivation than intrinsic motivation or creative self-efficacy. Supportive leadership may benefit one's intrinsic motivation and creative self-efficacy; however, the positive relationships that supportive leadership has with intrinsic motivation and creative self-efficacy may not be as strong or linear as the relationship between supportive leadership and prosocial motivation. Specifically, as a type of external intervention, overly supportive leadership (e.g., receiving a plethora of guidance or advice from leaders) may not always foster one's sense of internal autonomy (i.e., a fundamental source of one's intrinsic motivation) that requires acting and making decisions fully based on one's own desires (Deci & Ryan, 1985, 2000). Although supportive leadership is beneficial to employees' completion of tasks, excessive external support from leaders (e.g., leaders giving employees detailed instructions on how to complete each step of the work) may result in employees doubting their own capability of accomplishing jobs, and feeling compelled to rely on external assistance to get their work done. However, in a recent review of prosocial motivation and behavior studies, researchers concluded that "leaders appear to have the most robust influence on prosocial behaviors," which are natural outcomes of prosocial motivation (Bolino & Grant, 2016). That is, leaders may exert a strong and stable impact on employees' prosocial motivation and subsequently, prosocial behavior.

2.6.1. Supportive leadership

Supportive leaders display positive behaviors such as providing resources and encouraging employees to perform well in the workplace (Amabile, 1988). As suggested by the prosocial motivation literature (e.g., Bolino & Grant, 2016; Grant & Berg, 2011), supportive leadership may strongly trigger employees' prosocial motivation because of role-modeling (Bass, 1990) and reciprocity (Cropanzano & Mitchell, 2005) mechanisms. First, leaders are a critical source of social influence for employees, who tend to model and display their leaders' attitudes and behaviors (Mayer, Kuenzi, Greenbaum, Bardes, & Salvador, 2009). By emulating supportive leaders, employees may become prosocially motivated to support others in the workplace. Second, when receiving support from leaders, employees feel obligated to reciprocate and thus develop prosocial motivation to protect and promote the well-being of others (Cropanzano & Mitchell, 2005). Hence, the above arguments and evidence, along with our Hypothesis 3, suggest:

Hypothesis 8. Supportive leadership is more positively related to prosocial motivation (than to intrinsic motivation or creative self-efficacy), which in turn leads to creativity.

2.7. Exploratory research questions

Our review of the creativity literature reveals that little research has been done to explore the conditions under which the three motivational mechanisms are more or less likely to fuel creativity, although studies suggest that it is valuable to investigate such conditions to extend motivation and creativity research (e.g., Grant & Berry, 2011). In their comprehensive review of creativity studies, Zhou and Hoever (2014) called for meta-analyses to examine the contingent effects of sample characteristics on the relationships between antecedents and creativity. Thus, this meta-analysis endeavors to address this call for examining how sample characteristics may alter the links between the three motivational factors and creativity, in order to more completely understand the motivational mechanisms' unique functions.

2.7.1. Individualism

We first look at the moderating effect of a national cultural characteristic, individualism (i.e., the extent a study sample has an individualistic culture). In their review of creativity studies, Zhou and Su (2010) suggested that it would be intriguing to investigate how and why individualism may moderate the influence of antecedents on creativity. Individualism fundamentally distinguishes some cultures from others and is the single most fruitful cultural dimension in cross-cultural management research (Hofstede, Hofstede, & Minkov, 2010). Intrinsic motivation and creative self-efficacy conform to norms of individualism rather than collectivism because an individualistic culture stresses personal choice and competency (Eaton & Dembo, 1997). In an individualistic culture, people tend to consider themselves independent of their affiliated communities, thereby allowing their personal interests (i.e., intrinsic motivation) and beliefs about their creative capabilities (i.e., creative self-efficacy) to affect their behavior, such as being creative. Thus, individualism may augment the positive relationships that intrinsic motivation and creative self-efficacy have with creativity. Prosocial motivation, reflecting one's desire to benefit others, aligns with a more collectivistic culture, where people are inclined to consider themselves as part of their affiliated communities and strive to attain collective goals (De Dreu, Weingart, & Kwon, 2000). Consequently, the positive relationship

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between prosocial motivation and creativity may be weakened by individualism, which produces contextual cues against the functioning of prosocial motivation. Supporting this line of reasoning, Randhawa and Gupta (2000) documented that math self-efficacy was more predictive of performance for Canadian students with individualistic cultural values than Indian students with collectivistic cultural values. Also, Huang and Van De Vliert (2003) found that the relationship between intrinsic job characteristics and job satisfaction was more positive in individualistic countries. Despite the scarcity of research on culture and prosocial motivation, the cross-cultural management literature reveals that prosocial motivation may be more functional and influential in cultures lower on individualism, which supports the notion that individuals in these cultures subordinate their personal interests and enjoyment for the pursuit of others' welfare (Hofstede, 1991; Hofstede & Hofstede, 2005). Thus,

Exploratory Research Question 1. Does individualism moderate the relationship between intrinsic motivation and creativity such that the relationship is more positive in countries characterized as highly individualistic?

Exploratory Research Question 2. Does individualism moderate the relationship between creative self-efficacy and creativity such that the relationship is more positive in countries characterized as highly individualistic?

Exploratory Research Question 3. Does individualism moderate the relationship between prosocial motivation and creativity such that the relationship is less positive in countries characterized as highly individualistic?

2.7.2. Cultural tightness

Recent cross-cultural studies also suggest that the situational influence of individualism may depend on cultural tightness. Cultural tightness indexes "the strength of social norms, or how clear and pervasive norms are within societies, and the strength of sanctioning, or how much tolerance there is for deviance from norms within societies" (Gelfand, Nishii, & Raver, 2006, p. 1226). When cultural tightness is higher, a national culture has more explicit and pervasive cultural norms, and people under this type of national culture would have less tolerance and impose stronger sanctioning for any deviance from their cultural norms (Gelfand et al., 2011). Tighter cultures allow individuals to have a more clear-cut understanding of cultural norms, and in the meantime prompt them to more closely follow their cultural norms. Accordingly, the moderating role of individualism in the relationships of intrinsic motivation, creative self-efficacy, and prosocial motivation with creativity should be more likely to be activated in countries with tighter cultures. Conversely, when there is lower cultural tightness, the norms of individualism will be less clear and individuals are thus less subject to the impact of individualism. Therefore,

Exploratory Research Question 4. Do individualism and cultural tightness jointly moderate the relationship between intrinsic motivation and creativity such that the relationship is more positive in countries characterized as highly individualistic when the national cultures are tighter?

Exploratory Research Question 5. Do individualism and cultural tightness jointly moderate the relationship between creative self-efficacy and creativity such that the relationship is more positive in countries characterized as highly individualistic when the national cultures are tighter?

Exploratory Research Question 6. Do individualism and cultural tightness jointly moderate the relationship between prosocial motivation and creativity such that the relationship is less positive in countries characterized as highly individualistic when the national cultures are tighter?

2.7.3. Methodological factors

In addition to the moderating effects of national culture, researchers also have suggested that methodological factors may affect the relationships between antecedents and creativity. For example, Ng and Feldman (2012) compared the self-report and non-self-report measures of creativity and found that most antecedents tend to have stronger relationships with creativity when self-ratings of creativity are used. Their study also suggested that when the motivational antecedents were specifically directed toward creative work (e.g., general vs. creative intrinsic motivation; general vs. creative self-efficacy), their relationships with creativity should be stronger. Moreover, Davis (2009) found that publication status (i.e., published or unpublished) may influence the relationships between antecedents and creativity, with the relationships being stronger for journal publications. Building on these prior meta-analyses, we also explore the moderating effects of three methodological factors on the relationships of intrinsic motivation, creative self-efficacy, and prosocial motivation with creativity.

Exploratory Research Question 7. Do rating sources of creativity moderate the relationships of intrinsic motivation, creative self-efficacy, and prosocial motivation with creativity such that the relationships are stronger when self-ratings of creativity are used?

Exploratory Research Question 8. Does the specificity of intrinsic motivation, creative self-efficacy, and prosocial motivation measures moderate their relationships with creativity such that the relationships are stronger when specific measures are used?

Exploratory Research Question 9. Does publication status moderate the relationships of intrinsic motivation, creative self-efficacy, and prosocial motivation with creativity such that the relationships are stronger for journal publications?

3. Method

3.1. Literature search

To identify studies that could be used in this meta-analysis, we first searched for articles published through January 2016 in PsycINFO, ISI Web of Science, Business Source Premier, and Google Scholar using search terms such as creativity, creative behavior, creative performance, and creative outcomes in English, Chinese, and Korean. Second, to supplement the electronic search, we conducted a manual search of peer-reviewed management and psychology journals that regularly publish empirical research on creativity such as *Academy of Management Journal*, *Administrative Science Quarterly*, *Creativity Research Journal*, *Journal of Applied Psychology*, *Journal of Creative Behavior*, *Journal of Management*, *Journal of Organizational Behavior*, *Leadership Quarterly*, *Organizational Behavior and Human Decision Processes*, and *Personnel Psychology*. Third, we checked the reference lists of the prior reviews on creativity, including theoretical reviews (e.g., Hennessey & Amabile, 2010; Shalley et al., 2004; Zhou & Shalley, 2003) and meta-analytic reviews (e.g., Byron & Khazanchi, 2012; Hammond, Neff, Farr, Schwall, & Zhao, 2011). Moreover, we used the same search terms to search ProQuest Digital Dissertations, as well as conference programs from the Academy of Management and the Society of Industrial and Organizational Psychology from 2008 to 2015. We also tried to obtain unpublished research by contacting researchers in the field of creativity.

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Each primary study had to meet the following criteria for inclusion in our meta-analysis. First, it had to be an empirical investigation of creativity at the individual level of analysis. Studies on team creativity (e.g., Shin & Zhou, 2007) were excluded from the analyses given that the present research focuses on individual creativity. Second, we only included studies that provided correlation coefficients or other information (e.g., *F* values and *d* values) that could be used to estimate the relationships between creativity and other variables. We excluded those that did not report such information (e.g., Shalley, 1995; Zhou, 1998). Third, a study had to report sample size for us to calculate the sample size-weighted effect size. Fourth, when the same sample was used in two or more articles, we considered only the one that provided greater information. When a study used two or more independent samples, we coded the independent samples separately (e.g., Grant & Berry, 2011; Zhou, 2003). We obtained a final sample of 191 independent samples (N = 51,659) (see Appendix A for all coded studies included in this meta-analysis).

3.2. Coded variables

As suggested by Lipsey and Wilson (2001), we first created a coding scheme including sample information (e.g., sample size and the country origin of the sample), key variables, reliabilities of variables, and correlations among variables. Two of the authors used this scheme to code data, which resulted in an agreement rate of 98%. Then, the two coders checked the primary studies and resolved their disagreements.

3.2.1. Creativity

As defined by previous research (e.g., Amabile, 1996; Zhou & Shalley, 2003), creativity refers to the development of individuals' ideas that are novel and potentially useful to the organization. It can range from suggestions for incremental adaptions to radical breakthroughs, and may be generated by employees in any job (Shalley et al., 2004). Measures of creativity include both perceptual measures rated by employees themselves (e.g., Shalley, Gilson, & Blum, 2009), supervisors (e.g., George & Zhou, 2001; Tierney & Farmer, 2002), coworkers (e.g., Amabile et al., 2005), and expert judges (e.g., Binnewies, Ohly, & Sonnentag, 2007), as well as objective measures (e.g., Liao, Liu, & Loi, 2010).

3.2.2. Intrinsic motivation

Intrinsic motivation refers to motivation that engages individuals in an activity for the interest and enjoyment of the activity itself. Our sample includes studies measuring intrinsic motivation for general work (e.g., Eisenberger & Aselage, 2009) and those measuring intrinsic motivation for creative work (e.g., Shin & Zhou, 2003; Tierney, Farmer, & Graen, 1999). Although the two types of measures differ in the targets of intrinsic motivation, they both reflect individuals' drive to engage in interesting, enjoyable, and positively challenging tasks (Amabile, Hill, Hennessey, & Tighe, 1994). As reported below in Section 4, we compared the corrected correlations of intrinsic motivation for general work and for creative work. For all studies reporting the relationship between intrinsic motivation and creativity, please see Appendix B.

3.2.3. Creative self-efficacy

Creative self-efficacy reflects one's perceived capacity for completing creative work (Tierney & Farmer, 2004, 2011). We also considered studies that measured general self-efficacy but did not refer to it as specifically focusing on creative work because individuals' efficacy beliefs for completing creative work can be generalized from their efficacy beliefs regarding performing work in general (Tierney & Farmer, 2002). Similar to what we did for the intrinsic motivation-creativity relationship, we compared the correlations of creative self-efficacy and general self-efficacy with creativity. For all studies reporting the relationship between creative self-efficacy and creativity, please see Appendix C.

3.2.4. Prosocial motivation

Prosocial motivation reflects individuals' desire to expend effort to help or contribute to other people (Grant, 2008). Researchers measured prosocial motivation using the scale developed by Grant (2008) (e.g., Grant & Berry, 2011) or through experimental manipulations (e.g., whether the participants engaged in creativity-related activities for others or for themselves in Li & Bai, 2015; Polman & Emich, 2011).

3.2.5. Job autonomy

Job autonomy was measured as whether individuals have freedom or autonomy to determine how they complete their work (e.g., Cohen-Meitar, Carmeli, & Waldman, 2009; Grant & Berry, 2011; Wu, Parker, & de Jong, 2014), or whether they have multiple means to perform the job (e.g., George & Zhou, 2001).

3.2.6. Openness to experience and conscientiousness

Openness to experience and conscientiousness were measured by Big Five Factors scales such as the International Personality Item Pool (Goldberg, 1999), NEO-Five Factor Inventory (Costa & McCrae, 1992), and shorter versions of those measures (e.g., Donnellan, Oswald, Baird, & Lucas, 2006).

3.2.7. Job complexity

Measures of job complexity include perceived job challenge (e.g., Carmeli, Cohen-Meitar, & Elizur, 2007; Cohen-Meitar et al., 2009), skill variety (e.g., Grant & Berry, 2011; Noefer, Stegmaier, Molter, & Sonntag, 2009), and complexity (e.g., Baer & Oldham, 2006), as well as an objective measure from the Dictionary of Occupational Titles (e.g., Shalley, Gilson, & Blum, 2000; Shalley et al., 2009; Tierney & Farmer, 2002, 2004, 2011).

3.2.8. Supportive leadership

Supportive leadership consists of leaders' supportive behaviors toward employees, such as supportive supervision (Oldham & Cummings, 1996), creativity-supportive behavior (Tierney & Farmer, 2002, 2004), developmental feedback (Zhou, 2003), transformational leadership (e.g., Gong et al., 2009; Shin & Zhou, 2003), and leader-member exchange (e.g., Liao et al., 2010; Scott & Bruce, 1994; Tierney et al., 1999).

3.2.9. Moderators

To examine the moderating effect of national culture, we first coded the country where the study was conducted (e.g., Australia, China, and US). Then we referred to Hofstede's (2001) national culture score to code individualism scores and Gelfand et al. (2011) to code cultural tightness scores. In our sample, the individualism scores ranged from 14 (Pakistan) to 91 (US), and tightness scores ranged from 3.30 (Netherlands) to 12.30 (Pakistan). To examine the potential methodological moderators of the relationships of intrinsic motivation, creative self-efficacy, and prosocial motivation with creativity, we coded the rating sources of creativity (0 = non-self-rated, 1 = self-rated), the types of intrinsic motivation and creative self-efficacy measures (0 = general, 1 = creative), and publication status (0 = non-journal publication, 1 = journal publication).

3.2.10. Control variables

We coded extrinsic motivation as a control variable when examining the path relationships of other variables with creativity. This is because extrinsic motivation has been considered generally disadvantageous to one's creativity (Amabile, 1988, 1996). Extrin-

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sic motivation refers to motivation that comes from factors external to an activity, such as receiving recognition and rewards generally for the job (e.g., Grant & Berry, 2011; Liu, Chen, & Yao, 2011) and specifically for creativity (e.g., Baer, Oldham, & Cummings, 2003; George & Zhou, 2002).

3.3. Meta-analytic calculation and hypotheses testing procedures

We first summarized the relationships between creativity and all other variables by following the statistical procedure outlined by Hunter and Schmidt (2004). For variables measured using perceptual scales, we adopted internal reliability (i.e., Cronbach alpha) to correct for the measurement error of the observed correlations. For studies that failed to report such information, we used an imputation procedure based on the average weighted reliability from other studies included in our meta-analysis. The average weighted reliabilities for creativity, intrinsic motivation, creative self-efficacy, prosocial motivation, job autonomy, openness to experience, job complexity, conscientiousness, supportive leadership, and extrinsic motivation were .88, .80, .90, .83, .79, .75, .79, .78, .88, and .80, respectively. We then corrected for sampling error to estimate average weighted correlations ($\bar{r}$) and average weighted corrected correlations ($\bar{\rho}$) among variables. As shown in Table 1, we also calculated the 80% credibility interval (CV), 95% confidence interval (CI), and percentage of variance of observed relationships accounted for by statistical artifacts for the corrected correlation (%V). Moreover, in order to detect publication bias, we calculated the fail-safe *k*, which indicates how many nonsignificant studies, if they were missing from our research, would be needed to reduce the effect size to a nonsignificant value (Hunter & Schmidt, 2004).

We used meta-analytic structural equation modeling (SEM) to examine the unique influence of intrinsic motivation, creative self-efficacy, and prosocial motivation on creativity as well as their mediating effects. These analyses were conducted by creating correlation matrices among all relevant variables and calculating the harmonic means of the cell sample sizes (Viswesvaran & Ones, 1995). Table 2 presents the correlations calculated in this study by following the above-described procedures. Because all identified studies for the prosocial motivation–creativity relationship assessed creativity with non-self-rated measures, we used the relationships between all other variables and non-self-rated creativity as the input of the following regression analyses. This also helped minimize common method variance. We performed meta-analytic SEM and path analyses in LISREL 8.71 and used the chi-square statistic (χ^2), comparative fit index (*CFI*), normed fit index (*NFI*), the root mean square error of approximation (*RMSEA*), and the standardized root-mean-square residual (*SRMR*) to assess how well path models fit the data.

We relied on the Hunter and Schmidt's (2004) 75% rule to detect the potential moderator effects. Specifically, when statistical artifacts account for less than 75% of the correlation variance, it is considered that moderator variables are likely to exist. To explore the moderating effects of national culture, we used the control variables (e.g., the sources of creativity measure, the measures of intrinsic motivation and creative self-efficacy, and publication status) and individualism and cultural tightness as well as the product of the two cultural variables as predictors of the corrected effect sizes in weighted least squares regression models. When testing the moderating effects of the rating sources of creativity, the types of intrinsic motivation and creative self-efficacy, and publication status, we used the subgroup analyses to compare the reliability-corrected effect sizes of the two groups separated by each moderator and used *z* values to indicate the significance of the comparison results (Quińones, Ford, & Teachout, 1995). A SPSS syntax created by Field and Gillett (2010) was used to conduct the analyses.

4. Results

4.1. Unique effects of intrinsic motivation, creative self-efficacy, and prosocial motivation on creativity

Table 1 summarizes the overall relationships between creativity and all other variables. Table 2 presents the correlation matrix including relationships among creativity and all other variables. We used this table to test our Hypotheses 1–8. In Hypotheses 1–3, we posited that intrinsic motivation, creative self-efficacy, and prosocial motivation made unique contributions to creativity. In support of this set of hypotheses (see Table 3), we found that intrinsic motivation ($B = .16$, $SE = .03$, $p < .01$), creative self-efficacy ($B = .21$, $SE = .02$, $p < .01$), and prosocial motivation ($B = .07$, $SE = .03$, $p < .01$) were all positively related to creativity while controlling for extrinsic motivation ($B = -.06$, $SE = .02$, $p < .01$). Together, these three variables and extrinsic motivation explained 13% of the total variance of creativity (i.e., $R^2 = .13$, $SE = .03$, $p < .01$, Harmonic $N = 2347$). Therefore, Hypotheses 1–3 were supported.

4.2. Mediating effects of intrinsic motivation, creative self-efficacy, and prosocial motivation

In Hypotheses 4–8, we proposed that intrinsic motivation, creative self-efficacy and prosocial motivation play different roles in mediating the relationships between the five antecedents (i.e., job autonomy, openness to experience, job complexity, conscientiousness, and supportive leadership) and creativity. To test these hypotheses, we used the correlation matrix in Table 2 as the input in SEM. We examined a mediation model in which all antecedents

Table 1
Meta-analytic correlations between creativity and antecedents.

Variable names	*k*	*N*	$\bar{r}$	$\bar{\rho}$	80% CV	95% CI	%V	Fail-safe *k*
Intrinsic motivation	68	19,695	.28	.34	.08: .60	.21: .46	9.25	126
Creative self-efficacy	68	19,973	.35	.40	.13: .67	.28: .52	7.44	168
Prosocial motivation	5	679	.20	.21	.21: .21	.04: .36	100.00	5
Job autonomy	35	9,144	.28	.34	.10: .58	.21: .47	11.70	53
Openness to experience	35	8,603	.18	.23	−.02: .47	.08: .37	13.61	34
Job complexity	32	7,948	.22	.26	.12: .40	.12: .40	29.71	38
Conscientiousness	19	4,299	.10	.13	−.03: .28	−.03: .29	31.98	0
Supportive leadership	82	21,700	.23	.26	.05: .47	.13: .39	14.28	113
Extrinsic motivation	28	7,098	.02	.02	−.13: .17	−.13: .16	29.29	0

Note. *k* = number of studies; *N* = combined sample size; $\bar{r}$ = mean sample size weighted observed correlations; $\bar{\rho}$ = mean sample size weighted corrected correlation; CV = credibility interval of $\bar{\rho}$; CI = confidence interval of $\bar{\rho}$; %V = % variance of $\bar{r}$ attributable to all statistical artifacts; Fail-safe *k* = number of unlocated studies with nonsignificant effect sizes that would have to exist to make the $\bar{\rho}$ nonsignificant.

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Table 2
Meta-analytic estimates of intercorrelations among study variables.

	1	2	3	4	5	6	7	8	9
1. Intrinsic motivation	—								
2. Creative self-efficacy ($\bar{r}$, $\bar{\rho}$)	.44, .53								
k/*N*	19/5,752								
3. Prosocial motivation ($\bar{r}$, $\bar{\rho}$)	.52, .61	.22, .25							
k/*N*	10/2,537	4/1,166							
4. Job autonomy ($\bar{r}$, $\bar{\rho}$)	.31, .38	.28, .34	.26, .29						
k/*N*	13/3,081	5/1,769	5/585						
5. Openness to experience ($\bar{r}$, $\bar{\rho}$)	.23, .31	.23, .30	.17, .22	.09, .12					
k/*N*	12/3,022	11/2,387	4/1,354	10/2,118					
6. Supportive leadership ($\bar{r}$, $\bar{\rho}$)	.27, .33	.32, .37	.31, .36	.43, .53	.09, .11				
k/*N*	24/6,457	24/7,911	6/2,859	15/4,314	8/1,978				
7. Job complexity ($\bar{r}$, $\bar{\rho}$)	.15, .18	.15, .19	.08, .09	.35, .48	.13, .16	.20, .23			
k/*N*	7/2,613	12/2,931	2/231	7/1,168	6/1,070	15/3,447			
8. Conscientiousness ($\bar{r}$, $\bar{\rho}$)	.16, .21	.30, .38	.22, .27	.02, .02	.16, .20	.08, .11	−.10, −.13		
k/*N*	6/1,387	5/1,201	4/1,354	5/752	17/3,266	4/680	3/389		
9. Extrinsic motivation ($\bar{r}$, $\bar{\rho}$)	.12, .15	.08, .10	.20, .25	.19, .23	.01, .02	.36, .43	.03, .03	.09, .10	
k/*N*	19/5,438	8/2,129	5/2,580	7/1,993	5/1,348	7/1,475	5/1,016	2/684	
10. Creativity ($\bar{r}$, $\bar{\rho}$)	.26, .31	.27, .31	.20, .21	.27, .32	.16, .20	.22, .24	.20, .24	.07, .09	.00, .00
k/*N*	53/13,562	47/13,242	5/679	25/6,982	30/7,771	64/17,584	25/5,456	13/2,620	22/5,813

Note. *k* = number of studies; *N* = combined sample size; $\bar{r}$ = mean sample size weighted observed correlations; $\bar{\rho}$ = mean sample size weighted corrected correlation.

Table 3
Effects of intrinsic motivation, creative self-efficacy, and prosocial motivation on creativity.

Variables	Model 1 *B*(*SE*)	Model 2 *B*(*SE*)	Model 3 *B*(*SE*)	Model 4 *B*(*SE*)
Intrinsic motivation	.32**(.02)			.16**(.03)
Creative self-efficacy		.31**(.02)		.21**(.02)
Prosocial motivation			.22**(.02)	.07**(.03)
Extrinsic motivation	−.05*(.02)	−.03(.02)	−.06**(.02)	−.06**(.02)
R^2	.10**(.03)	.10**(.03)	.05**(.03)	.13**(03)

Note. Harmonic *N* = 2,347. The coefficients were unstandardized coefficients. Standard errors of the regression coefficients were reported in the parentheses.
* $p < .05$.
** $p < .01$.

had both direct and indirect relationships with creativity through intrinsic motivation, creative self-efficacy, and prosocial motivation (Fig. 1). Due to the high correlations among the three motivational mediators, we correlated them with one another in the SEM analyses rather than considering them as independent mediators. The model fit the data adequately well ($\chi^2(3) = 29.04$, $p < .01$, CFI = .99, NFI = .99, RMSEA = .08, SRMR = .02). To further highlight the differential mediating roles of intrinsic motivation, creative self-efficacy, and prosocial motivation, we reported the path coefficients in both Fig. 1 and Table 4 and compared the regression coefficients of each independent variable on intrinsic motivation, creative self-efficacy, and prosocial motivation by using the formula provided by Paternoster, Brame, Mazerolle, and Piquero (1998). Job autonomy and openness to experience were more significantly related to intrinsic motivation than to creative self-efficacy and prosocial motivation; job complexity and conscientiousness were more significantly associated with creative self-efficacy than with intrinsic motivation and prosocial motivation; and supportive leadership was more significantly related to prosocial motivation than intrinsic motivation. As shown by Table 4, while the coefficient for the relationship between supportive leadership and prosocial motivation ($B = .25$, $SE = .03$, $p < .01$) is larger than the coefficient for the relationship between supportive leadership and creative self-efficacy ($B = .21$, $SE = .03$, $p < .01$), their difference is not significant ($d = .04$, $SE = .04$, *ns*). Thus, Hypotheses 4–7 were fully supported and Hypothesis 8 was partially supported. Overall, the findings demonstrate the disparate roles of the three motivational mechanisms in the relationships between different antecedents and creativity.

4.3. Results for exploratory research questions regarding moderators

In addition to examining the main effects and mediating effects of intrinsic motivation, creative self-efficacy, and prosocial motivation, we also explored the boundary conditions of their relationships with creativity. As presented in Table 1, statistical artifacts accounted for less than 75% of the variance in the relationship between intrinsic motivation and creativity (9.25%) and the relationship between creative self-efficacy and creativity (7.44%), indicating moderators exist in these relationships. However, statistical artifacts (e.g., measurement errors) explained all the variance of the relationship between prosocial motivation and creativity, indicating no need to examine any potential moderators of this relationship (Hunter & Schmidt, 2004). Therefore, we did not test the moderation effects for the relationship between prosocial motivation and creativity in exploratory research questions 3, 6, 7, 8, and 9.

We first examined the moderating effect of national culture on the relationships of intrinsic motivation and creative self-efficacy with creativity (exploratory research questions 1, 2, 4, and 5). We first grand-mean centered individualism and tightness scores and created the interaction term of these two and then included these two variables and their interaction term as predictors of the corrected relationships of intrinsic motivation and creative self-efficacy with creativity in weighted least squares regression analyses. As shown in Table 5, individualism was negatively related to the intrinsic motivation-creativity relationship ($B = -.003$, $SE = .001$, $p < .01$) and the creative self-efficacy-creativity relationship ($B = -.002$, $SE = .001$, $p < .01$) after controlling for all other moderators. When considering the joint moderating effects of individualism and tightness, we found that individualism and tightness had significant and positive interactive effects on both the intrinsic motivation—creativity relationship ($B = .004$, $SE = .002$, $p < .10$) and the creative self-efficacy—creativity relationship ($B = .005$, $SE = .003$, $p < .10$) after controlling for other potential moderators. To help interpret the joint moderating effects, we plotted the interaction effects in Figs. 2 and 3. Consistent with our expectations, in countries with tight cultures the relationship between intrinsic motivation and creativity increases as their individualism scores increase, but in those with loose cultures the relationship decreases as their individualism scores increase. For the relationship between creative self-efficacy and creativity, we found that the relationship is more

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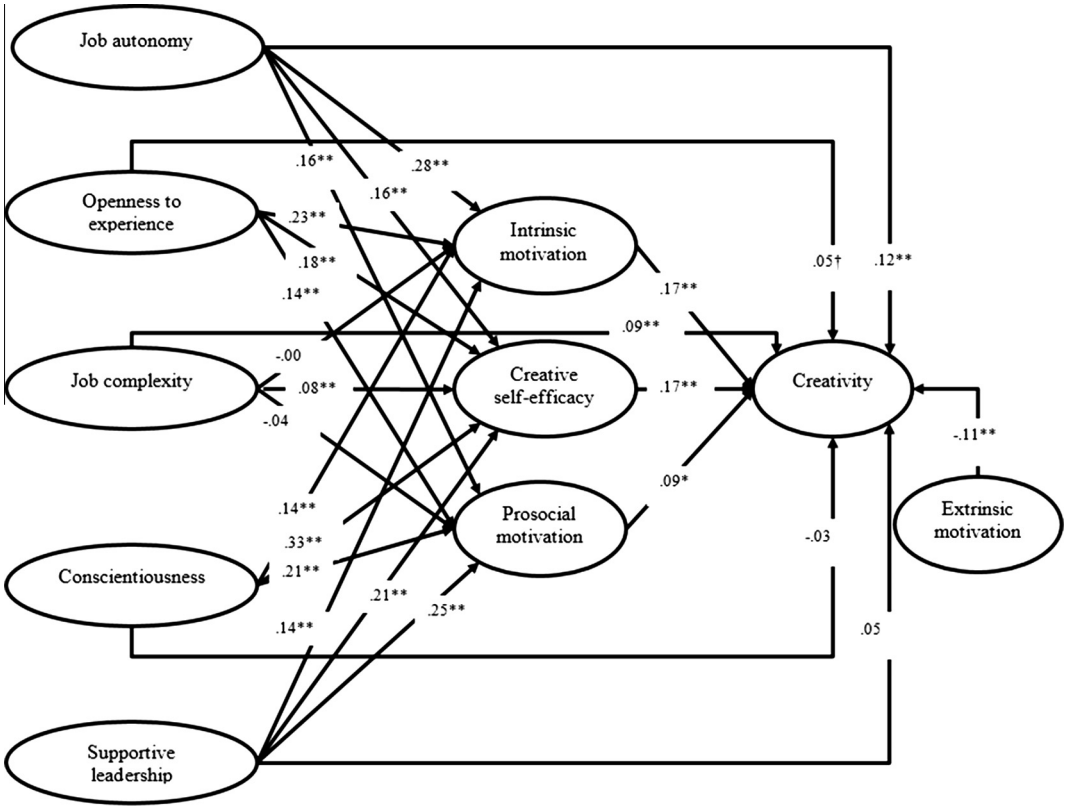

Fig. 1. Results of the effects of antecedents on creativity through intrinsic motivation, prosocial motivation, and creative self-efficacy. *Note.* Harmonic $N = 1{,}472$. All coefficients were unstandardized estimates. RMSEA = .08, CFI = .99, NFI = .99, SRMR = .02, $\chi^2(3) = 29.04$, $p < .01$. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$.

Table 4
Mediating effects of intrinsic motivation, creative self-efficacy, and prosocial motivation.

	Intrinsic motivation Model 1 *B*(*SE*)	Creative self-efficacy Model 2 *B*(*SE*)	Prosocial motivation Model 3 *B*(*SE*)	d(M2-M1) *d*(*SE*)	d(M3-M1) *d*(*SE*)	d(M3-M2) *d*(*SE*)	Creativity Model 4 *B*(*SE*)
Job autonomy	.28**(.029)	.16**(.027)	.16**(.029)	−.11**(.040)	−.12**(.041)	−.01(.040)	.12**(.033)
Openness to experience	.23**(.023)	.18**(.022)	.14**(.023)	−.06†(.032)	−.10**(.033)	−.04(.032)	.05†(.026)
Job complexity	−.00(.026)	.08**(.024)	−.04(.026)	.08*(.035)	−.03(.037)	−.11**(.036)	.09**(.027)
Conscientiousness	.14**(.023)	.33**(.022)	.21**(.023)	.19**(.032)	.07*(.033)	−.12**(.032)	−.03(.027)
Supportive leadership	.14**(.026)	.21**(.025)	.25**(.027)	.07†(.036)	.10**(.037)	.04(.036)	.05(.032)
Intrinsic motivation							.17**(.027)
Creative self-efficacy							.17**(.028)
Prosocial motivation							.09**(.026)
Extrinsic motivation							−.11**(.025)

Note. Harmonic $N = 1{,}472$. All computations were based on the unstandardized coefficients presented in Fig. 1. Standard errors of the regression coefficients were reported in the parentheses. *d* = differences in the regression coefficients of independent variables on intrinsic motivation, prosocial motivation, and creative self-efficacy.
† $p < .10$.
* $p < .05$.
** $p < .01$.

likely to be positively affected by individualism in countries with tight cultures than those with loose cultures.

We next examined the moderating effects of sources of the creativity measure, specificity of intrinsic motivation/creative self-efficacy measures, and publication status on the relationships between intrinsic motivation/creative self-efficacy and creativity (Research Questions 7–9). As shown in Table 6, the intrinsic motivation-creativity relationship was more positive when creativity was self-reported ($\bar{\rho} = .40$, 95% CI = .30: .51) than when it was rated by others ($\bar{\rho} = .29$, 95% CI = .13: .36), and the difference in corrected effect sizes was significant ($z = 4.60$, $p < .01$). We also found a significant moderating effect of the intrinsic motivation measure ($z = 2.54$, $p < .05$) such that, the intrinsic motivation–creativity relationship was more positive when intrinsic motivation was directed toward creativity ($\bar{\rho} = .37$, 95% CI = .23: .50) than when it was directed toward general tasks ($\bar{\rho} = .29$, 95% CI = .17: .41). Moreover, we found that publication status significantly moderated the intrinsic motivation–creativity relationship ($z = 4.35$, $p < .01$) such that a more positive relationship was found for journal publications ($\bar{\rho} = .38$, 95% CI = .26: .50) than for non-journal

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Table 5
Moderating effects of individualism and tightness on the relationships of intrinsic motivation and creative self-efficacy with creativity.

	Intrinsic motivation—creativity			Creative self-efficacy—creativity		
	Model 1 *B*(*SE*)	Model 2 *B*(*SE*)	Model 3 *B*(*SE*)	Model 4 *B*(*SE*)	Model 5 *B*(*SE*)	Model 6 *B*(*SE*)
Intercept	.152*(.073)	.212** (.071)	.402**(.121)	.115†(.061)	.181**(.065)	.457*(.181)
Types of creativity measures	.177†(.092)	.135(.089)	.162†(.089)	.435**(.062)	.410**(.061)	.431**(.061)
Types of intrinsic motivation measures	.095(.075)	.069(.072)	.069(.070)			
Types of creative self-efficacy measures				.126*(.060)	.106†(.058)	.087(.058)
Publication status	.182*(.079)	.125(.077)	.123(.077)	.163**(.060)	.094(.065)	.106(.065)
Individualism		−.003**(.001)	−.002(.002)		−.002*(.001)	.009(.006)
Tightness			.001(.041)			.241†(.135)
Individualism × tightness			.004†(.002)			.005†(.003)
k	68	66	66	69	69	69

Note. The coefficients were unstandardized coefficients. Standard errors of the regression coefficients were reported in the parentheses. *k* = number of studies.
† $p < .10$.
* $p < .05$.
** $p < .01$.

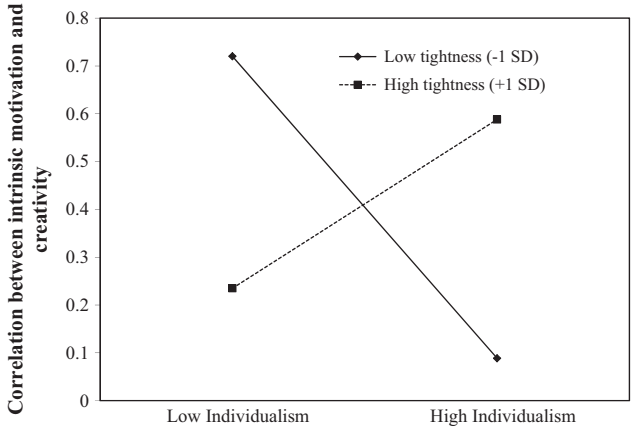

Fig. 2. Moderating effects of individualism and cultural tightness on the relationship between intrinsic motivation and creativity.

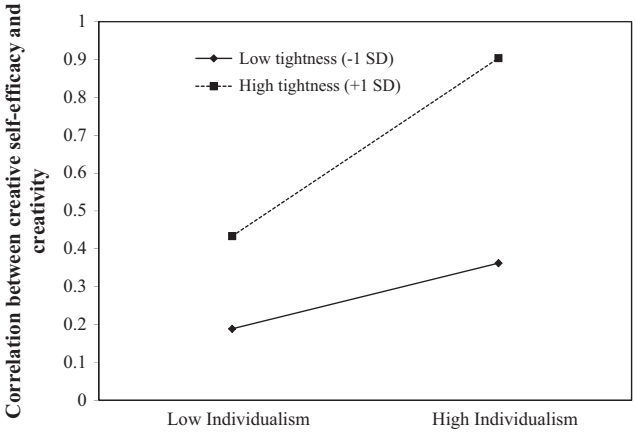

Fig. 3. Moderating effects of individualism and cultural tightness on the relationship between creative self-efficacy and creativity.

publications ($\bar{\rho}$ = .22, 95% CI = .08: .36). In terms of the creative self-efficacy–creativity relationship, we found significant moderating effects of the rating sources of creativity ($\bar{\rho}$ = .59, 95% CI = .50: .69 for self-report creativity; $\bar{\rho}$ = .31, 95% CI = .18: .43 for non-self-report creativity; $z = 6.76$, $p < .01$), measure of self-efficacy ($\bar{\rho}$ = .42, 95% CI = .30: .54 for creative self-efficacy; $\bar{\rho}$ = .32, 95% CI = .22: .43 for general self-efficacy; $z = 3.37$, $p < .01$), and publication status ($\bar{\rho}$ = .45, 95% CI = .35: .56 for journal publications; $\bar{\rho}$ = .27, 95% CI = .13: .41 for non-journal publications; $z = 3.81$, $p < .01$).

To supplement the results of subgroup analyses, we also included three moderators simultaneously in the weighted regression analyses to see whether their moderating effects would hold after controlling for the effect of one another. As shown in Model 1 of Table 5, we only found a significant moderating effect of publication status on the relationship between intrinsic motivation and creativity. For the relationship between creative self-efficacy and creativity, all three moderators were significant predictors of this relationship, suggesting the robustness of the moderating effects (Model 4 of Table 5).

5. Discussion

This meta-analysis simultaneously examined the main and mediating effects of intrinsic motivation, creative self-efficacy, and prosocial motivation on creativity. We hypothesized and found that these three motivational mechanisms served as mediators to varying degrees between different personal and contextual factors and creativity. Further, in an exploratory vein, we examined whether the relationships of intrinsic motivation and creative self-efficacy with creativity are contingent upon sample characteristics and methodological factors (i.e., national culture, creativity rating sources, intrinsic motivation and creative self-efficacy measures, and publication status). Primary studies regarding the motivational mechanisms for creativity have yielded rather mixed results. Addressing the calls for advancing a clearer understanding via more in-depth research on the role of different motivational mechanisms for creativity (e.g., Anderson, Potočnik, & Zhou, 2014; George, 2007; Shalley et al., 2004; Zhou & Shalley, 2011), this meta-analytic investigation produces unique insights and suggests fruitful directions for future creativity research.

5.1. Key insights from findings and avenues for future theory and research

As motivational mechanisms, intrinsic motivation and creative self-efficacy have been theorized to be key drivers for creativity, and yet primary studies have produced mixed findings (Anderson et al., 2014), raising questions about whether intrinsic motivation and creative self-efficacy truly act as distinct motivational forces in directing and sustaining creative endeavors. In addition, in a few recent studies, prosocial motivation has been found to be asso-

Table 6
Methodological moderators of the relationships of intrinsic motivation and creative self-efficacy with creativity.

Variable names	*k*	*N*	$\bar{r}$	$\bar{\rho}$	80% CV	95% CI	%V	Fail-safe *k*	*z*
The relationship between intrinsic motivation and creativity									
Creativity rating sources									
Self-report	15	6,168	.32	.40	.10: .71	.30: .51	5.19	59	4.60**,a
Non-self-reported	53	13,562	.25	.29	.05: .53	.13: .36	11.97	102	
Intrinsic motivation measures									
Creative	35	8,864	.31	.37	.09: .64	.23: .50	9.18	73	2.54*,b
General	33	10,866	.25	.29	.04: .55	.17: .41	9.01	46	
Publication status									
Journal publications	43	13,087	.32	.38	.16: .61	.26: .50	10.87	99	4.35**,d
Non-journal publications	25	6,643	.18	.22	−.07: .50	.08: .36	9.32	19	
The relationship between creative self-efficacy and creativity									
Creativity rating sources									
Self-report	21	6,731	.50	.59	.40: .79	.50: .69	9.38	91	6.76**,a
Non-self-reported	47	13,242	.27	.31	.09: .53	.18: .43	12.52	83	
Creative self-efficacy measures									
Creative	50	13,854	.36	.42	.12: .72	.30: .54	6.55	138	3.37**,c
General	22	7,928	.29	.32	.08: .56	.22: .43	7.99	39	
Publication status									
Journal publications	45	14,486	.39	.45	.21: .70	.35: .56	7.94	136	3.81**,d
Non-journal publications	23	5,487	.23	.27	.00: .53	.13: .41	10.45	33	

Note. *k* = number of studies; *N* = combined sample size; $\bar{r}$ = mean sample size weighted observed correlations; $\bar{\rho}$ = mean sample size weighted corrected correlation; CV = credibility interval of $\bar{\rho}$; CI = confidence interval of $\bar{\rho}$; %V = % variance of $\bar{r}$ attributable to all statistical artifacts; Fail-safe *k* = number of unlocated studies with nonsignificant effect sizes that would have to exist to make $\bar{\rho}$ nonsignificant.

[a] z scores indicate the effect size difference between subgroups separated by the creativity measures.

[b] z scores indicate the effect size difference between subgroups separated by the intrinsic motivation measures.

[c] z scores indicate the effect size difference between subgroups separated by the creative self-efficacy measures.

[d] z scores indicate the effect size difference between subgroups separated by the publication statuses.

** $p < .01$.

ciated with the relationship between contextual and personal factors and creativity (e.g., Li & Bai, 2015). Therefore, we leveraged the unique advantages of meta-analysis over primary studies to simultaneously examine the main and mediating effects of these motivational mechanisms.

First, we theorized and showed that each of the three motivational mechanisms made a unique contribution to creativity after controlling for extrinsic motivation. Therefore, while any one of the three motivational mechanisms still significantly promotes one's creativity, they indeed come into play in an additive fashion, where the confluence of them determines the ultimate level of creativity. Prior research has only investigated these constructs separately using either a conceptual framework based on the componential theory of creativity (Amabile, 1983), social cognitive theory (Bandura, 2001), or prosocial motivation theory (Grant & Berg, 2011). Moreover, little research has partialed out the influence of extrinsic motivation while studying any of these motivational mechanisms. Our study clearly points to the unique role of each of the motivational constructs to creativity, above and beyond each other as well as extrinsic motivation. Building on this quantitative review, researchers can develop a more comprehensive motivational theory of creativity. For example, the componential theory of creativity may need to be refined to include the important roles of creative self-efficacy and prosocial motivation, in addition to intrinsic motivation, for creativity.

Given that our results show that all three motivational mechanisms are simultaneously related to creativity, it is possible that the three motivational mechanisms may affect creativity through distinct affective and behavioral pathways and future research could examine this possibility. For example, excitement and happiness may mediate the relationship between intrinsic motivation and creativity, while perseverance may mediate the relationship between creative self-efficacy and creativity. As for the relationship between prosocial motivation and creativity, sympathy and compassion may serve as mediators. Future research also could look at the combined effects of each of these motivational mechanisms for creativity. For example, when employees' intrinsic motivation, creative self-efficacy, and prosocial motivation are all high, they may achieve the optimal level of creativity because not only do they direct their attention and resources toward working on their jobs creatively, but they also sustain this effort and investment in creative processes. Finally, our research shows that the three motivational factors are correlated. Hence, future research could adopt event sampling methods (Hektner, Schmidt, & Csikszentmihalyi, 2007) to investigate whether the three motivational mechanisms mutually affect one another or whether there are causal relationships among them.

Second, as expected, we found that the three motivational mechanisms simultaneously mediated the relationships that different contextual and personal factors had with creativity. The results indicate that because previous studies focus on only one motivational mediator, the mixed findings regarding mediation hypotheses may be due to the failure to simultaneously include additional motivational mechanisms. Hence, future research should consider multiple motivational mechanisms and better map out different predictors onto their corresponding motivational mechanisms. To extend this research, future work also should investigate the psychological processes underlying the relationships between antecedents and the three motivational constructs. For example, in line with self-determination theory, autonomy need satisfaction (i.e., the degree to which one's need for autonomy is satisfied) may mediate the associations of job autonomy and openness to experience with intrinsic motivation (Gagné & Deci, 2005). Mastery experience may translate job complexity and conscientiousness onto creative self-efficacy according to social cognitive theory and research (Bandura, 2001; Tierney & Farmer, 2002). The relationship between supportive leadership and prosocial motivation may be underpinned by the role-modeling process, as suggested by social learning theory and prosocial motivation theory (Bandura, 1986; Grant & Berg, 2011). Therefore, future studies

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examining these mechanisms could help further unveil the distinct nature of the three motivational factors. Furthermore, the componential theory of creativity could be refined to more clearly specify how different contextual factors in the work environment relate to the different motivational mechanisms.

Third, given that cross-cultural creativity investigations are still relatively scarce and that disparities in national cultures may change the effects of creativity predictors (Anderson et al., 2014), research that examines the moderating influence of national culture is a meaningful extension of the creativity literature. Integrating insights derived from the individualism-collectivism literature and creativity research, we demonstrated that in countries with tight national cultures, the relationship between intrinsic motivation and creativity increased as individuals were higher on individualism, while in loose cultures this relationship decreased. This finding is interesting because it suggests that cultural looseness is more likely to constrain the functioning of intrinsic motivation in more individualistic cultures. This may be because in a loose individualistic culture, people are more likely to be negatively impacted by unclear cultural norms and to feel that their intrinsic motivation is incongruent with the external environment. Similarly, for creative self-efficacy, the relationship with creativity was more positive in individualistic countries with a tight rather than loose national culture.

The above findings are interesting since they may help explain some of the inconsistent results in past research regarding the role of intrinsic motivation and creative self-efficacy. It could be that some of the samples studied were associated with national cultures that were less conducive for the functioning of intrinsic motivation and creative self-efficacy. For example, using a Korean sample characterized by a tight collectivistic culture, Shin and Zhou (2003) only found a partial mediation effect of intrinsic motivation on the relationship between transformational leadership and creativity. As a quantitative review of existing primary studies, our meta-analysis has the advantage of considering the idiosyncratic nature of each primary study and providing a more complete picture of the relationship between motivation and creativity in different cultures. Given the global nature of organizations today, it is critical for future research to directly theorize and test the contingent role of cultural factors in the associations between predictors at different organizational levels and creativity.

Fourth, regarding the methodological characteristics examined, rating sources of creativity, intrinsic motivation and self-efficacy measures, and publication status all significantly moderated the relationships of intrinsic motivation and creative self-efficacy with creativity. These findings showed that intrinsic motivation and creative self-efficacy had stronger relationships with creativity when creativity was measured via self-report than measured by other-reports. This indicates that those who were interested in jobs and believed in their capabilities of being creative tended to rate their own creativity more highly. Accordingly, future research involving the relationships of intrinsic motivation and creative self-efficacy with creativity should use other-reported creativity instead of self-reports in order to reduce the potential common method bias. In addition, intrinsic motivation and creative self-efficacy were more positively related to creativity when the two motivational mechanisms were measured using creativity-specific measures. This was consistent with previous research emphasizing the distinction between general and creative intrinsic motivation and self-efficacy (e.g., Tierney & Farmer, 2002). Moreover, there was a significant moderating effect for publication status, in that there was a more positive relationship between intrinsic motivation or creative self-efficacy with creativity for published rather than non-published work. This supports the common understanding that journals tend to publish papers that have found statistically significant or stronger results.

Finally, in terms of research design, this meta-analysis also makes a valuable contribution to the creativity literature for two primary reasons. First, this creativity meta-analysis collected a much larger number of independent samples ($k = 191$) than prior creativity meta-analyses ($k = 26$ (see de Jesus et al., 2013) to 111 (see Ma, 2009)) and had a broader scope. We made a strong effort at identifying primary studies published in English as well as non-English journals and were able to include published studies in Chinese, English, and Korean journals, which helps to increase the generalizability of the results. Most of the prior meta-analytic reviews of creativity have focused specifically on the main effects of the antecedents of interest on creativity (e.g., Feist, 1998; Hunter et al., 2007). Only one past meta-analysis centered on the role of motivation on creativity; however it only identified intrinsic motivation which had a positive relationship with creativity ($r = .30$) and it was only moderated by the type of research design (de Jesus et al., 2013). Yet, we not only looked at main effects of the three motivational mechanisms on creativity but also their mediation roles in the relationships between antecedents and creativity. Second, beyond methodological moderators, our study represents the first creativity meta-analysis that takes a cross-cultural approach to uncovering the national culture moderators for the link between antecedents and creativity. Prior meta-analytic work has been related to methodological moderators such as sample features (de Jesus et al., 2013) and types of creativity measures (Ng & Feldman, 2012). Given the increased trend of globalization, studying national culture moderators is a meaningful addition to the creativity literature.

5.2. Limitations

Similar to other studies, this meta-analysis has limitations that should be discussed, especially because they may lead to additional research opportunities. First, when examining the unique effects of the three motivational constructs and the mediation model, we combined similar variables into broader constructs due to the content overlap among those variables. This approach is not uncommon in meta-analytic reviews (e.g., Harrison, Newman, & Roth, 2006; Newman, Joseph, & Hulin, 2010) and can help us to understand the overall relationships between creativity and those broader constructs. However, it may be advisable for researchers to separate those variables if they are interested in specific relationships between certain variables and creativity and they have a large enough sample size.

Second, we did not test the moderation effects for the relationship between prosocial motivation and creativity in our exploratory research questions because statistical artifacts (e.g., measurement errors) accounted for all of the variance in the relationship between prosocial motivation and creativity, indicating no need to statistically examine potential moderators of this relationship (Hunter & Schmidt, 2004). This may be because there have only been a small number of studies on prosocial motivation and creativity. Therefore, as scholars conduct more field studies, future meta-analyses can reexamine whether culture and other moderators may alter the link between prosocial motivation and creativity.

Third, the present meta-analysis focused on motivational mechanisms and did not look at non-motivational mediation mechanisms which future research could examine. Specifically, Amabile's (1983, 1988) componential theory of creativity emphasizes that three psychological mechanisms – intrinsic motivation, domain-relevant expertise, and creative thinking skills – underlie individual creativity. Yet, our review of creativity studies shows that little research has examined the mediating roles of the non-motivational mechanisms, domain-relevant expertise and creative thinking skills (see Liu, Gong, Zhou, & Huang, in press for an excep-

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tion), and no research that we are aware of has examined the mediating effects of these three mechanisms simultaneously. Hence, researchers also may pay increased attention to non-motivational mediating mechanisms, including cognitive, affective, and behavioral ones. Examining non-motivational mediators also may facilitate identifying unusual antecedents of creativity that operate via certain non-motivational mediators. For example, Lin, Law, and Zhou (in press) identified under-employment as an unusual antecedent that affects creativity via task crafting. It also would be a valuable extension of the creativity literature to examine the three-way interactive effect of domain relevant expertise, creativity relevant skills, and intrinsic motivation on creativity. Researchers also may investigate whether, when, and how other motivational variables such as approach and avoidance motivation (Elliot, 2006) and promotion and prevention focus (Higgins, 1998) might impact creativity. The above research directions can help to further advance our understanding of the distinctive role of different types of mechanisms in facilitating or constraining creativity.

Fourth, drawing on the individualism-collectivism literature, this research explored the moderation effect of individualism on the relationships between intrinsic motivation/creative self-efficacy and creativity. Other theoretical perspectives may prompt researchers to identify additional important moderators relevant for influencing the motivational mechanisms-to-creativity paths. For example, the importance of each of the motivational mechanisms could be lessened if individuals are higher on learning goal orientation (Dweck & Leggett, 1988).

Finally, our findings are contingent on boundary conditions. One boundary condition is that we only focused on individual creativity. Employees are working in teams at an increasing rate, and team creativity research has gained more attention (e.g., Perry-Smith & Shalley, 2014; Shin & Zhou, 2007). As more studies are conducted on team creativity, it will be worthwhile to meta-analyze team creativity, while identifying the mediating and moderating processes. Researchers also can conduct organization-level analyses. For instance, it would be interesting to investigate whether employees' collective prosocial motivation might promote social entrepreneurship and corporate social responsibility initiatives via employees' aggregated creativity. A second boundary condition is that most of the studies included were either cross-sectional surveys or experimental studies examining short-term effects. Due to the lack of longitudinal studies (cf., Tierney & Farmer, 2011), how motivational variables impact creativity over an extended period of time is not clear and should be studied in the future. Another boundary condition is that we did not look into different operationalizations of creativity. Future research could take a more nuanced view of creativity to examine whether the three motivational factors may have distinct relationships with different measures of creativity (e.g., assessing creativity using fluency or flexibility (Jung, 2001)) as well as different types of creativity (e.g., responsive, expected, contributory, and proactive (Unsworth, 2001)).

5.3. Practical implications

Increasingly, organizations are calling for their employees to be creative at work. Yet, considering the constraint of organizational resources, researchers and managers are eager to know which mechanisms are most useful for boosting employee creativity. The results of this meta-analysis can help to inform scholars and practitioners as to the non-redundant contributions of intrinsic motivation, creative self-efficacy, and prosocial motivation to creativity. We encourage organizations to draw on the insights from self-determination theory (Deci & Ryan, 2012), social cognitive theory (Bandura, 2001), and prosocial motivation theory (Grant & Berg, 2011) to design intervention practices to fuel each of these three motivational factors. Specifically, our research shows that increasing job autonomy and selecting employees open to experience are especially effective in promoting intrinsic motivation, while having complex jobs and selecting conscientious employees are relatively more functional in enhancing creative self-efficacy, and fostering managers' supportive leadership can strongly facilitate prosocial motivation. To gauge the extent to which the above contextual and personal factors are conducive to creativity, managers can keep track of the changes in employees' motivation for all three mechanisms.

Globalization compels organizations to compete and survive in different national cultures (Hofstede et al., 2010). Our findings clearly highlight the role of cultural differences in the relationships between intrinsic motivation/creative self-efficacy and creativity. To select the most effective way to enhance employee creativity in a given culture, managers can reference a country's individualism score at Hofstede's cultural profile website and a country's cultural tightness score (Gelfand et al., 2011). For tight collectivist countries or loose individualistic countries, attempting to boost employees' intrinsic motivation and creative self-efficacy may not be the best choice, so managers may want to focus on other management practices to stimulate employee creativity. For example, in a tight collectivistic country, in order to effectively boost employee creativity, managers may want to concentrate on improving employees' domain-relevant expertise and creative thinking skills rather than their intrinsic motivation and creative self-efficacy according to Amabile's (1983, 1988, 1996) componential theory of creativity. In contrast, in a tight individualistic culture, organizations should be encouraged to dedicate more resources to cultivating employees' intrinsic motivation and creative self-efficacy.

5.4. Conclusions

In summary, the results of this meta-analysis help to highlight the functioning of the three most widely studied motivational mechanisms in the relationships between contextual and personal factors and creativity. In particular, our results show that intrinsic motivation, creative self-efficacy, and prosocial motivation each serve as motivational mechanisms that can provide employees with unique motivational stimuli for them to be creative at work. They also have differential roles in linking contextual and personal antecedents to creativity. National culture can play an important role, such that, in countries with tight individualistic cultures, intrinsic motivation and creative self-efficacy more positively affect creativity. These findings highlight the need to take a more refined view of the multiple underlying motivational mechanisms for creativity and to consider the cultural landscape of the organizational workforce.

Acknowledgements

We thank action editor Steven Farmer and four anonymous reviewers for their valuable comments and suggestions throughout the review process. We are also grateful to Xinwen Bai, Amy Breidenthal, Melody Chao, Gilad Chen, María Luisa Sanz de Acedo Lizarraga, Larry Jiing-Lih Farh, Adam Grant, Chaoyun Liang, Jian Liang, Joseph Liu, Muhammad Abdur Rahman Malik, Jiwen Song, and Junfeng Wu for their help and support. This research is partially supported by grants from the National Natural Science Foundation of China (Project Numbers: 71421061, 71121001, and 71672156).

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Appendix A. Summary of studies providing information for meta-analytic path analysis

Sample	CR measure	*N*	CR[b]	IM[c]	CSE[c]	PM[c]	JA[c]	OP[c]	JC[c]	CO[c]	SL[c]	EM[c]
Acar and Van den Ende (2013)	Self	636	–	−.03/–								.10/–
Afsar, Badir, and Bin Saeed (2014)	Non-self	639	.73				.52/.78				.48/.83	
Akinlade (2014)	Non-self	139	.89		.00/.73				.15/.95		.26/.92	
Anderson (2006)	Non-self	124	–	.23[a]/.83			.00/.77					
Arendt (2006)	Non-self	491	.96		.32[a]/.93							
Baer (2010)	Non-self	238	.93					.24/.85				
Baer and Oldham (2006)	Non-self	170	.98					.00/.72	.17/.98			
Baer et al. (2003)	Non-self	171	.90						.22/.82			.08/.77
Baran (2011)	Non-self	80	.92								.34/.95	
Bledow, Rosing, and Frese (2013)	Self	102	.84					.26/–		.16/–		
Brown and Baer (2015)	Non-self	230	.97	.18/.86								
Carmeli et al. (2007)	Non-self	175	.95						.27/.75			
Cassidy (2011)	Non-self	386	.90	.08/.82								
Cavazotte, Moreno, and Vilas Boas (2012)	Non-self	106	.87								.28/.87	
Chae, Choi, and Park (2012)	Non-self	250	.95						.29/.80		.17/.93	
Chae, Lee, and Kim (2011)	Self	264	.89		.60/.83							
Chamorro-Premuzic (2006)	Non-self	307	.79					.46/–		.05/–		
Chan and Hempel (2012)	Non-self	224	.84									.20/.93
Chang, Jia, Takeuchi, and Cai (2014)	Non-self	1059	.90					.04/.81				
Chao and Farh (2012)	Non-self	188	–	.17/.83	.19/.76							−.01/.82
Chen, Farh, Campbell-Bush, Wu, and Wu (2013)	Non-self	428	.96	.19/.83	.26/.90							
Chen and Liang (2015)	Non-self	223	.88		.21/.81				.21/.79		.29/.96	
Cheung (2011)	Non-self	252	.94					.16[a]/.69	.25[a]/.92			
Cho, Kim, and Byun (2010)	Self	247	.70				.52/.77					
Cohen-Meitar et al. (2009)	Non-self	141	.95				.22/.71		.14/.87			
Collins (2008)	Non-self	133	.89	.10/.73			−.05/.87	.11/.66		.08/.75	−.03/.81	
de Acedo Lizarraga, de Acedo Baquedano, and Closas (2014)	Non-self	180	.71	.16/.75	.40/.75							
Dewett (2002)	Non-self	540	.96	.16/.72	.13/.85		.21/.85	.19/.69			.19/.86	.07/.82
Dewett (2007)	Non-self	165	.96	.23[a]/.84	.21[a]/.80		.32[a]/.87	.22[a]/.66				
Eder (2007)	Non-self	269	.98	.07/.79	.04/.74		.09/.71	.09/.78		.06/.72	.13/.78	.03/.85
Eisenberger and Aselage (2009) sample 1	Non-self	180	.94	.17/.85			.22/.72					
Eisenberger and Aselage (2009) sample 2	Non-self	405	.64	.09/.91			−.01/.69					.10/–
Ellefson (2010)	Self	148	.93		.53/.90							
Friedman (2009)	Non-self	81	.84									.09/1.00
George and Zhou (2001)	Non-self	149	.96				.26/.74	.02/.69	.21/.74	−.03/.81	.26/.69	
George and Zhou (2002)	Non-self	67	.98									.15/.77
George and Zhou (2007)	Non-self	161	.94								.16/.85	
Gilmore (2013)	Non-self	209	–	.03[a]/.91	−.01[a]/.81							.11[a]/.80
Giuca (2012)	Non-self	223	.93		−.06/.95							
Gong, Cheung, Wang, and Huang (2012)	Non-self	190	.96					−.08/–			.23/.95	
Gong et al. (2009)	Non-self	277	.93		.24/.91						.18/.98	
Gong, Kim, Lee, and Zhu (2013)	Non-self	485	.97								−.11/.89	

(*continued on next page*)

Appendix A (*continued*)

Sample	CR measure	*N*	CR[b]	IM[c]	CSE[c]	PM[c]	JA[c]	OP[c]	JC[c]	CO[c]	SL[c]	EM[c]
Graham (2011) sample 1	Non-self	88	.73		.06/.86			.27/.77		−.26/.84		
Graham (2011) sample 2	Non-self	102	.72		−.04/.80			.05/.63		.06/.82		
Grant and Berry (2011) sample 1	Non-self	90	.97	.32/.94		.28/.91	.07/.97	.07/.77		.06/.75		
Grant and Berry (2011) sample 2	Non-self	111	.97	.21/.91		.10/.90	.19/.87	.13/.78	.15/.91	.17/.79		−.06/.92
Gu, Zhou, and Peng (2014)	Self	248	.85		.68/.94						.45/.90	
Haq et al. (2010)	Self	143	.81								.55/.78	
Harris, Li, Boswell, Zhang, and Xie (2014) sample 1	Non-self	151	.98								.20/.92	
Harris et al. (2014) sample 2	Non-self	117	.97								.49/.85	
Hirst, van Dick, and van Knippenberg (2009)	Non-self	115	.94								.11/.86	
Hirst, Zhu, and Zhou (2012)	Non-self	317	.91		.27/.86							
Hon (2012)	Non-self	250	.94	.40/.79							.25/.88	
Hon and Lu (2015)	Non-self	298	.85									−.28/.80
Hon (2011)	Non-self	286	.94								.33/.90	
Hong and Wang (2011)	Self	179	.82		.56/.77				.38/.74		.39/.86	
Hsu, Hou, and Fan (2011)	Self	120	.91		.42/.80			.45/.89		.37/.71		
Huang, Krasikova, and Liu (2016)	Non-self	544	.95		.29/.65						.44/.90	
Hughes (2005) sample 1	Non-self	150	.92	.10/.84								
Hughes (2005) sample 2	Non-self	71	.92	.33/.84								
Huh and Cheon (2013)	Self	238	.71		.56/.74							
Janssen and Giebels (2012)	Non-self	113	.91								.21/.92	
Jaskyte (2008) sample 1	Self	122	.72	.48/.54							.28/.91	−.05/.52
Jaskyte (2008) sample 2	Self	79	.79	.10/.52							.08/.94	.17/.65
Jaussi and Dionne (2003)	Non-self	322	.81	.15/.79							−.03/.95	
Jaussi, Randel, and Dionne (2007)	Non-self	179	.92		.15/.62			.07/.65				
Jiang and Yang (2014)	Non-self	211	.95		.35/.91						.38/.86	
Jimeno-Ingrum (2007)	Non-self	274	.89				.05/.83	−.01/.77				
Joo (2007)	Non-self	167	.96						.25/–		.32/.87	
Khazanchi and Masterson (2011)	Non-self	205	.80								.14/.94	
Kim and Lee (2011)	Self	559	.82	.24/.74							.13[a]/.71	
Kim and Lee (2012)	Non-self	178	.98							.05/.82		
King and Gurland (2007)	Non-self	90	.84				.11/.64					
Lee and Kim (2008)	Non-self	171	.97				.22/.73					
Leung, Chen, and Chen (2014)	Non-self	189	.97	.40/.71							.00/.88	
Li (2013)	Non-self	303	.76	.23/.70			.25/.77				.33/.92	
Li and Bai (2015)	Non-self	80	1.00			.23/1.00						
Li, Feng, and Huang (2011)	Self	419	.91	.72/.79	.56/.90						.29/.87	
Li, Luo, and Huang (2013)	Non-self	214	.82		.50/.84							
Li, Zhang, Li, and Liu (2015)	Self	295	.93	.20/.82							.24/.87	
Li, Deng, and Zhao (2013)	Non-self	202	.91	.15/.82								−.08/.77
Liang, Hsu, and Chang (2013)	Self	943	.85	.31/.83	.25/.89							
Liao et al. (2010)	Non-self	828	–		.32/.90						.25/.89	
Lin, Kark, and Mainemelis (2013)	Non-self	226	.95								.14/.84	
Liu et al. (2011) sample 1	Non-self	933	.90				.44/.86					
Liu et al. (2011) sample 2	Non-self	525	.91	.16/.88			.23/.84					−.09/.89

Appendix A (*continued*)

Sample	CR measure	*N*	CR[b]	IM[c]	CSE[c]	PM[c]	JA[c]	OP[c]	JC[c]	CO[c]	SL[c]	EM[c]
Liu, Liao, and Loi (2012)	Non-self	762	.89								.12/.93	
London (2006)	Non-self	160	.86		.27[a]/.71							
Lopez (2003)	Self	111	.90		.56/.72						.12/.80	
Luo, Du, and Huang (2013)	Self	169	.84		.53/.74							
Madjar (2002)	Non-self	354	.97					.18/.63			.32/.74	
Mainemelis (2001)	Self	113	.87	.22/.62			.19/.79		.25/.77			
Malik, Butt, and Choi (2013)	Non-self	181	.76		.28/.75							.01/.84
McLean (2011)	Non-self	492	–								.08[a]/.74	
McMahon and Ford (2013)	Non-self	289	.95	.19/.93							.13/.87	
Miron-Spektor and Beenen (2012)	Non-self	304	.85								.37/.82	
Miron, Erez, and Naveh (2004)	Self	349	–							.31/.74		
Moneta, Amabile, Schatzel, and Kramer (2010)	Non-self	201	.61					.17/.74		.15/.84		
Montag (2012)	Non-self	125	.87	.14[a]/.86								
Moye (2001)	Non-self	123	–	.18[a]/.92			−.07[a]/.81				−.12[a]/.90	−.08[a]/.85
Mueller, Golcalo, and Kamdar (2011)	Non-self	346	.91	.33/.87								
Mueller and Kamdar (2011)	Non-self	291	.91	.35/.87								
Mueller, Melwani, and Goncalo (2012)	Non-self	140	.78					.20/–				
Ng and Feldman (2009)	Non-self	162	.93						−.08/–			
Noefer et al. (2009)	Self	81	.93						.26/.53			
Ohly, Sonnentag, and Pluntke (2006)	Non-self	278	.92						.31/.65		.12/.91	
Oldham and Cummings (1996)	Self	171	–				.28/–		.24/.68		.14/–	
Pan, Lou, and Zhou (2013)	Non-self	96	.91	.48/.86								
Parke and Seo (2013)	Non-self	129	.96					−.08/.79	.03/.62	−.10/.77	.09/.80	
Parker and Collins (2010)	Self	622	.76		.33/.74					.03/.80		
Pei, Li, and Gao (2013)	Non-self	254	.80	.28/.86							.23/.91	
Perry-Smith (2006)	Non-self	97	.91	.20/.71								
Polman and Emich (2011) sample 1	Non-self	262	.91			.22/1.00						
Polman and Emich (2011) sample 2	Non-self	136	1.00			.18/1.00						
Prabhu, Sutton, and Sauser (2008)	Self	124	.68	.39/.71	.30/.83			.35/.77				−.20/.65
Qu, Shi, and Gao (2012)	Non-self	206	.96		.40/.89						.28/.90	
Raja and Johns (2010)	Non-self	383	.88					.20/.72		.08/.72		
Rego, Sousa, Marques, and Cunha (2012)	Non-self	201	.90								.65/.91	
Rego, Sousa, Marques, and Cunha (2014)	Non-self	501	.97		.65/.90							
Richter, Hirst, van Knippenberg, and Baer (2012)	Non-self	176	.92		.09/.74							
Ruan (2011)	Self	247	.78				.06/.64		.49/.70		.42[a]/–	
Schoen (2012)	Non-self	193	.81	.10/.86	.13/.84							
Scott and Bruce (1994)	Non-self	172	.89								.17/.90	
Shalley et al. (2009)	Self	1430	.78	.30/.70					.20/1.00			
Shalley and Perry-Smith (2001)	Non-self	81	–	.16/–								
Sheldon (1995) sample 1	Non-self	132	–				.12/.74					
Sheldon (1995) sample 2	Self	113	–				.45/.74					
Shin, Kim, Lee, and Bian (2012)	Non-self	316	.91		.16/.86			.21/.76				
Shin and Zhou (2003)	Non-self	290	.95	.19/.84							.22/.93	
Shipman (2011)	Non-self	243	.81	.16/.89	.03/.83							

(*continued on next page*)

Appendix A (*continued*)

Sample	CR measure	*N*	CR[b]	IM[c]	CSE[c]	PM[c]	JA[c]	OP[c]	JC[c]	CO[c]	SL[c]	EM[c]
Si and Wei (2012)	Non-self	465	.94				.39/.95				.41/.82	
Simmons (2006)	Non-self	225	.83	.09/.79	.08/.87			.18/.68				
Simmons, Payne, and Pariyothorn (2014) sample 1	Non-self	124	.93		.06/.66							
Simmons et al. (2014) sample 2	Non-self	128	.75		.57/.89							
Solomon (2010)	Self	20	–				.47/–				.41/–	.28/–
Song, Gu, and Yu (2014)	Self	254	.90		.53/.88							
Spreitzer, De Janasz, and Quinn (1999)	Self	393	.88				.19/.82					
Sun, Zhang, Qi, and Chen (2012)	Non-self	385	.79				.52/.87				.17/.95	
Sung and Choi (2009)	Self	304	.81	.09/.61				.26/.75		.03/.75		.11/.61
Taggar (2002)	Non-self	480	.82	.41/.71				.17/.72		.19/.82		
Tamannaeifar and Motaghedifard (2014)	Self	355	.66		.34/.81							
Tierney and Farmer (2002) sample 1	Non-self	584	.96		.18[a]/.83				.31/1.00		.05/.93	
Tierney and Farmer (2002) sample 2	Non-self	158	.95		.14[a]/.87				.12/1.00		–.10/.94	
Tierney and Farmer (2004)	Non-self	140	.96		.29/.76				.31/1.00		.17/.85	
Tierney and Farmer (2011)	Non-self	145	.93		.29/.81				.13/1.00			
Tierney et al. (1999)	Non-self	191	.95	.28/.74							.30/.91	
To, Fisher, Ashkanasy, and Rowe (2012)	Self	30	.95								.04/.85	
Tsai, Horng, Liu, and Hu (2015)	Self	320	.94	.51/.86								
Van Dyne, Jehn, and Cummings (2002)	Non-self	195	.88								.37/.90	
Venkataramani, Richter, and Clarke (2014)	Non-self	214	.80	.29/.88				.21/.76			.04/.91	
Volmer et al. (2012)	Self	144	.89				.33/.76				.17/.86	
Wang (2009)	Non-self	259	.77		.47/.72			–.02/.80	–.01/.74			
Wang and Peng (2013)	Self	323	.73		.60/.85							
Wang and Cheng (2010)	Non-self	167	.97				.31/.86				.33/.86	
Wang and Hong (2010)	Self	181	.82	.58/.81							.41/.86	
Wang and Li (2013)	Non-self	586	.92	.71/.76								
Wang, Rode, Shi, and Luo (2012)	Non-self	181	.92								.27/.94	
Wang et al. (2014)	Non-self	395	.82		.30/.74						.19/.79	
Wang, Xue, and Su (2010)	Self	233	.88	.73/.91							.40/.92	
Wang and Zhao (2011)	Self	236	.88		.68/.90		.40/.71		.37/.74			
Watt (2007)	Self	559	.94		.57[a]/.92		.43[a]/.77				.36[a]/.96	
Wigert (2013)	Non-self	310	.92	.06/.46	.09/.86							
Williams (1999)	Non-self	208	.89				.17/.66	.23/.83				
Wu et al. (2014)	Non-self	179	.93				.40/.89	.23/.68				
Xie, Wang, and Chu (2014)	Non-self	353	.93	.22/.72							.23/.80	
Yang and Zhang (2012)	Self	334	.83		.53/.73							
Yao, Yan, and Du (2014)	Self	376	–		.65/–						.34/–	
Ying (2008) sample 1	Non-self	534	.94	.26/.83								–.15/.86
Ying (2008) sample 2	Non-self	265	.88	.40/.75								–.09/.81
Yong and Schulte (2013)	Self	182	.93					.67/.86		.24/.86		
Yoshida, Sendjaya, Hirst, and Cooper (2014)	Non-self	369	.74								–.04/.89	
Yu, Gu, and Zhu (2014)	Non-self	874	.84		.39/.91							
Yuan and Woodman (2010)	Non-self	216	.93	.30/.85							.22/.90	
Yunlu (2013)	Non-self	22	.95	.08/.88	.16/.91							

Appendix A (*continued*)

Sample	CR measure	*N*	CR[b]	IM[c]	CSE[c]	PM[c]	JA[c]	OP[c]	JC[c]	CO[c]	SL[c]	EM[c]
Zhang and Bartol (2010)	Non-self	367	.91	.66/.82				.64/.86				
Zhang, Fan, and Yu (2014)	Self	334	.85		.59/.84							
Zhang, Kwan, Zhang, and Wu (2012)	Non-self	235	.92	.40/.86	.17/.88				.19/.68		.19/.94	
Zhang and Li (2011)	Non-self	300	.94		.30/.87						.13/.92	
Zhang and Long (2013)	Non-self	296	.80		.28/.80				.13/.72			.03/1.00
Zhang, Long, and He (2014)	Non-self	364	.87	.25/.89								.09/.74
Zhang, Long, Wu, and Huang (2015) sample 1	Non-self	222	.92	.26/.84					.13/.80			.03/.83
Zhang et al. (2015) sample 2	Non-self	216	.95	.27/.94					.13/.75			.02/.79
Zhang, Lu, and Jiang (2012)	Self	375	.87	.46/.83	.66/.88							
Zhang and Zhou (2014) sample 1	Non-self	322	.94		.61/.79						.45/.87	.17/1.00
Zhang and Zhou (2014) sample 2	Non-self	199	.96		.39/.94						.34/.88	
Zhou (2003) sample 1	Non-self	25	.97								.45/.87	
Zhou (2003) sample 2	Non-self	123	.98								.05/.81	
Zhou (2012)	Non-self	347	.84						.39/.80		.46[a]/.92	
Zhou and Long (2011)	Non-self	286	.85	.58/.81	.34/.79				.20/.85			
Zhu and Peng (2012)	Non-self	398	.91	.44/.88	.29/.92						.17/.89	

Note. *N* = sample size; CR = creativity, IM = intrinsic motivation, CSE = creative self-efficacy, PM = prosocial motivation, JA = job autonomy, OP = openness to experience, JC = job complexity, CO = conscientiousness, SL = supportive leadership, and EM = extrinsic motivation. – = reliability information was not provided in the primary studies.

[a] Multiple correlations about the same relationship were combined using the formula provided by Hunter and Schmidt (2004, pp. 435–439).

[b] This column lists reliabilities of creativity measures.

[c] The first number is the uncorrected correlation reported in the primary study and the second number is the reliability of the variable.

Appendix B. Summary of studies providing information for the relationship between intrinsic motivation and creativity

Study	N	α of creativity	α of intrinsic motivation	*r*	Country	Individualism[b]	Tightness[c]	Creativity measure[d]	Intrinsic motivation measure[e]	Publication status[f]
Acar and Van den Ende (2013)	636	–	–	−.03	Netherlands	38	3.3	Self	General	Others
Anderson (2006)	124	–	.83	.23	Canada	39	5.1	Non-self	Creative	Others
Brown and Baer (2015)	230	.97	.86	.18	Singapore	74	10.4	Non-self	General	Journal
Cassidy (2011)	386	.90	.82	.08	US	40	5.1	Non-self	Creative	Others
Chao and Farh (2012)	188	–	.83	.17	China	80	7.9	Non-self	General	Others
Chen et al. (2013)	428	.96	.83	.19	China	80	7.9	Non-self	Creative	Journal
Collins (2008)	133	.89	.73	.10	US	40	5.1	Non-self	General	Others
de Acedo Lizarraga et al. (2014)	180	.71	.75	.16	–	–	–	Non-self	General	Journal
Dewett (2007)	165	.96	.84	.23[a]	US	40	5.1	Non-self	General	Journal
Dewett (2002)	540	.96	.72	.16	US	40	5.1	Non-self	General	Others
Eder (2007)	269	.98	.79	.07	US	40	5.1	Non-self	General	Others
Eisenberger and Aselage (2009) sample 1	180	.94	.85	.17	US	40	5.1	Non-self	General	Journal
Eisenberger and Aselage (2009) sample 2	405	.64	.91	.09	US	40	5.1	Non-self	General	Journal

(*continued on next page*)

Appendix B (*continued*)

Study	N	α of creativity	α of intrinsic motivation	*r*	Country	Individualism[b]	Tightness[c]	Creativity measure[d]	Intrinsic motivation measure[e]	Publication status[f]
Gilmore (2013)	209	–	.91	.03[a]	US	40	5.1	Non-self	General	Others
Grant and Berry (2011) sample 1	90	.97	.94	.32	US	40	5.1	Non-self	General	Journal
Grant and Berry (2011) sample 2	111	.97	.91	.21	US	40	5.1	Non-self	General	Journal
Hon (2012)	250	.94	.79	.40	China	80	7.9	Non-self	General	Journal
Hughes (2005) sample 1	150	.92	.84	.10	US	40	5.1	Non-self	Creative	Others
Hughes (2005) sample 2	71	.92	.84	.33	US	40	5.1	Non-self	Creative	Others
Jaskyte (2008) sample 1	122	.72	.54	.48	Lithuania	42	–	Self	Creative	Journal
Jaskyte (2008) sample 2	79	.79	.52	.10	US	40	5.1	Self	Creative	Journal
Jaussi and Dionne (2003)	322	.81	.79	.15	US	40	5.1	Non-self	Creative	Journal
Kim and Lee (2011)	559	.82	.74	.24	South Korea	60	10.0	Self	Creative	Journal
Leung et al. (2014)	189	.97	.71	.40	China	80	7.9	Non-self	Creative	Journal
Li (2013)	303	.76	.70	.23	China	80	7.9	Non-self	Creative	Others
Li et al. (2011)	419	.91	.79	.72	China	80	7.9	Self	Creative	Journal
Li et al. (2015)	295	.93	.82	.20	China	80	7.9	Self	Creative	Others
Li, Deng, et al. (2013)	202	.91	.82	.15	China	80	7.9	Non-self	Creative	Others
Liang et al. (2013)	943	.85	.83	.31	Taiwan	58	7.9	Self	Creative	Journal
Liu et al. (2011) sample 2	525	.91	.88	.16	China	80	7.9	Non-self	General	Journal
Mainemelis (2001)	113	.87	.62	.22	US	40	5.1	Self	General	Others
McMahon and Ford (2013)	289	.95	.93	.19	US	40	5.1	Non-self	General	Journal
Montag (2012)	125	.87	.86	.14[a]	US	40	5.1	Non-self	Creative	Others
Moye (2001)	123	–	.92	.18[a]	US	40	5.1	Non-self	Creative	Others
Mueller et al. (2011)	346	.91	.87	.33	India	77	11.0	Non-self	General	Journal
Mueller and Kamdar (2011)	291	.91	.87	.35	India	77	11.0	Non-self	General	Journal
Pan et al. (2013)	96	.91	.86	.48	China	80	7.9	Non-self	Creative	Journal
Pei et al. (2013)	254	.80	.86	.28	China	80	7.9	Non-self	General	Journal
Perry-Smith (2006)	97	.91	.71	.20	US	40	5.1	Non-self	Creative	Journal
Prabhu et al. (2008)	124	.68	.71	.39	US	40	5.1	Self	Creative	Journal
Schoen (2012)	193	.81	.86	.10	US	40	5.1	Non-self	Creative	Others
Shalley et al. (2009)	1,430	.78	.70	.30	US	40	5.1	Self	General	Journal
Shalley and Perry-Smith (2001)	81	–	–	.16	US	40	5.1	Non-self	General	Journal
Shin and Zhou (2003)	290	.95	.84	.19	Korea	60	10.0	Non-self	Creative	Journal
Shipman (2011)	243	.81	.89	.16	US	40	5.1	Non-self	Creative	Others
Simmons (2006)	225	.83	.79	.09	US	40	5.1	Non-self	Creative	Others
Sung and Choi (2009)	304	.81	.61	.09	US	40	5.1	Self	General	Journal
Taggar (2002)	480	.82	.71	.41	Canada	39	5.1	Non-self	General	Journal
Tierney et al. (1999)	191	.95	.74	.28	US	40	5.1	Non-self	Creative	Journal
Tsai et al. (2015)	320	.94	.86	.51	Taiwan	58	7.9	Self	Creative	Journal
Venkataramani et al. (2014)	214	.80	.88	.29	Spain	57	5.4	Non-self	Creative	Journal
Wang and Hong (2010)	181	.82	.81	.58	China	80	7.9	Self	Creative	Journal
Wang and Li (2013)	586	.92	.76	.71	Taiwan	58	7.9	Non-self	General	Others
Wang et al. (2010)	233	.88	.91	.73	China	80	7.9	Self	Creative	Journal

Please cite this article in press as: Liu, D., et al. Motivational mechanisms of employee creativity: A meta-analytic examination and theoretical extension of the creativity literature. *Organizational Behavior and Human Decision Processes* (2016), http://dx.doi.org/10.1016/j.obhdp.2016.08.001

Appendix B (*continued*)

Study	N	α of creativity	α of intrinsic motivation	*r*	Country	Individualism[b]	Tightness[c]	Creativity measure[d]	Intrinsic motivation measure[e]	Publication status[f]
Wigert (2013)	310	.92	.46	.06	US	40	5.1	Non-self	Creative	Others
Xie et al. (2014)	353	.93	.72	.22	China	80	7.9	Non-self	General	Journal
Ying (2008) sample 1	534	.94	.83	.26	China	80	7.9	Non-self	General	Others
Ying (2008) sample 2	265	.88	.75	.40	China	80	7.9	Non-self	General	Others
Yuan and Woodman (2010)	216	.93	.85	.30	US	40	5.1	Non-self	Creative	Journal
Yunlu (2013)	22	.95	.88	.08	US	40	5.1	Non-self	General	Others
Zhang and Bartol (2010)	367	.91	.82	.66	China	80	7.9	Non-self	Creative	Journal
Zhang, Kwan, et al. (2012)	235	.92	.86	.40	China	80	7.9	Non-self	General	Journal
Zhou and Long (2011)	286	.85	.81	.58	China	80	7.9	Non-self	Creative	Journal
Zhang, Long, et al. (2014)	364	.87	.89	.25	China	80	7.9	Non-self	General	Journal
Zhang et al. (2015)	216	.95	.94	.27	Taiwan	58	7.9	Non-self	Creative	Journal
Zhang et al. (2015)	222	.92	.84	.26	China	80	7.9	Non-self	Creative	Journal
Zhang, Lu, et al. (2012)	375	.87	.83	.46	China	80	7.9	Self	General	Journal
Zhu and Peng (2012)	398	.91	.88	.44	China	80	7.9	Non-self	General	Journal

Note. *N* = sample size; α = internal reliability; *r* = correlation between intrinsic motivation and creativity. – = reliability information was not provided in the primary studies.

[a] Multiple correlations about the same relationship were combined using the formula provided by Hunter and Schmidt (2004: 435–439).

[b] Individualism scores were coded from Hofstede's website http://geert-hofstede.com/countries.html.

[c] Tightness scores were coded from Gelfand et al. (2011).

[d] Self = creativity was self-rated, Non-self = creativity was not self-rated.

[e] Creative = creativity intrinsic motivation, General = general intrinsic motivation.

[f] Journal = journal publications, others = non-journal publications such as conference papers, dissertations and theses, and working papers.

Appendix C. Summary of studies providing information for the relationship between creative self-efficacy and creativity

Study	*N*	α of creativity	α of CSE	*r*	Country	Individualism[b]	Tightness[c]	Creativity measure[d]	Self-efficacy measure[e]	Publication status[f]
Akinlade (2014)	139	.89	.73	.00	US	40	5.1	Non-self	Creative	Others
Arendt (2006)	491	.96	.94	.05[a]	US	40	5.1	Non-self	General	Others
Arendt (2006)	491	.96	.92	.20[a]	US	40	5.1	Non-self	Creative	Others
Chae et al. (2011)	264	.89	.83	.60	Korea	60	10	Self	Creative	Journal
Chao and Farh (2012)	188	–	.76	.19	China	80	7.9	Non-self	Creative	Others
Chen et al. (2013)	428	.96	.90	.26	China	80	7.9	Non-self	General	Journal
Chen and Liang (2015)	223	.88	.81	.21	China	80	7.9	Non-self	Creative	Others
de Acedo Lizarraga et al. (2014)	180	.71	.75	.40	–	–	–	Non-self	Creative	Journal
Dewett (2002)	540	.96	.85	.13	US	40	5.1	Non-self	General	Others
Dewett (2007)	165	.96	.80	.21[a]	US	40	5.1	Non-self	General	Journal
Eder (2007)	269	.98	.74	.04	US	40	5.1	Non-self	Creative	Others
Ellefson (2010)	148	.93	.90	.53	US	40	5.1	Self	General	Others
Gilmore (2013)	209	–	.81	−.01[a]	US	40	5.1	Non-self	Creative	Others
Giuca (2012)	223	.93	.95	−.06	US	40	5.1	Non-self	Creative	Others
Gong et al. (2009)	277	.93	.91	.24	Taiwan	58	7.9	Non-self	Creative	Journal
Graham (2011) sample 1	88	.73	.86	.06	US	40	5.1	Non-self	General	Others

(*continued on next page*)

Appendix C (*continued*)

Study	*N*	α of creativity	α of CSE	*r*	Country	Individualism[b]	Tightness[c]	Creativity measure[d]	Self-efficacy measure[e]	Publication status[f]
Graham (2011) sample 2	102	.72	.80	−.04	US	40	5.1	Non-self	General	Others
Gu et al. (2014)	248	.85	.94	.68	China	80	7.9	Self	Creative	Journal
Hirst et al. (2012)	317	.91	.86	.27	Australia, Taiwan, China	58	6.73	Non-self	Creative	Journal
Hong and Wang (2011)	179	.82	.77	.56	China	80	7.9	Self	Creative	Journal
Huang et al. (2016)	544	.95	.65	.29	US	40	5.1	Non-self	Creative	Journal
Hsu et al. (2011)	120	.91	.80	.42	Taiwan	58	7.9	Self	Creative	Journal
Huh and Cheon (2013)	238	.71	.74	.56	Korea	60	10	Self	Creative	Journal
Jaussi et al. (2007)	179	.92	.62	.15	US	40	5.1	Non-self	Creative	Journal
Jiang and Yang (2014)	211	.95	.91	.35	China	80	7.9	Non-self	Creative	Journal
Li et al. (2011)	419	.91	.90	.56	China	80	7.9	Self	General	Journal
Li, Luo, et al. (2013)	214	.82	.84	.50	China	80	7.9	Non-self	General	Journal
Liang et al. (2013)	943	.85	.89	.25	Taiwan	58	7.9	Self	Creative	Journal
Liao et al. (2010)	828	–	.90	.32	China	80	7.9	Non-self	General	Journal
London (2006)	160	.86	.71	.27[a]	US	40	5.1	Non-self	Creative	Others
Lopez (2003)	111	.90	.72	.56	US	40	5.1	Self	Creative	Others
Luo et al. (2013)	169	.84	.74	.53	China	80	7.9	Self	Creative	Journal
Malik et al. (2013)	181	.76	.75	.28	Pakistan	55	12.3	Non-self	Creative	Others
Parker and Collins (2010)	622	.76	.74	.33	Australia	36	4.4	Self	General	Journal
Prabhu et al. (2008)	124	.68	.83	.30	US	40	5.1	Self	General	Journal
Qu et al. (2012)	206	.96	.89	.40	China	80	7.9	Non-self	General	Others
Rego, Sousa et al. (2014)	501	.97	.90	.65	Portugal	63	7.8	Non-self	Creative	Journal
Richter et al. (2012)	176	.92	.74	.09	US, UK, Canada, and Sweden	–	–	Non-self	Creative	Others
Schoen (2012)	193	.81	.84	.13	US	40	5.1	Non-self	Creative	Journal
Shin et al. (2012)	316	.91	.86	.16	China	80	7.9	Non-self	Creative	Others
Shipman (2011)	243	.81	.83	.03	US	40	5.1	Non-self	General	Others
Simmons (2006)	225	.83	.87	.08	US	40	5.1	Non-self	General	Journal
Simmons et al. (2014) sample 1	124	.93	.66	.06	US	40	5.1	Non-self	Creative	Journal
Simmons et al. (2014) sample 2	128	.75	.89	.57	US	40	5.1	Non-self	Creative	Journal
Song et al. (2014)	254	.90	.88	.53	China	80	7.9	Self	Creative	Journal
Tamannaeifar and Motaghedifard (2014)	355	.66	.81	.34	Iran	58	–	Self	Creative	Journal
Tierney and Farmer (2011)	145	.93	.81	.29	US	40	5.1	Non-self	Creative	Journal
Tierney and Farmer (2004)	191	.96	.76	.29	US	40	5.1	Non-self	Creative	Journal
Tierney and Farmer 1 (2002)	584	.96	.77	.13	US	40	5.1	Non-self	General	Journal
Tierney and Farmer 1 (2002)	584	.96	.83	.17	US	40	5.1	Non-self	Creative	Journal
Tierney and Farmer 2 (2002)	158	.95	.85	.01	US	40	5.1	Non-self	General	Journal
Tierney and Farmer 2 (2002)	158	.95	.87	.24	US	40	5.1	Non-self	Creative	Others
Wang (2009)	259	.77	.72	.47	US	40	5.1	Non-self	Creative	Journal
Wang and Peng (2013)	323	.73	.85	.60	China	80	7.9	Self	Creative	Journal
Wang et al. (2014)	395	.82	.74	.30	Taiwan	58	7.9	Non-self	Creative	Journal
Wang and Zhao (2011)	236	.88	.90	.68	China	80	7.9	Self	Creative	Others
Watt (2007)	559	.94	.92	.35[a]	US	40	5.1	Self	General	Others

Please cite this article in press as: Liu, D., et al. Motivational mechanisms of employee creativity: A meta-analytic examination and theoretical extension of the creativity literature. *Organizational Behavior and Human Decision Processes* (2016), http://dx.doi.org/10.1016/j.obhdp.2016.08.001

Appendix C (*continued*)

Study	*N*	α of creativity	α of CSE	*r*	Country	Individualism[b]	Tightness[c]	Creativity measure[d]	Self-efficacy measure[e]	Publication status[f]
Watt (2007)	559	.94	.87	.67[a]	US	40	5.1	Self	Creative	Others
Wigert (2013)	310	.92	.86	.09	US	40	5.1	Non-self	Creative	Journal
Yang and Zhang (2012)	334	.83	.73	.53	China	80	7.9	Self	Creative	Journal
Yao et al. (2014)	376	–	–	.65	China	80	7.9	Self	Creative	Journal
Yu et al. (2014)	874	.84	.91	.39	China	80	7.9	Non-self	General	Others
Yunlu (2013)	22	.95	.91	.16	US	40	5.1	Non-self	Creative	Journal
Zhang, Fan, et al. (2014)	334	.85	.84	.59	China	80	7.9	Self	Creative	Journal
Zhang and Li (2011)	300	.94	.87	.30	China	80	7.9	Non-self	General	Journal
Zhang and Long (2013)	296	.80	.80	.28	China	80	7.9	Non-self	Creative	Journal
Zhang, Lu, et al. (2012)	375	.87	.88	.66	China	80	7.9	Self	General	Journal
Zhang, Kwan, et al. (2012)	235	.92	.88	.17	China	80	7.9	Non-self	General	Journal
Zhang and Zhou (2014) sample 1	322	.94	.79	.61	China	80	7.9	Non-self	Creative	Journal
Zhang and Zhou (2014) sample 2	199	.96	.94	.39	China	80	7.9	Non-self	Creative	Journal
Zhou and Long (2011)	286	.85	.79	.34	China	80	7.9	Non-self	Creative	Others
Zhu and Peng (2012)	398	.91	.92	.29	China	80	7.9	Non-self	Creative	Others

Note. *N* = sample size; α = internal reliability; *r* = correlation between creative self-efficacy and creativity. – = reliability information was not provided in the primary studies.

[a] Multiple correlations about the same relationship were combined using the formula provided by Hunter and Schmidt (2004, pp. 435–439).

[b] Individualism scores were coded from Hofstede's website http://geert-hofstede.com/countries.html.

[c] Tightness scores were coded from Gelfand et al. (2011).

[d] Self = creativity was self-rated, Non-self = creativity was not self-rated.

[e] Creative = creativity self-efficacy, General = general self-efficacy.

[f] Journal = journal publications, others = non-journal publications such as conference papers, dissertations and theses, and working papers.

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Please cite this article in press as: Liu, D., et al. Motivational mechanisms of employee creativity: A meta-analytic examination and theoretical extension of the creativity literature. *Organizational Behavior and Human Decision Processes* (2016), http://dx.doi.org/10.1016/j.obhdp.2016.08.001