Within-person relationships between mood and creativity

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Abstract

State mood has been proposed as a facilitator of creative behavior. While positive mood compared to neutral mood generally facilitates creative performance, mood effects are weaker and less consistent when positive mood is compared to negative mood. These inconsistent results may be due to focusing only on mood valence, while neglecting or confounding mood activation. The current study is based on the dual-pathway model, which describes separate roles for mood valence and mood activation in facilitating creativity. We used experience sampling methodology to investigate the concurrent and lagged effects of mood valence and activation on creative process engagement (CPE) within-person over time among individuals working on a long-term project requiring creativity. We also investigated the moderating effects of individual differences in goal orientation and supervisory support on within-person mood-creativity relationships. As expected, we found that activating positive and activating negative moods were positively associated with concurrent CPE whereas deactivating moods of both valences were negatively related to CPE. Activating negative mood had a significant lagged effect on CPE while activating positive mood did not. We also found that activating positive mood was more strongly related to concurrent CPE among individuals with high rather than low learning goal orientation. Further, activating positive mood interacted with prove goal orientation and supervisory support for creativity, such that activating positive mood had the strongest association with CPE when both prove goal orientation and supervisory support were high.

Keywords: creativity, mood valence, mood activation, goal orientation, creative process
Within-Person Relationships Between Mood and Creativity

Creativity is regarded as a key to organizational success and survival (Amabile, 1996; George & Zhou, 2002; Hennessey & Amabile, 2010; Shalley, Zhou, & Oldham, 2004; Zhou & Shalley, 2008). But how are creative outcomes produced? Researchers such as Amabile, Barsade, Mueller, and Staw, (2005); Shalley et al. (2004) and Zhang and Bartol (2010a) have suggested studying the processes or behaviors that are instrumental for creative outcomes, and then exploring the personal and situational antecedents of such behaviors. Consistent with this approach, we focus on predicting creative process engagement (CPE), conceptualized by Zhang and Bartol (2010a) as including redefining and thinking about a problem, consulting information from different sources, and generating alternatives. Zhang and (Bartol, 2010a; 2010b) have shown that self-reported CPE is a significant predictor of supervisor-rated creative outcomes.

Traditionally, creativity was viewed as a relatively stable individual difference, with some people being regarded as consistently more creative than others (e.g., Gough, 1979; Tierney & Farmer, 2002; Zhou & Shalley, 2003). More recently, creativity has been studied as less stable phenomenon that varies as a function of shorter term states of the person and situation (e.g., George, 2007; Shalley & Gilson, 2004; Shalley et al., 2004; Zhou & Shalley, 2008). Mood represents a transient state that has attracted a great deal of research attention as a potential facilitator of creativity (Baas, De Dreu, & Nijstad, 2008; Davis, 2009; George & Zhou, 2002; 2007; Isen 1999a; 1999b; Kaufmann, 2003). Most of this research has investigated the effects of induced moods on immediate creative output on laboratory tasks (e.g., Isen, 1999a; 1999b; Martin & Stone, 1996; Hirt, Devers, & McCrea, 2008). Fewer studies have examined the relationship between naturally occurring moods and creativity, however, and even fewer have explored short term fluctuations in mood and creativity over time. To our knowledge, Amabile et al., (2005) is the only prior study to have assessed naturally occurring mood and daily creativity.
repeatedly over time and within-person. Like Amabile and her colleagues, we also take a within- 
person approach, investigating the concurrent and lagged relationships between activating and 
deactivating momentary moods and creative process engagement among individuals working on 
a long-term project requiring creativity. In addition, we investigate the effects of individual 
differences in goal orientation and supervisory support for creativity on within-person mood- 
creativity relationships. The dual pathway model of De Dreu, Baas and Nijstad (2008) forms the 
primary basis for our hypotheses.

Individuals are not always at their creative best. They may choose to engage in varying 
amounts of creative behavior over time as they work on an on-going project. Short term 
fluctuations in creativity may be explained by equally transient factors such as state mood (Baas 
et al., 2008; Davis, 2009; Isen 1999a; 1999b, Kaufmann &Vosburg, 1997). In this respect, much 
of the research and theorizing about the effects of mood on creativity has focused on the valence 
or hedonic tone of mood. Recent meta-analyses, for instance, have concluded that induced 
positive mood often facilitates creative performance compared to neutral mood, but when 
positive mood is compared to negative mood, the differential effects of mood valence on 
creativity are heterogeneous and non-significant (Baas et al., 2008) or very small (Davis, 2009). 
Davis suggests that mood valence effects on creativity are context dependent rather than 
universal. Other scholars affirm that the role of mood valence in creativity is still not entirely 
clear, and that while positive mood effects are more pervasive, there are cases in which negative 
moods can also facilitate creativity (e.g., Friedman, Förster, & Denzler, 2007; Gasper, 2003; 
George & Zhou, 2002; 2007; Kaufmann, 2003; Kaufmann & Vosburg, 1997). For instance, 
Friedman et al. (2007) found support for their “motivational compatibility” predictions that 
positive mood facilitates creative effort on fun and silly tasks, whereas negative mood facilitates 
creative effort on serious and important tasks. Baas et al. reached a similar conclusion: “Negative
moods tended to produce more creativity than positive moods when the task was framed as serious and performance oriented, whereas positive moods did better when the task was framed as fun and enjoyable” (p. 793).

Baas et al. (2008) and De Dreu et al. (2008) suggest that hedonic tone needs to be considered in concert with a second mood dimension—activation—to understand mood-creativity links. Some moods are positive in tone with high activation (e.g., excited, enthusiastic), while other positive moods are deactivating (e.g., calm, relaxed). Some moods are negative in tone with high activation (e.g., anxious, upset), while other negative moods are deactivating (e.g., discouraged, fatigued). In view of this, De Dreu et al. proposed a dual pathway model to explain the mechanisms by which mood activation and mood valence jointly influence creativity. De Dreu and his associates hypothesized that creativity can be achieved in two ways, either “through enhanced cognitive flexibility, set-breaking, and cognitive restructuring, which manifests itself in the use of many broad and inclusive cognitive categories…[or] through enhanced persistence and perseverance, which manifests itself in a higher number of ideas and insights within a relatively low number of cognitive categories, prolonged effort and relatively long time-on-task” (p. 740).

Positive mood facilitates the first path to creativity by enabling cognitive flexibility (Amabile et al., 2005; Isen 1999a; 1999b), while negative mood facilitates the second path by calling forth perseverance and effort toward generating innovative solutions to a problematic situation (George & Zhou, 2002; De Dreu et al., 2008). High rather than low activation moods provide the energy and enhance the cognitive capacity to enable creativity by either route (De Dreu et al.; Seo Barrett, &Bartunek, 2004). Four laboratory studies have produced support for the dual pathway model (De Dreu et al.). In the present study, we draw on the dual pathway model to propose that momentary activating moods of both valences are likely to predict concurrent
engagement in creative processes, and that activating negative mood will sustain longer
engagement in creative processes over time by cuing persistent effort.

Our study makes several contributions to the literature. First, we are among the first to
explore within-person relationships between mood and creative process engagement in natural
settings. Second, we extend the dual pathway laboratory finding that both activation and valence
dimensions of mood are helpful in predicting creativity. In particular, we demonstrate that dual
pathway predictions hold up when predicting CPE on a real project lasting for weeks. Third, we
test lagged effects of mood valence and activation on CPE, whereas De Dreu et al. (2008)
focused only on immediate consequences. Fourth, we integrate the interactionist and cross-level
approaches to creativity, both of which have been recognized as important avenues for future
research on creativity (George, 2007; Shalley, Gilson & Blum, 2009; Woodman, Sawyer, &
Griffin, 1993; Zhou & Shalley, 2008), to derive and to test hypotheses about how dispositional
goal orientation and supervisory support might affect mood-creativity relationships. Our findings
clarify situations in which activating moods might influence creativity, and hence contribute to
resolving some of the uncertainty about mood-creativity relationships that still exists in the
literature.

**Concurrent Mood-Creativity Links**

Several mechanisms have been proposed to explain how the two dimensions of mood may
influence creativity. First is the valence hypothesis, which suggests that positive rather than
neutral or negative mood should facilitate creativity by priming cognitive flexibility and access
(Ashby, Isen, & Turke, 1999; Hirt, Levine, McDonald, Melton, & Martin, 1997; Isen, 1999a;
1999b; Isen, Daubman, & Nowicki, 1987). Isen and her colleagues (1985) reasoned that positive
materials are more extensive and diverse than other materials in memory. Consistent with this
idea, it is reasonable to expect that positive moods will prime people to access these extensive
and complex materials and thus promote cognitive flexibility for creativity. Ashby et al. (p. 532) argued that “… the increase in cognitive flexibility and creative problem solving reported in many articles are indeed due to positive affect, not simply to increases in arousal.” Negative moods do not prime access to these materials so should be less likely to foster creativity by the cognitive flexibility route. However, research has shown that negative moods can also promote creativity under some conditions, and this has led researchers such as George (2007), George and Zhou (2002), and Kaufmann (2003) to wonder if additional mechanisms may need to be considered.

Mood activation research suggests such additional mechanisms (Baas et al., 2008; De Dreu et al., 2008). According to the dual pathway model (De Dreu et al.), creativity can be achieved through a cognitive flexibility route, a persistence route, or some combination of the two. The model suggests that mood activation determines the likelihood of creativity, while valence determines the routes by which creativity comes about. These authors reason that the arousal that accompanies activating moods triggers release of specific neurotransmitters (dopamine and noradrenalin) that enhances working memory capacity and the ability to hold information transiently in mind in the service of comprehension, thinking, and planning (Baddeley, 2000; Baas et al., 2008; De Dreu et al.). Because creativity requires complex cognitive activities to reconcile disparate information, activating mood states and the accompanying increased working memory capacity may facilitate creativity.

In addition to its effects on cognitive capacity, activation also provides motivation. Seo et al. (2004) assert that affective activation, regardless of valence, creates a motivational state of energy that urges behavioral responses (see also Brehm, 1999; Cacioppo, Garden, & Berntson, 1999). Supporting their hypothesis, Seo, Bartunek, and Barrett (2010) found that people in activated states devoted more effort to their current task, regardless of whether their mood was
pleasant or unpleasant. In sum, activating mood states create both greater transient motivation and increased cognitive capacity.

While activation contributes to the likelihood that creativity will occur, De Dreu et al. (2008) argue that valence influences how creativity will take place. Activating positive mood promotes creativity by leading people to feel less constrained, to experience the situation as unproblematic, to think flexibly, and to act in a more generative way (De Dreu, et al.; George & Zhou 2007; Schwarz & Clore, 2003; Seo et al., 2004). Positive moods inform people that the environment is safe, thereby prompting looser information processing, more expansive divergent thinking, novelty seeking, and playfulness (Clore, Gasper, & Gavin, 2001; George & Zhou; Schwarz & Clore). This is consistent with Fredrickson’s (2001) “broaden and build” (p. 218) theory, which suggests that positive affect leads to wider thought-action repertories. Baas and colleagues’ meta-analysis (2008) confirms that activating positive mood – but not deactivating positive mood – is associated with greater creativity when compared to neutral mood.

Activating negative mood may also foster creativity, however, by sustaining hard work, perseverance, active coping, and prolonged effort toward producing in-depth, unusual, and original solutions (De Dreu et al., 2008; Kaufmann, 2003; Seo et al., 2004). Creativity may be stimulated by recognition of a problem or dissatisfaction with the current situation and awareness of the need for change (Zhou & George, 2001). The mood as information model suggests that negative moods inform people that the environment is problematic, thereby promoting a detail-oriented, analytic approach to understanding the nature of the problem, reduced reliance on pre-existing schemas or scripts, and greater effort to improve matters (George & Zhou, 2002; 2007; Schwarz & Clore, 2003). There is evidence that activating negative moods narrow attentional focus (Friedman & Förster, 2010), but this deeper concentration may also facilitate progress on solving problems. De Dreu et al. found that activating negative moods promoted greater creative
fluency and originality (via persistence but not flexibility) compared to deactivating negative mood states.

In sum, during higher arousal mood states (provided they are not too extreme), individuals are more likely to be motivated and therefore able to combine information and consider multiple alternatives (Baas et al., 2008). Conversely, low levels of arousal lead to inactivity, inattention to information, and low capacity for complex thinking, and therefore to less creativity (De Dreu, et al., 2008). The hypotheses that emerge from the foregoing discussion are:

**Hypothesis 1:** Momentary activating positive and activating negative mood states will both be positively related to concurrent creative process engagement within-person.

**Hypothesis 2:** Momentary deactivating positive and deactivating negative mood states will both be negatively related to concurrent creative process engagement within-person.

**Lagged Mood-Creativity Links**

Evidence from dynamic experience-sampling studies (e.g., Amabile et al., 2005; Judge and Ilies, 2004) has shown that activated affective systems and their associated arousal can persist over time. For instance, mood states appear to have lagged as well as concurrent effects on job attitudes and behavior. Thus, it seems likely that mood may have both immediate and slightly delayed effects on engagement in creative processes.

It is possible that positive mood could foster duration of creative process engagement by increasing an individual’s expectancy that his or her efforts will produce desired outcomes in the near future (Seo et al., 2004). On the other hand, positive mood may carry information that past efforts have been successful and sufficient, such that further creative task engagement is unnecessary (George & Zhou; Martin & Stoner, 1996). Research on “stop rules” suggests that on performance-oriented tasks, positive mood signals that efforts can cease (Martin & Stoner). Baas
et al. (2008) found that the beneficial effects of positive versus neutral mood on creativity declined with longer time on task. We therefore do not hypothesize a lagged effect of positive activating mood on CPE.

However, we do expect a lagged effect of negative activating mood on CPE. Drawing on their dual pathway model, De Dreu et al. (2008) theorized and found that activating negative (but not positive) mood promoted perseverance, greater seriousness, focused attention, and longer time spent on creative processes for the purpose of improving a problematic situation (George & Zhou, 2002; Schwarz & Clore, 2003). Davis (2009) suggested that negative moods might sustain creative activity on lengthy tasks that require more time and effort. He reasoned that the problem signaled by a negative mood could motivate people to exert prolonged effort or delay the decision to quit, and that these facilitating effects could persist longer after the effects of transient positive mood have diminished. Recent findings from an experience-sampling study by Judge and Ilies (2004) offer further (indirect) support for the idea that negative mood may have longer lasting effects than positive mood. They found that activating positive mood had a concurrent relationship to job satisfaction, whereas activating negative mood had both concurrent and lagged relationships to job satisfaction. We therefore hypothesize:

**Hypothesis 3:** Lagged activating negative mood will be positively related to CPE within-person.

Research from an interactionist perspective views creativity as a product of individual characteristics, contextual influences, and the interaction between the two (George & Zhou, 2007; Shalley et al., 2009; Woodman et al., 1993). Moods carry information that needs to be interpreted; and people vary in terms of how they make sense of current moods as a function of stable individual differences as well as situational factors (Martin, Ward, Achee, & Wyer, 1993; George & Zhou, 2002; To, Ashkanasy, Fisher, & Rowe, 2010). We therefore suggest that the relationship of mood to CPE will be moderated by approach goal orientation (an individual
difference) and supervisory support for creativity (a contextual factor), as will be explained further below.

**Goal Orientation and Mood**

Martin et al. (1993) argue that the implications of the information provided by mood are not universal but are interpreted relative to the goals or objectives sought by the individual. For people with different goal orientations, mood states may lead to different conclusions and thus different behaviors (To et al., 2010). Hirst, Knippenberg, and Zhou (2009) have suggested that creativity may arise in the course of goal-directed behavior, and that dispositional goal orientation may explain individual differences in creativity. Goal orientation is thus proposed as a potential moderator of the effects of mood on creativity.

Goal orientation is fundamentally about self-regulation in response to achievement situations (for reviews, see DeShon & Gillespie, 2005; Payne, Youngcourt, & Beaubien, 2007). Goal orientation constructs are divided into approach and avoidance orientations. Approach goal orientation is further divided into two types (Dweck & Leggett, 1988; Elliot, 2008; Elliot & Dweck, 1988). The first of these is *learning goal orientation*, which involves working to develop competence through expanding one’s abilities by mastering challenging situations. The other is *prove goal orientation*, which involves working to validate competence by seeking favorable judgments from others (VandeWalle, 1997). Research on the approach-avoidance distinction suggests that the motivation system associated with an approach orientation rather than an avoidance orientation is more relevant in the promotion of creativity (see Baas, et al., 2008). However, recent dispositional goal orientation research indicates that learning and prove goal orientations might impact creativity in different ways (Hirst et al., 2009; Janssen & Van Yperen, 2004).
**Learning goal orientation and mood.** Learning goal orientation focuses attention on developing competence by acquiring new knowledge and skills and directs attention to the value of the activity itself (Elliot & Harackiewicz, 1994; Harackiewicz, Barron, Tauer, & Elliot, 2002; Pekrun, Elliot, & Maier, 2006). Individuals high on this orientation believe that effort is a determinant of success (VandeWalle, 1997). They tend to persist in the face of obstacles, view negative feedback as useful information for improvement, and desire to work on challenging tasks (e.g., Button, Mathieu, & Zajac, 1996; Cron, Slocum, VandeWalle, & Fu, 2005; VandeWalle). Creativity often requires the development and generation of something new for which the requisite task activities have yet to be mastered (Hirst et al., 2009; Janssen & Van Yperen, 2004). Efforts to develop new and useful solutions may expose individuals to difficult tasks, setbacks, or failures. In this case, a strong learning goal orientation can assist in coping with the challenges and obstacles of creative process engagement. Moreover, learning goal orientation implies an intrinsic interest in comprehending and mastering complex task activities, which often leads to engagement in creativity (Hirst et al.; Janssen & Van Yperen). Research evidence supports a main effect of learning goal orientation on creativity at the between-persons level (Hirst, et al.; Gong, Huang, & Farh, 2009; cf. Janssen & Van Yperen).

George and Zhou (2002) suggest that positive mood informs people that they have achieved their task goals or are making good progress towards their goals. Moreover, within a learning goal orientation, activating positive mood acts as a signal of progress toward task mastery (To et al., 2010). In response to this mood cue, high learning goal individuals will be more likely to engage in creative processes. To these individuals, the somewhat risky, exploratory task activities included in CPE are likely to be viewed as learning events beneficial to the development of skills (To et al.). High learning goal individuals are therefore more likely to
direct the cognitive resources and energy flowing from activating positive mood toward creative processes to foster mastery or competence development.

Negative moods signal a lack of progress toward goals. Such feedback may inform an individual high on learning goal orientation that additional effort and skill development are needed (Cron et al., 2005; VandeWalle, Cron, & Slocum, 2001). Individuals with a high learning goal orientation are likely to believe that competence is malleable, and to view effort as a means to improve (Dweck & Leggett, 1988; VandeWalle, 1997; VandeWalle et al.). Further, these individuals are likely to view unsuccessful attempts or setback as useful cues about improvement that may be required rather than as permanent signs of low ability (Cron et al.; VandeWalle et al.). Therefore, activating negative mood within a high learning goal orientation may cue a sense of challenge and call for attempts to develop new competence or skills for problem-solving (To et al., 2010). An activating negative mood is also likely to motivate a high learning goal oriented individual to devote greater efforts toward CPE. We therefore hypothesize:

*Hypothesis 4: *Learning goal orientation will moderate the relationship between activating mood state and CPE, such that (a) activating positive moods and (b) activating negative moods will have more positive relationships with concurrent CPE when learning goal orientation is high than when learning goal orientation is low.

**Prove goal orientation, mood, and supervisory support.** Button et al. (1996) showed that high prove goal orientation individuals tend to evaluate performance by normative standards. Prove goal orientation focuses attention on the possibility of attaining positive achievement outcomes, the controllability of these outcomes, and the extrinsic value of these outcomes (Pekrun et al., 2006; VandeWalle, 1997). Moreover, with demonstration of competence to others as a primary concern, high prove goal orientation individuals may choose to rehearse familiar tasks to increase efficiency, or enact proven and established task strategies to ensure successful
performance (Elliot & McGregor, 2001; Fisher & Ford, 1998; Pekrun et al., 2006; Janssen & Van Yperen, 2004; Steele-Johnson, Beauregard, Hoover, & Schmidt, 2000). Seeking novel but unproven ideas or solutions may be a less preferred strategy when prove orientation is high. This is because, as Janssen & Van Yperen (2004) argue, an innovative strategy exposes individuals to the possibility of failure, which is detrimental to the desired show of competence.

As a signal of goal attainment, positive moods when prove goal orientation is high are likely to signal successful performance or sufficient ability. During an activating positive mood state, high prove goal individuals may direct their enhanced energy to a task on which they expect to succeed, and this may not be the more risk-prone creative option. Therefore, a strong prove goal orientation may of itself weaken the facilitating effects of activating positive mood on creative process engagement.

There is evidence however that high prove goal orientation individuals are also responsive to extrinsic rewards in choosing which behaviors to display. As Hirst et al. (2009) found, these individuals are likely to engage in creativity when doing so is recognized as a means to demonstrate competence and to obtain favorable judgments from others. We therefore focus on supervisory support, a widely investigated contextual factor for creativity, as a situational moderator (Shalley & Gilson, 2004; Shalley et al., 2004). Supervisory support for creativity not only provides subordinates with encouragement and assistance to engage in the creative processes, but also conveys expectations that creativity is expected and valued (Madjar, Oldman, & Pratt, 2002; Tierney & Farmer, 2004). In fact, and contrary to earlier thinking, recent research evidence does not show a significant relationship between supervisory support and subordinates’ creativity (e.g., Baer & Oldman, 2006; George & Zhou, 2001; 2007; Zhou, 2003). This suggests that the relationship may be moderated by individual differences (Shalley & Gilson, 2004).
Perhaps supervisory support for creativity is more effective in cueing creativity in subordinates who are particularly concerned about being seen as competent performers.

We propose therefore that activating positive mood will have a stronger relationship with CPE when both prove goal orientation and supervisory support for creativity are high. When advocated by supervisors, a supportive context for creativity offers cues favorable to novelty. When a supervisor shows high support for unusual ideas, subordinates will perceive that creativity is recognized and valued. When a supervisor provides useful feedback focusing on improvement rather than fault, creative failures will be less likely to be perceived as incompetence. High prove goal individuals tend to be particularly responsive to such contextual cues. To perform well and to obtain favorable judgments from their supervisors, people high on prove goal orientation are thus especially likely to devote the enhanced cognitive resources and energy generated by an activating positive mood to creative process engagement.

In sum, we propose a three-way interaction between activating positive mood, prove goal orientation, and supervisory support in explaining CPE. The highest levels of CPE should occur only when all three conditions are high. People possess higher levels of energy and cognitive flexibility for CPE during activating positive moods. A high prove goal orientation is associated with a stronger achievement motive for accomplishment. When supervisors value and show high support for creativity, individuals in a positive activating mood will be more motivated to engage in creative processes for the sake of demonstrating competence. When creativity is not supported by supervisors, however, a high prove goal orientation focusing attention on external reward and performance outcomes (rather than the intrinsic value of the task activity) may weaken the effects of positive mood on creativity. Thus:

*Hypothesis 5a:* There will be a three-way interaction between activating positive mood, prove goal orientation, and supervisory support for creativity in explaining CPE.
Specifically, activating positive mood will have the strongest positive association with CPE when both prove orientation and supervisory support for creativity are high. Conversely, activating positive mood will have a weaker association with CPE when prove orientation is high but supervisory support for creativity is low.

When prove goal orientation is high, negative moods may be read as feedback that performance is below desired standard, and may warn of insufficient ability and thus pose a threat to self-esteem (Dweck & Leggett, 1988; To et al., 2010). Concerned about being seen as competent, high prove goal individuals may respond to problematic mood cues by employing familiar or proven solutions to assure successful problem-solving. As we suggested earlier, creative strategies may not be attractive to individuals high on prove goal orientation because the potential setbacks may jeopardize their reputations as capable performers. These individuals may divert the energy supplied by activating negative mood to coping and performance strategies other than creativity. Therefore, a high prove goal orientation per se is likely to weaken the otherwise facilitating effect of high arousal negative mood on CPE.

As discussed above, however, high prove goal individuals are sensitive to context to determine whether or not creativity is an appropriate task strategy (Hirst et al., 2008). Following this reasoning, we propose that high prove goal orientation individuals will display more CPE during high arousal negative mood in the presence of high supervisory support for creativity. Strong supervisory support for creativity not only signals a high expectation and appreciation for creative efforts but also allays concerns about criticism for failed attempts. To demonstrate their ability in creative problem-solving when supervisory support is high, prove goal oriented individuals may channel the energy and cognitive resources supplied by activating negative moods toward creativity.
In sum, we propose a three-way interaction of activating negative mood, prove goal orientation and supervisory support in explaining CPE. The highest levels of CPE should occur only when the three conditions are all high. Activating negative moods call forth a sense of seriousness, energy, focus, and hard work in an attempt to change a problematic situation. A high prove goal orientation is associated with a strong motive for achieving high performance that is recognized normatively. When supervisors display support and preference for creativity, high activation individuals with a focal concern of proving their competence will be more motivated to engage in creative processes. When creativity is not valued and supported by supervisors, however, a high prove goal orientation focusing attention on external judgments may prevent individuals from extracting the creative benefits of a high arousal negative mood. This may serve to diminish the otherwise facilitating effect of activating negative mood on CPE. Therefore, our final hypothesis is:

_Hypothesis 5b_: There will be a three-way interaction between activating negative mood, prove goal orientation, and supervisory support for creativity in explaining CPE. Specifically, activating negative mood will have the strongest positive association with CPE when both prove orientation and supervisory support for creativity are high. Conversely, activating negative mood will have a weaker association with CPE when prove orientation is high but supervisory support for creativity is low.

**Method**

**Participants and Context**

Research participants were PhD and postgraduate honors students from an Australian university. Approximately 60 students were invited to participate in this experience sampling
study, and about half of those approached agreed to do so (N=30). The participants ranged in age from 21 to 53 years (median age 27). Fifty-seven percent were male. Participants reported CPE and mood three times per day for ten working days, and were rewarded with occasional coffee vouchers throughout the study.

At the time of data collection, participants were working on their individual research thesis projects continuously, having already completed the coursework requirements of their degrees. Conducting and writing up a research thesis is a high-stakes situation in which creativity is critical for success, though more mundane/safe/routine activities associated with the research were also possible and at times necessary, allowing for considerable within-person variance in CPE over time. Unlike laboratory creativity tasks, writing a research thesis is a long term activity likely to be perceived as serious and performance oriented rather than fun or silly. Research supervisors and their level of support for creativity were also a salient feature of the participants’ environment. For these reasons, the situation was ideal for testing the hypotheses about the roles of naturally occurring positive and negative activating and deactivating moods and individual difference and situational moderators proposed in this research.

**Procedure**

Participants were asked to complete an initial paper survey assessing trait goal orientation and the perceived support for creativity received from their research supervisor. They subsequently received emailed links to an on-line questionnaire three times per day for ten working days, on which they reported current mood and CPE. E-mail schedules were customized to each participant based on their normal daily work routine. For most participants, the first survey took place in the late morning. The second survey was approximately 3-4 hours later, and the final questionnaire of the day was approximately two hours after the second. Reminder emails
were sent to participants who did not respond regularly. A total of 778 momentary reports were collected from the 30 participants. The overall response rate to survey requests was 86.4%. The mean number of responses per participant was 25.93 (SD = 5.07).

Measures

Mood. We adapted items from De Dreu et al. (2008) and the Positive Affect and Negative Affect Schedule (PANAS: Watson, Clark, & Tellegen, 1988) to measure mood states. The four adjectives measuring activating positive mood were “excited”, “enthusiastic”, “interested” and “inspired” (reliability averaged over measurements=.90). The four adjectives measuring activating negative mood were “upset”, “ashamed”, “angry” and “anxious” (reliability averaged over measurements=.75). The three adjectives measuring deactivating positive mood were “calm”, “relaxed” and “relieved” (reliability averaged over measurements=.73). The three adjectives measuring deactivating negative mood were “discouraged”, “fatigued” and “bored” (reliability averaged over measurements=.75). Participants rated the extent to which they were feeling each adjective in connection with their current work task using a 5-point scale, ranging from 1 (not at all/very slightly) to 5 (very much).

Goal orientation. We slightly modified the items from VandeWalle (1997) to measure learning goal orientation (reliability =.70) and prove goal orientation (reliability = .70) in an academic context on a 5-point Likert scale. Learning goal orientation was measured with five items (e.g., “I am willing to select a challenging task that I can learn a lot from”; “I prefer to study in situations that require a high level of ability and talent”). Prove goal orientation was measured with four items (e.g., “I am concerned with showing that I can perform better than the others; “I enjoy it when others around me are aware of how well I am doing”).

Supervisory support for creativity. We slightly modified the items from Madjar et al., (2002) to measure supervisory support for creativity in an academic context (reliability =.84) on a
5-point Likert scale. Supervisory support for creativity was measured with three items (e.g., “My supervisor is always ready to support me if I introduce an unpopular idea or solution in my study; “My supervisor discusses with me my study-related ideas in order to improve them”).

**Creative process engagement.** CPE is conceptualized as one of several antecedents to creative performance (Zhang & Barton, 2010a; 2010b). CPE includes behaviors likely to lead to creative outcomes. Given the momentary time-frame of our research, it is particularly relevant to measure CPE behaviors at discrete points in time rather than creative outcomes that may be the result of creative behavior undertaken some time earlier. Further, respondents should be more accurate in reporting the behaviors they have been engaging in recently than in evaluating how creative their recent accomplishments have been.

We selected items from Zhang and Bartol’s (2010a) 11 item CPE measure. This instrument contains three dimensions: problem identification, information processing, and idea/alternative generation. Dimensions are closely related and only a total score across all items has been used in past research. ESM research often uses shortened scales to reduce participant response burden and because only straight-forward recent experiences and feelings are requested. The six items we selected for the present study were those that would logically be expected to vary over the short term, and included two items from each the three dimensions. The items were phrased with momentary time instructions (e.g., “During the last few moments… I was trying to devise potential solutions that move away from established ways of doing things”; “…I was trying to sift through information that helps to generate new and operable ideas”; “…I was spending time trying to understand the nature of the problem”; “…I was thinking about the problem from different perspectives”). Participants were asked to respond on a 5-point Likert scale, and reliability averaged over measurements was .92. The effectiveness of using these six items to operationalize CPE was further confirmed in a separate sample of 52 employees who
completed the full 11 item scale. The correlation between the 6 item version and the 11 item version was .95 in that sample.

**Control variable.** We included a measure of momentary psychological empowerment as a control variable. Research shows that psychological empowerment has a significant impact on creative processes and outcomes (Gumusluoglu & Ilsev, 2009; Zhang & Bartol, 2010a). Psychological empowerment was assessed with four items adapted from Spreitzer’s (1995) measure. The items were “During the last few moments…I had significant autonomy in determine how I did the task”; “…My impact on what happened in the task was very large”; “…I was confident about my capabilities to perform the task”; “…The task was meaningful to me” (reliability averaged over measurements = .76).

**Results**

Hierarchical linear modeling (HLM: Bryk & Raudenbush, 1992) was used to test all hypotheses. To examine within-person relationships between mood and CPE (Level 1), momentary CPE was regressed on momentary moods. At Level 2, the parameters estimated at Level 1 (intercepts and slopes) were regressed on between-person variables (goal orientation and supervisory support for creativity).

In HLM analyses, time-series data violate the assumption of residual independence at Level 1 (Hofmann, Griffin & Gavin, 2000), so it was necessary to account for serial dependence (residual autocorrelation) that may be present in the Level 1 data. To accomplish this, lagged creative process engagement (Time t-1) was included as a control for all analyses (Ilies & Judge, 2002; Judge & Ilies, 2004). To form the lagged variable, momentary CPE was lagged by one survey period. The scores were not lagged across missing reports. The scores for CPE (Time t-1) were centered at the mean for each individual in order to remove the between-individual variance in this control variable (Bryk & Raudenbush, 1992). To control for possible time trends in CPE, a
time index variable was also included (Judge & Ilies, 2004). This variable was coded according to the day and time of each measurement. Table 1 shows the means, standard deviations, correlations, and reliabilities for all study variables.

**Within-Person Analyses**

Before testing the hypotheses, we estimated the within- and between-person variance components from the null hierarchical linear model for the dependent variable (CPE) and estimated the within-person variance for the Level 1 independent variables. The percentage of total variance that was within-person for CPE was 61%; for the four moods it was from 39% to 44%; and for psychological empowerment it was 53%. These figures are within the range of percentages of within-person variance for moods found in other ESM studies (e.g., Fisher & Nobel, 2004; Seo et al., 2010).

In Hypothesis 1, we predicted that momentary activating positive and negative mood states both would be positively related to concurrent CPE within-person. In Hypothesis 2, we predicted that momentary deactivating positive and negative mood states both would be negatively related to concurrent CPE within-person. To test these hypotheses, we regressed momentary CPE on concurrent activating moods and deactivating moods. The scores of Level 1 predictor variables were centered relative to each respondent’s average score to eliminate between-individual variance. Therefore, the estimates represent strictly within-person associations (Ilies, Scott & Judge, 2006). As shown in Table 2 (Models 2 and 3), activating positive and negative mood states (at Time t) were positively related to concurrent CPE, and deactivating positive and negative mood states (at Time t) were negatively related to concurrent CPE. These results support Hypotheses 1 and 2.

In Hypothesis 3, we predicted that momentary activating negative mood would have a significant lagged effect on CPE. To form the lagged mood variables (Time t-1), we lagged
momentary activating positive and negative moods by one survey period. The scores were not lagged across missing reports. The lagged variable was centered at the mean for each individual in order to remove between-individual variance. As can be seen in Table 2 (Model 4), lagged activating negative mood (Time t-1) was found to be positively related to CPE (Time t) as predicted. No lagged effect was predicted or found for activating positive mood (see Model 4). Hypothesis 3 was supported.

We expected (Hypotheses 4a and 4b) to find that learning goal orientation (Level 2) would interact with activating positive and negative mood states (Level 1) to predict CPE (Level 1). We also predicted (Hypotheses 5a and 5b) that prove goal orientation (Level 2) would interact with supervisory support for creativity and activating moods to predict CPE (Level 1). Before testing the cross-level interaction effects, we examined whether there was significant variance in the within-person slopes for activating moods predicting CPE. Results showed significant variability in the within-person slope for predicting CPE with activating positive mood ($p < .01$). Variability in the within-person slopes for predicting CPE with activating negative mood was not significant, however, meaning that activating negative mood predicted CPE with similar strength for all participants. Therefore, we could not test Hypothesis 4b and 5b.

**Learning Goal and Activating Moods**

As can be seen in Table 3 (Model 1), the interaction term of learning goal orientation and activating positive mood was significant. Figure 1 graphically presents the interactive effects of learning goal orientation and activating positive mood on CPE. As predicted, activating positive mood had a stronger relationship with CPE when learning goal orientation was high at $+1SD$ rather than low at $-1SD$. Probing results showed that the simple slope at $+1SD$ of learning goal orientation was significant ($p < .01$), while the simple slope at $-1SD$ of learning goal orientation was not significant. Thus, Hypothesis 4a was supported.
Prove Goal, Activating Positive Mood, and Supervisory Support

In Hypothesis 5a, we proposed a three way interaction of activating positive mood, prove goal orientation, and supervisory support in explaining CPE. From Table 3 (Model 3), it can be seen that the three-way interaction term was significant, in support of this hypothesis. Figure 2 graphically presents the interactive effects. Probing results showed that activating positive mood was positively associated with CPE when prove goal orientation and supervisory support were both high at +1SD ($p < .01$). The relationship between activating positive mood and CPE was not significant when prove goal orientation was high but supervisory support was low at −1SD.

Discussion

The results of this study allow us to draw three conclusions that advance understanding of creative process engagement. First, we found that sixty-one percent of the variance in 778 reports of current creative process engagement was within-person. Our results represent a response to Fisher’s (2008) call to “take within-person performance variability seriously” (p. 185). Understanding that CPE fluctuates within-person, and how individual and contextual factors may influence these fluctuations, may provide levers for improving creative outcomes. Second, we provide evidence that both mood valence and mood activation are important in understanding within-person relationships between mood and creativity concurrently and over time. Third, we demonstrate that goal orientation and supervisor support for creativity moderate within-person mood-creativity relationships as predicted.

Affect and creativity researchers traditionally concentrated on the effects of induced mood valence on creativity, but have largely overlooked the effects of mood activation. More recently, researchers such as George and Zhou (2007) and Madjar et al. (2002) have begun to offer field evidence that sheds light on the roles played by activating positive and negative moods in facilitating creativity at work at the between-persons level. This is supported in meta-analyses by
Baas et al. (2008) and Davis (2009), who concluded that a better understanding can be achieved by considering the distinctive influences of high and low arousal moods apart from valence effects.

In line with this idea, we measured mood as four combinations of valence and activation, and found that individuals engaged more in creative processes during activating positive and negative moods (e.g., exited, angry) but less during deactivating positive and negative moods (e.g., relaxed, discouraged). This finding is consistent with De Dreu et al.’s (2008) dual pathway model, which suggests that activation interacts with valence to foster creativity. Our ESM design did not allow us to pinpoint the specific paths by which creativity might have occurred – cognitive flexibility in the case of positive activating moods, and increased persistence and focus in the case of negative activating moods. On the other hand, a series of laboratory studies by De Dreu et al. did support these paths as particularly characteristic of positive or negative mood respectively.

Our findings are also consistent with the idea that, under some conditions, negative moods (if activating) can be associated with greater creativity (George & Zhou, 2002). The task in the current study, being long-term, serious, and performance oriented, was precisely the type of setting in which beneficial effects of negative activating mood might be expected as a result of increased focus, effort, and persistence (Davis, 2009). Nevertheless, we note that the coefficient for activating positive mood was larger than that for activating negative mood in predicting concurrent (but not lagged) CPE. While activating negative mood may promote creativity through prolonged cognitive effort toward producing original and high-quality solutions, it does not offer the cognitive flexibility enabled by positive moods (Baas et al., 2008). Overall, our findings support the idea that the relationship between mood and creativity can be better understood in terms of both valence and activation rather than by either dimension alone (Baas et al.; De Dreu
et al. 2008; George & Zhou, 2002). Further, our experience-sampling evidence shows that this perspective holds up in real-life settings with naturally occurring moods and long term performance oriented creative tasks, thus complementing the laboratory work carried out by De Dreu et al. (2008).

Consistent with our rationale for how negative activating mood may sustain engagement in creativity over time via focus, effort and persistence, we found that activating negative mood (Time t-1) predicted subsequent CPE (Time t), whereas activating positive mood did not. These results are consistent with Baas et al. (2008), who found that the effects of positive mood on creativity diminished rapidly as time on task increased. They also fit with the findings of Judge and Ilies’s (2004) workplace ESM study, that activating negative mood had a longer lasting effect than positive mood on momentary job satisfaction, itself a trigger for individuals to engage in creativity (Zhou & George, 2001).

The question of how and whether positive affect influences later creativity is not entirely resolved, however. Amabile et al. (2005) conducted the first event-sampling study offering insights on within-person creativity fluctuations on long term work tasks. Their study indicated that daily positive affective experience predicted current and subsequent creativity across days. In contrast, our research did not find lagged effects of activating positive mood on creative behavior. We explained our findings by the dual pathway model that activating positive mood may promote creativity through a shorter-lived flexibility route rather than the longer-lived focus, persistence, and effort route associated with activating negative mood. Whether or not there are lagged effects of positive mood on creativity may depend on how the positive mood is interpreted. Hirt et al. (2008) showed that individuals in positive moods are especially discerning about choice of subsequent tasks and prefer activities likely to maintain their positive moods. If positive mood is interpreted as indicating that sufficient progress has been achieved on an
arduous task, it may lead some people to cease effortful creative striving earlier (George & Zhou, 2002; Martin & Stoner, 1996). If positive mood is read as a signal that the actor is “on a roll,” however, and further efforts are likely to be satisfyingly fruitful, it may motivate continued creative striving. Additional laboratory research may be useful to reveal how individuals choose whether to undertake tasks requiring creativity versus more mundane activities after experiencing various moods. Alternatively, an open-ended diary study in a natural setting might also shed light on these processes (Amabile et al.).

We also explored some person-level (Level 2) moderators of the within-person mood-creativity relationship. In particular, we hypothesized and found that activating positive mood was more strongly and positively related to CPE for individuals with a strong learning goal orientation. Interpreted as a signal of impending goal attainment, activating positive mood paired with a high learning goal orientation may encourage people to direct their enhanced energy and cognitive flexibility toward creative processes to further develop skills and competence. Creative behaviors may also be seen as likely to maintain positive mood for those high in learning goal orientation.

Confirming the three-way interaction hypothesis, our results indicated that activating positive mood was most strongly related to CPE when both prove goal orientation and supervisory support for creativity were high. When prove goal orientation was high but supervisory support was low, the relationship between activating positive mood and CPE was at its weakest. Thus, prove goal orientation can either augment or weaken the otherwise facilitating effects of activating positive mood on CPE. In the absence of supervisory support, the signal of success inferred from an activating positive mood may be more likely to cue a high prove goal individual to use familiar, successful task strategies rather than to engage in potentially risky creative behavior. On the other hand, when supervisory support for creativity is high,
subordinates will perceive that creativity is recognized and valued (Tierney & Farmer, 2004) and high prove goal individuals will be more willing to attempt creative behavior in order to demonstrate performance and ability to their supervisors who value such behavior. This cross-level interaction of mood, goal orientation, and supervisor support opens three new avenues for future creativity research.

First, we focused on the two approach goal constructs, learning and prove orientation. Goal orientation research also includes a performance avoidance dimension featuring a concern with avoiding the display of incompetence or receiving unfavorable judgments from others (Elliot & McGregor, 2001; VandeWalle, 1997). It is reasonable to expect that avoidance goal orientation may also interact with mood state in the prediction of creativity. For example, for someone high on performance avoidance goal orientation, a deactivating mood (e.g., feeling relaxed) may signal a safe and unproblematic state of affairs, such that they may be especially reluctant to abandon the status quo and risk CPE.

Second, additional contextual moderators of mood-creativity-goal orientation relationships may be worth considering. Reviews have highlighted the importance to examine goal orientations as they unfold dynamically in context (Button et al., 1996; DeShon & Gillespie, 2005). Recent field evidence shows that contextual characteristics can facilitate and restrict the creative expression of dispositional goal orientations (Hirst et al., 2009; Hirst, Knippenberg, Chen, & Claudia, in press; Tett & Burnett, 2003). Aspects of the environment (in our study, supervisory support) may activate latent traits (prove goal orientation) to increase the likelihood of CPE. Another potential moderator of the effects of prove goal orientation on mood-creativity links may be the extent to which competition with others is a salient feature of the environment (Shalley & Oldman, 1997). Other contextual features such as job control/autonomy may be relevant to expression of learning goal orientation, thereby enhancing the effects of activating
moods on creativity. In contrast, situational constraints such as controlling evaluation and close monitoring may reduce the desire of intrinsically motivated high learning goal individuals to channel activating moods into CPE (Shalley & Perry-Smith, 2001; Zhou, 2003). Finally, a punishing or psychologically unsafe environment may prevent activating negative moods from stimulating creativity among those high on performance avoidance goal orientation.

Third, we were unable to test Hypothesis 4b and Hypothesis 5b regarding potential moderators in the relationships between negative activating mood and CPE because there was insufficient slope variance. In our situation, which involved a serious and lengthy achievement task, activating negative moods stimulated CPE across individuals. In a task seen as fun, silly, or enjoyable, activating negative moods may have heterogeneous effects (Baas et al., 2008; Davis, 2009), especially if mood management is seen as more important than task achievement (To et al., 2010). Researchers may wish to examine our untested hypotheses 4b and 5b in a context with different task features. Additional research is needed to explore boundary conditions under which the persistence route to creativity triggered by negative activating moods will occur.

**Implications for Practice**

Our findings contradict the popular belief that contented individuals (deactivated positive mood) are more creative. In line with De Dreu et al. (2008), our data confirm that creative behavior does not emerge when people are feeling calm and relaxed. An emphasis on these states in the workplace might thus be counterproductive. Rather, both naturally occurring activating positive and activating negative moods are associated with creative process engagement. Activating positive mood showed an especially strong relationship to concurrent CPE, while activating negative mood predicted both concurrent and next period CPE. Managers or project leaders should encourage activated positive moods for concurrent creative process engagement,
and provide employees in activating mood states, especially negative ones, with adequate time for incubation and exploration so that their focused and persistent efforts have time to bear fruit.

Further, the dynamic interaction of mood, goal orientation, and context in predicting creativity reported in this research offers important lessons for managers. While one might expect employees driven by approach goals to be more willing to attempt creativity than those driven by avoidance goals, managers must realize that employees wishing to develop competence versus to demonstrate competence want to be creative for different reasons. Different managerial practices may be required to maximize creativity. Employees high on prove goal orientation are likely to be sensitive to situational cues and to rely more on extrinsic motivation for sustaining creative behavior. A supportive context for creativity advocated by supervisors may be particularly important to them. Managers or project leaders should thus show recognition and support when creative attempts (successful or not) have been made. In a supportive environment, employees high on prove goal orientation will be more likely to direct cognitive resources and energy toward creative processes during a positive activating state. Seeking to develop their competence, learning goal oriented individuals are more likely to engage in creative behavior for its own sake. Managers who wish to increase creativity in their organizations should therefore avoid creating situations that reduce learning focus or undermine intrinsic motivation among these individuals, so that the energy provided by activating positive moods can best be directed toward CPE.

Limitations and Strengths

This study is not without limitations. As will be explained below, however, these limitations do not prevent the study from making a contribution to the literature.

Sample size. By typical between-person design standards, a sample size of 30 would not be considered large, suggesting problems of statistical power. For analyses based on within-person relationships, however, the number of observations (N= 643 when observations without
T-1 reports were dropped) was quite sufficient, and meets Scherbaum and Ferreter’s (2009) Level 2 sample size requirement for multi-level analysis. It is also similar to that used in other multi-level research in organizational psychology (e.g., Ilies, & Judge, 2002; Mathieu & Rapp, 2009).

Students as research participants. We recognize that some researchers might be concerned about students as research participants, based on a belief that such participants are not “real people” and cannot be taken as representative of such. There may be some merit to this position when students are asked to imagine their responses to hypothetical situations, to make simulated managerial decisions, or to behave in an area outside their experience or expertise. This was not the case in our study. Although participants were students, they were also adults who were working full-time on an important long-term project requiring creativity. Further, research supervisors monitored their work and needed to be satisfied. Thus, the research setting was not unlike that experienced by employees in the R&D or academic sectors.

In addition, the major theory underpinning our paper is De Dreu et al.’s (2008) dual pathway model, which references the fundamental neurophysiological stimulus/arousal and cognitive tuning effects of mood (see also Clore et al., 2001; George & Zhou, 2007; Schwarz & Clore, 2003). These short-term affective processes are generic to all human beings. Thus, we believe that the results from this study can provide useful insights on mood-creative behavior links in on-going achievement settings similar to those found in the workplace.

Self-report. The nature of experience sampling research virtually dictates the use of self-report measures. In our particular case, there were no external sources that could consistently monitor and assess creative behavior on a short-term basis, and no external source could report moods. Self-report variables may raise concerns about common method bias, although some have suggested that repeated-measure research involving within-person analyses are less subject to this problem (Foo, Uy, and Barson, 2009; Williams & Alliger, 1994). We note in particular that four
concerns applicable to self-report measures in between-persons studies were dealt with by the experience sampling design and analyses.

First, since each variable in the within-person analyses was centered at each individual’s mean, many of the usual problems with self-reported data such as personality confounds or response-set tendencies are eliminated (Judge & Ilies, 2004; Scott & Judge, 2006). Second, predictor and criterion were in some instances collected at different times, thus reducing the potential for common method bias (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003). For example, participants reported the criterion variable (CPE) and Level 2 moderators (learning and prove goal orientation and supervisory support) in different questionnaires at different times. Temporal separation also occurred for the lagged analysis between mood and CPE. Third, we conducted a Harman’s single factor test, a technique widely used by researchers to address the issue of common method variance (Podsakoff et al., 2003). Exploratory factor analysis of all Level 1 variables yielded five factors (not just one), with the first accounting for only 27% of the variance. Since a single or general factor did not account for most of the variance, common method variance is unlikely to be a serious problem in this study (Podsakoff et al., 2003). Fourth, self-ratings of mood and of very recent behavior such as CPE are likely to be accurate because participants did not need to use the error-prone process of recalling many past experiences and integrating across time to construct a response. Instead, they simply access immediate experience to produce accurate reports with minimal processing errors (Robinson & Clore, 2002).

Causality. The correlational nature of the ESM design means that definitive conclusions that mood causes creativity cannot be drawn from the concurrent Level 1 analyses. Amabile et al. (2005) have suggested that some reciprocal causation between mood and creativity is possible. For example, being creative could produce both pleasant valence and activation in the form of enthusiasm due to task success. Nevertheless, decades of laboratory research with manipulated
mood, together with evidence for an underlying physiological process by which activation enables creativity, add weight to the idea that mood can be causally related to CPE. Additional evidence consistent with the mood-causes-creativity position is provided by the lagged analyses and by the support for complex interaction predictions derived from mood-causes-creativity rationales.

In conclusion, we believe that the present study contributes to the literature on mood and creativity by demonstrating the distinct role played by mood activation and mood valence in the prediction of concurrent and lagged creative process engagement within individuals. While positive activating mood predicts concurrent CPE, negative activating mood also contributes to both concurrent and lagged CPE on a serious and long term task. These findings are consistent with De Dreu et al.’s (2008) dual pathway model. We also contribute by exploring goal orientation and supervisory support for creativity as Level 2 moderators of mood-creativity relationships. Integrating the interactionist and cross-level approaches, our study therefore contributes to untangling some of the complexity surrounding the relationship between moods and creativity.


References


Table 1

*Descriptive Statistics and Correlations Among Variables*

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<td>(.92)</td>
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<td>2. Psychological</td>
<td>3.49</td>
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<td>.31**</td>
<td>(.76)</td>
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<td>3. Activating positive</td>
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<td>1.09</td>
<td>.35**</td>
<td>.39**</td>
<td>(.90)</td>
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<td>4. Activating negative</td>
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<td>5. Deactivating positive</td>
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<td>.95</td>
<td>.00</td>
<td>.14**</td>
<td>.27**</td>
<td>-.18**</td>
<td>(.73)</td>
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<td>6. Deactivating negative</td>
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<td>-.13*</td>
<td>-.24**</td>
<td>-.38**</td>
<td>.26**</td>
<td>-.15**</td>
<td>(.75)</td>
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<td>7. Prove goal orientation</td>
<td>3.40</td>
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<td>.14</td>
<td>.36*</td>
<td>.41*</td>
<td>-.08</td>
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<td>8. Learning goal</td>
<td>3.97</td>
<td>.54</td>
<td>.29†</td>
<td>.61**</td>
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<td>9. Supervisory support</td>
<td>4.11</td>
<td>.77</td>
<td>.04</td>
<td>.31*</td>
<td>.38*</td>
<td>.33*</td>
<td>.08</td>
<td>.17</td>
<td>.12</td>
<td>.34*</td>
<td>(.84)</td>
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*Note.* Variables 1-6 are within-person variables at Level 1. The correlations of these within-person variables (over time) were estimated from fixed-effects HLM models with single standardized Level 1 variables and no Level 2 variables (n = 764-775). Variables 7-9 are between-person variables at Level 2. We computed the correlations between these variables and variables 1-6 using individuals’ aggregated scores and one-tailed tests of significance (n = 30). Reliabilities are shown on the diagonal in parentheses; for the within-person variables, reliability values were averaged over measurements.

†p<.06; *p<.05; **p<.01
Table 2

_HLM Estimates of the Effect of Mood States on Creative Process Engagement_

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
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<td>2.51**</td>
<td>2.51**</td>
<td>2.51**</td>
<td>2.50**</td>
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<tr>
<td>Time index</td>
<td>-.03*</td>
<td>-.03</td>
<td>-.04*</td>
<td>-.03*</td>
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<tr>
<td>Lagged CPE (Time t-1)</td>
<td>.13**</td>
<td>.11*</td>
<td>.13*</td>
<td>.13*</td>
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<tr>
<td>Psychological empowerment</td>
<td>.44**</td>
<td>.27**</td>
<td>.42**</td>
<td>.44**</td>
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<tr>
<td>Activating positive mood (Time t)</td>
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<td>.183</td>
<td>.172</td>
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*Note.* Values are unstandardized regression coefficients. $N = 643-651$. The scores of the Level 1 variables were centered at the individual’s means to eliminate between-individual variance. The scores of the Level 2 variables were grand-mean centered.

*p<.05; **p <.01
Table 3

*HLM Estimates of the Hypothesized Two-way and Three-way Interactive Effects on Creative Process Engagement*

<table>
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*Note.* Values are unstandardized regression coefficients. $N = 643$. The scores of the Level 1 variables were centered at the individual’s means to eliminate between-individual variance. The scores of the Level 2 variables were grand-mean centered.

*†P<.1; * p<.05; ** p <.01*
Figure 1. Interactive effect of learning goal orientation and activating positive mood on CPE (Hypothesis 4a)
Figure 2. Interactive effect of prove goal orientation, supervisory support for creativity, and activating positive mood on CPE (Hypothesis 5a)