CHAPTER 3

Specifying the Mood-Creativity Link: When and Why Affective Sharing and Certainty of Affect influence the Effect of Mood on Creativity
Abstract

Specifying the Mood-Creativity Link: When and Why Affective Sharing and Certainty of Affect influence the Effect of Mood on Creativity*

The present study supports a contextual perspective on the mood-creativity link by showing when and why positive affect influences creativity. We expected that positive affect would positively influence creativity with increasing affective sharing, especially for individuals who are affectively uncertain. Results from a scenario experiment (Study 1a, N = 303), a laboratory experiment (Study 1b, N = 155), and an organizational survey of employees (Study 2a, N = 116) supported this prediction. A survey of organizational work groups (Study 2b, N = 42) showed that our line of reasoning was supported not only at the individual level, but also at the group level. Moreover, both field studies showed that employees’ cooperative tendencies (partially) mediated the effects of positive affect on creative work involvement for those who were high on affective sharing and low on certainty of affect.

Research has paid a good deal of attention to the question whether affective states may predict creativity, or the generation of ideas, insights, or problem solutions that are new and meant to be useful (Amabile, 1983; De Dreu, Baas, & Nijstad, 2008; Paulus & Nijstad, 2003). The relationship between affect (mostly mood) and creativity has been examined in experimental settings (e.g., De Dreu et al., 2008; Gasper, 2003; Grawitch, Munz, Elliott, & Mathis, 2003; Grawitch, Munz, & Kramer, 2003; Hirt, Devers, & McCrean, 2008; Hirt, Levine, McDonald, Melton, & Martin, 1997; Isen, Johnsen, Mertz, & Robinson, 1985; Kaufmann & Vosburg, 1997; Ting Fong, 2006) and field settings (e.g., Amabile, Barsade, Mueller, & Staw, 2005; George & Zhou, 2002; George & Zhou, 2007, Madjar, Oldham, & Pratt, 2002; Staw, Sutton, & Pelled, 1994). However, literature on the mood-creativity link reflects conflicting perspectives on whether positive affect or negative affect is beneficial or detrimental to creativity (for reviews see Baas, De Dreu, & Nijstad, 2008; Davis, 2009; James, Brodersen, & Eisenberg, 2004).

On the one hand, most empirical findings show a positive relationship between positive affect and creativity, thereby corroborating the general proposition that experiencing positive feelings facilitates the display of creative behavior. For instance, positive affect has been found to increase flexible cognitive organization, thereby increasing the tendency to combine material in new ways, to see relatedness between divergent stimuli, and to gain access to more unusual and diverse information which facilitates creativity (Isen & Daubman, 1984; Isen, Daubman, & Nowicki, 1987; Murray, Sujan, Hirt, & Sujan, 1990). On the other hand, some studies report that negative moods promote creative performance to a greater extent than do positive moods. For instance, Kaufmann and Vosburg (1997) found that positive mood inhibited creative task performance, while negative mood enhanced it. Similarly, a field study of George and Zhou (2002) shows that employees’ positive affect reduces and negative affect promotes creativity under certain circumstances. More recently, George and Zhou (2007) found that creativity was highest when both positive and negative experienced moods were high and supervisors provided a supportive context.

Based on the above, the conclusion that positive affect always feeds into creativity seems a bit hasty, and instead, it appears that a more refined approach is desirable. Indeed, the need for specification of the mood-creativity link has presented itself (Davis, 2009; Kaufmann, 2003; Vosburg, 1998a). The identification of potential moderators may give insight into when the general proposition that positive affect facilitates creativity does or does not hold. Moreover, more insight is needed in why, or through which processes, positive affect may at times influence creativity.
The Moderating Role of Affective Sharing and Certainty of Affect

The mood-as-information-model by Schwarz (2001) provides insight into our question when positive affect influences creativity. The model states that individuals use their affective states as a source of information about the benign or problematic nature of the current situation. Negative mood suggests a problematic (task) environment which engenders careful and cautious behavior (Schwarz, 2001; Schwarz & Bless, 1991). In contrast, positive mood signals a safe and satisfactory (task) environment which may convey a sense of security that invites people to engage in agreeable and friendly behavior towards others (Sy, Côté, & Saavedra, 2005). This feeling of psychological safety and the positive atmosphere may cause people to feel relatively unconstrained and to take risks to pursue novel, creative paths of thought and action (cf. Fredrickson, 1998, 2001).

Moreover, the mood-as-information-model suggests that the impact of mood on processing strategies and behavior is dependent on the extent to which the experienced mood has informational value. Undermining the informational value of one’s moods, for instance through (mis)attribution of the mood (Schwarz & Clore, 1988) or by perceiving them as irrelevant (Gasper & Clore, 2000), causes elimination of the observed influence of mood on processing strategies. Thus, it seems that positive affect may stimulate creative behavior, especially when people perceive their positive feelings to be informative, relevant, and valid.

The informational value of one’s feelings, and thus their impact on behavior, may depend on the extent to which they are shared with others. This sharing of affect may be realized through affective contagion (the process in which people’s moods or emotions become more similar because they tend to automatically mimic and synchronize affective expressions of others; Hatfield, Cacioppo, & Rapson, 1994; Kelly, 2004), affective comparison (a process in which people assess the appropriateness of their experienced feelings by comparing them to those of others, cf., Festinger, 1954), and of course the conscious social sharing of affect (the open communication about emotional circumstances and their related feelings and reactions; Rimé, 1995). Importantly, each of these mechanisms serves the function of a social verification process that validates affective experiences, and makes them more real and informative. As a consequence, the impact of a person’s feelings on a person’s behavior may depend on the extent to which feelings are shared with others.

Corroborating this line of reasoning, Peters and Kashima (2007) argue that sharing emotions with others may lead to a stronger association between the particular emotion and the ostensibly appropriate behavior, because the act of sharing provides attitudinal social support and thus serves the function of validation of one’s feelings. Moreover, the sharing of emotions may feed into the emotion-behavior link because individuals may believe that
others may act in the same fashion and as such it may also provide instrumental social support (cf., Van Zomeren, Spears, Fisher, & Leach, 2004).

Other corroborating evidence, albeit not from research focusing on affect, comes for instance from research on the self-validation hypothesis (Briñol & Petty, 2003; Petty, Briñol, & Tormala, 2002) that has shown that the perception of the validity of one’s thoughts is determined by the degree to which they are shared by in-group members. Moreover, the sharedness of thoughts has been found to strengthen the link between thoughts and attitude change (Petty et al., 2002). Similarly, research on stereotyping shows that learning that one’s beliefs are shared with others validates held beliefs and, as a consequence, renders attitudes more predictive of behavior (Sechrist & Stangor, 2001). In a similar vein, research on group decision making shows that shared information is evaluated as more accurate and relevant than unshared information and therefore has a stronger impact on group decisions than unshared information (Mojzisch, Schulz-Hardt, Kerschreiter, Brodbeck, & Frey, 2008; Postmes, Haslam, & Swaab, 2005; see also Wittenbaum & Stasser, 1996, for a review).

Based on the above, we propose that sharing of affect may propel creative behavior to the extent that the focal affective state happens to be positive. However, not all individuals are equally in need of validation of their thoughts or feelings by others. Several studies and theoretical analyses indicate that it is especially those persons who are uncertain who are looking for validation (e.g., Festinger, 1954). Indeed, uncertainty is generally considered to be aversive (Fiske & Taylor, 1991; Hogg, 2000). The need to feel certain leads people to try to somehow wipe out their feelings of uncertainty, to eliminate the cause of their uncertainty, or find some way to make the uncertainty bearable and cognitively manageable (Van den Bos & Lind, 2002). One obvious way to handle uncertainty is to look for validation (e.g., Swann, 1983, 1987). Hogg argued that people who feel uncertain may turn to other group members for reassurance (Hogg, 2001; Hogg, Sherman, Dierselhuis, Maitner, & Moffitt, 2007), because the group may provide people with consensual knowledge about whom they are or how they should behave. Likewise, Schachter proposed that especially those who face an ambiguous situation, and are thus uncertain, will seek out and use affective information of others in order to make sense of how they feel (e.g., Schachter, 1959; Schachter & Singer, 1962).

Notably, affective certainty may not only pertain to a stable characteristic of an individual to discriminate clearly among one’s affective states (i.e., a metamood experience; Mayer & Gaschke, 1988) also referred to as clarity of feelings (e.g., George & Zhou, 2002; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). Affective certainty may also be more context specific (Lischetzke, Cuccodoro, Gauger, Todeschini, & Eid, 2005), varying with time and situational circumstances. In the current study we focus particularly on this latter kind of
affective certainty. We reason that the effects of affective sharing in explaining the mood-creativity link will be contingent on affective certainty. Our first hypothesis concerning the question when positive affect influences creativity, thus reads:

\textit{Hypothesis 1:} Positive affect will be positively related to creativity with increasing affective sharing with others, specifically for those who are low on certainty of affect.

To test this hypothesis we first conduct two experimental studies, one scenario study (Study 1a) and one laboratory study (Study 1b) in which we assess whether individuals with positive affective states will have higher creative performance than individuals with negative affective states, particularly when they feel to have shared their feelings with others (vs. not shared) and they are uncertain (vs. certain) about their feelings. In Study 1a, we focus on the originality aspect of creativity, which refers to the novelty or unusualness of ideas (De Dreu et al., 2008). To measure originality we adopted the ‘draw-an-alien-task’ (Rietzschel, De Dreu, & Nijstad, 2007). Instead, Study 1b focuses on the fluency aspect of creativity, which refers to the number of unique ideas that are generated (Baas et al., 2008). As such, we assessed the quantity of ideas that were generated in a brainstorm task (e.g., Friedman & Förster, 2001; Grawitch et al., 2003a; Paulus & Yang, 2000).

\textbf{Study 1a}

\textbf{Method}

\textbf{Design and participants.} Participants were 303 university students ($M_{age} = 22.1$, $SD = 2.5$, 39.6% male) who participated voluntarily and were randomly assigned to the conditions of a 2 (affect: positive vs. negative) by 2 (certainty of affect: certain vs. uncertain) by 2 (affective sharing: yes vs. no) between-subjects design.

\textbf{Procedure.} Participants read a business scenario that prompted them to imagine that they were a member of an organizational team that had two additional team members. The organization they worked for was an internationally orientated software company, named BOLT, with a good reputation.

Participants in the \textit{certain of affect condition} read that as an employee of BOLT they were certain about their emotional experiences at work and had no difficulty to determine how they felt. Their experienced feelings were clear to them, and they were sure of what they felt. The text concluded with: “In short, you are very certain about your feelings.” In the \textit{uncertain of affect condition} participants read that as an employee of BOLT they were in doubt about their emotional experiences at work, and that they had difficulty to determine
how they felt. Their experienced feelings were not clear to them, and they were not sure of what they felt. The text concluded with: “In short, you are very uncertain about your feelings.”

Our manipulation of affect constituted of an emotion-inducing newspaper article describing a recent event concerning the software company the participants worked for. In the positive affect condition participants read a newspaper article which stated that BOLT had successfully launched a new software program on the market and, as a result, had obtained the predicted million Euros sales. Participants were informed that the future of the company looked promising. The newspaper article contained a quote of the president of the company: “I am tremendously pleased with the obtained results. This is a very positive experience. We are very enthusiastic about this”. In the negative affect condition the newspaper article stated that BOLT had not been successful in launching a new software program on the market and, as a consequence, had not obtained the predicted million Euros sales. Participants were informed that the future of the company looked gloomy. In this condition the president of the company stated: “I am tremendously dejected with the obtained results. This is a very negative experience. We are very distressed about this”.

For participants in the affective sharing condition the scenario continued with stating that they shared their feelings regarding the event described in the newspaper article with their fellow team members. Participants for instance read: “You and your team members exchange feelings with one another, so you know exactly what your team members experience at this moment”. Participants were informed that they had a shared affective experience regarding the situation at the company. In contrast, the affective non-sharing condition stated that participants did not share their feelings concerning the recent event at the company with the other team members. Participants were informed that: “You and your team members do not exchange feelings with one another, so you do not know what your team members experience at this moment”. Participants were told that they had a personal affective experience with regard to the situation at the company.

**Dependent Measures**

**Creative performance: originality.** Next, participants were told that they and their fellow team members of the company had to work on a task. This task, adapted from earlier work of Rietzschel et al. (2007), involved the drawing of an alien. Participants were asked to draw an alien on a blank sheet of paper in their booklet. The drawing was coded on its originality by two coders. Following the procedure of Rietzschel et al. (2007) coders independently coded the drawing on whether or not the alien had several mammal-like features (for each feature, yes or no). Specifically, the coders considered whether the alien
had: (1) a head separated from the body (for instance by a neck), (2) facial expressions, and (3) symmetrical features. For each of the three features a score of zero (yes) or one (no) was obtained. A higher number of “no” answers indicated a higher originality score, because the alien had a less mammal-like appearance. We used a sum score of the three criteria (with a minimum score of 0 and a maximum score of 3) as the dependent variable ($M = 0.95$, $SD = 0.66$). One coder coded all 293\(^1\) drawings; the second coded a subset of 120 drawings (randomly selected from each condition) to determine the interrater reliability. In the analyses, we used the ratings of the individual who had coded all drawings. Interrater reliability was assessed by computing the average intraclass correlation ($ICC_2$; Shrout & Fleiss, 1979). The intraclass correlation was .67, which is considered “good” according to the criteria for reliability coefficients developed by Cicchetti and Sparrow (1981).

**Manipulation checks.** We performed a pilot study to test whether our manipulation of affect was perceived as intended. Despite the fact that the presentation of films and stories has been found to be effective in inducing both positive and negative mood states (for a review see, Westermann, Spies, Stahl, & Hesse, 1996), we decided to test whether the newspaper article we designed indeed induced the intended affective states. Having our affect manipulation tested in a pilot, and on the account of the fact that all manipulations logically flowed from the one into the other, we decided to also test our other manipulations (affective certainty and affective sharing) with the same pilot. A pilot may also ensure that responses to manipulation checks and main dependent variables not unduly contaminate one another.

The pilot study consisted of seventy-three university students ($M_{age} = 24.9$, $SD = 4.4$, 38.4% male) who were randomly assigned to the experimental conditions. Responses to items were assessed on 5-point scales ranging from 1 (completely disagree) to 5 (completely agree). To check the successfulness of the affect manipulation we asked participants how they felt after reading the news article. We used three propositions of positive affective states (e.g., ‘I feel cheerful’, Cronbach’s $\alpha = .92$, $M = 2.59$, $SD = 1.23$) and three propositions reflecting negative affective states (e.g., ‘I feel miserable’, Cronbach’s $\alpha = .80$, $M = 2.20$, $SD = .86$) that were derived from circumplex models of affect (Larsen & Diener, 1992). The affective certainty manipulation was checked with two items (‘I am certain about how I feel’, and ‘I have a clear picture of my experienced feelings’, Cronbach’s $\alpha = .98$, $M = 3.21$, $SD = 1.56$). The affective sharing manipulation was checked with three items based on Klep,

---

\(^1\) Ten cases were rejected because of missing data.
Specifying the Mood-Creativity Link

Wisse, and Van der Flier (2007; e.g., ‘With respect to my experienced affect I have a lot in common with my group members’, Cronbach’s $\alpha = .96$, $M = 2.86$, $SD = 1.56$).

A $2 \times 2 \times 2$ analysis of variance (ANOVA) on the positive affect score revealed that participants in the positive affect condition experienced more positive affect than participants in the negative condition ($M = 3.48$, $SD = 0.90$ vs. $M = 1.72$, $SD = 0.80$, $F(1, 65) = 80.69$, $p < .001$, $\eta^2 = .55$). Similarly, an ANOVA on the negative affect score revealed that participants in the negative affect condition experienced more negative affect than participants in the positive affect condition ($M = 2.49$, $SD = 0.59$ vs. $M = 1.90$, $SD = 1.00$, $F(1, 65) = 10.47$, $p < .01$, $\eta^2 = .14$). An ANOVA on affective certainty showed that participants in the certain of affect condition reported feeling more certain than participants in the uncertain of affect condition ($M = 4.42$, $SD = 0.78$ vs. $M = 1.96$, $SD = 1.10$, $F(1, 65) = 122.66$, $p < .001$, $\eta^2 = .65$). Finally, an ANOVA on affective sharing showed that participants in the affective sharing condition reported having shared their feelings with other team members to a greater extent than participants in the affective non-sharing condition ($M = 4.29$, $SD = 0.72$ vs. $M = 1.55$, $SD = 0.76$, $F(1, 65) = 236.61$, $p < .001$, $\eta^2 = .78$). No other effects were found, thus we conclude that our manipulations were successful.

Results

Creative Performance: Originality

A $2$ (affect) by $2$ (certainty of affect) by $2$ (affective sharing) ANOVA on participants’ originality score of the alien task was performed. As expected, the analysis yielded a three-way interaction, $F(1, 285) = 7.32$, $p < .01$, $\eta^2 = .03$. To examine the nature of this interaction simple effects analyses were conducted (see Figure 3.1). Conform our hypothesis we found that participants who were uncertain of their affect were more creative when they were in the positive affect condition ($M = 1.31$, $SD = 0.75$) than when they were in the negative affect condition ($M = 0.92$, $SD = 0.67$) when they were in the affective sharing condition, $F(1, 291) = 6.05$, $p < .05$, $\eta^2 = .02$. When participants were certain of their affect no difference between positive ($M = 0.81$, $SD = 0.46$) and negative affect ($M = 1.05$, $SD = 0.71$) was found in the affective sharing condition, $F(1, 291) = 2.51$, $ns$, $\eta^2 = .01$. Additionally, for participants who were uncertain of their affect no difference between positive ($M = 0.91$, $SD = 0.71$) and negative affect ($M = 0.85$, $SD = 0.66$) was found, $F(1, 291) < 1$, $ns$, $\eta^2 = .00$ in the affective non-sharing condition. Similarly, when participants were certain of their affect no difference between positive ($M = 1.00$, $SD = 0.59$) and negative affect ($M = 0.74$, $SD = 0.61$) was found in the affective non-sharing condition, $F(1, 291) = 2.64$, $ns$, $\eta^2 = .01$. 

61
The results of the scenario-experiment indicate that our hypothesis was confirmed: Participants were more creative when they experienced positive affect as compared to negative affect when they had shared (vs. not shared) their affect with others, but only when they were affectively uncertain. In Study 1b we test the same hypothesis with a laboratory experiment set-up.
Study 1b

Method

**Design and participants.** Dutch university students (N = 155; \(M_{\text{age}} = 20.5, 31.6\% \) male) participated voluntarily and were randomly assigned to the conditions of a 2 (affect) by 2 (certainty of affect) by 2 (affective sharing) between-subjects design.

**Procedure.** Participants completed the study on individual computers, but were led to believe that computer-mediated connections with other participants existed and that they would partake in a study on group task behavior. In reality all interaction with other participants was simulated. First, however, participants watched two 5-minutes lasting film-clips as a means to manipulate participants’ mood (see Gerrards-Hesse, Spies, & Hesse, 1994). Participants watched two humorous film-clips (*Finding Nemo*; *Shrek 2*) in the **positive affect condition** and two tragic war film-clips (*The sky is falling*; *Sophie’s choice*) in the **negative affect condition**. Then participants wrote a short essay on their experienced feelings, picked an emotion icon (i.e., a smiley with a facial expression ranging from sad [1] to happy [5]) that best represented their own feelings, and responded to a series of items assessing their affective state and the extent to which they were certain of feeling that way.

To manipulate certainty of affect participants were told that the computer had calculated a personal score based on their responses to the certainty of affect propositions and that this score was compared with the aggregated results of an alleged pool of 850 previously participating students. Participants in the **certain of affect condition** were presented a scale with an arrow indicating that their personal certainty of affect score was well above average. This, so they were told, indicated their certainty, lack of doubt, and lack of confusion regarding current feeling states. In the **uncertain of affect condition** participants were also presented the scale, but this time the arrow indicated that their personal certainty of affect score was well below average. They were told that this score indicated their uncertainty, doubt, and confusion regarding current feeling states.

Thereupon, participants in the **affective sharing condition** were told that each group member’s short essay and chosen emotion icon would be mutually exchanged among the group members. Next, participants were presented with bogus affective information of their simulated fellow group members. Through the verbal (short description) and non-verbal (emotion icon) sharing of affect, the experience of processes such as affective contagion, affective comparison, and social sharing of affect were facilitated. Then, participants were allowed 5 minutes to write a collective description of experienced feelings. In contrast, in the **affective non-sharing condition** there was no mutual exchange. Participants were fed back
only their own affective information and as such they were not aware of their alleged group members’ feelings. Indeed, all affective sharing processes were inhibited. Then, participants were provided 5 minutes to write a description of own experienced feelings.

**Dependent Measures.**

**Creative performance: fluency.** To measure creative performance we opted for an idea-generation task. Note that idea-generation tasks are frequently used in creativity research targeted at teams (e.g., Grawitch et al., 2003a; Paulus & Yang, 2000) and individuals (e.g., Friedman & Förster, 2001; Rietzschel et al., 2007). In particular, the number of generated ideas is considered to tap into the fluency aspect of creativity (De Dreu et al., 2008; Paulus, 2000), and it is found to correlate quite highly with the originality aspect of creativity (Diehl & Stroebe, 1991). Our main dependent variable, creative performance, was the number of ideas to improve the environment participants generated in 8 minutes time ($M = 17.77$, $SD = 7.86$). Each participant was asked to type as many ideas as possible into the computer and was told that his or her personal production would eventually contribute to the overall group production, so that all group members were equally responsible for the work group’s task performance.

**Manipulation checks.** All responses to the manipulation checks were assessed on 7-point scales (1 = completely disagree, 7 = completely agree). To check the successfulness of the affect manipulation we used participants’ responses to the series of affect items that were presented after the mood induction. Items were derived from circumplex models of affect (Larsen & Diener, 1992) and assessed moods both high and low in activation level. The positive affect scale had nine items, including the same items that were used in Study 1a (e.g., ‘I feel cheerful’ and ‘I feel relaxed’; Cronbach’s $\alpha = .86$, $M = 4.39$, $SD = .96$). The negative affect scale had five items, including the same items that were used in Study 1a, (e.g., ‘I feel miserable’ and ‘I feel nervous’; Cronbach’s $\alpha = .74$, $M = 2.85$, $SD = 1.04$). As a check on our certainty of affect manipulation we used the same items that were used in Study 1a, adding two items to tailor the specific setting of Study 1b (e.g., ‘I am more certain of my experienced feelings than the other students in the pool’; Cronbach’s $\alpha = .87$, $M = 4.79$, $SD = 1.66$). As a check on our affective sharing manipulation we measured affective sharing with 13 items, including the same items that were used in Study 1a (Klep et al., 2007; e.g., ‘With respect to my experienced affect I have a lot in common with my group members’, ‘My feelings are shared with my group members’, ‘My experienced affect is highly similar to the experienced affect of my group members’; Cronbach’s $\alpha = .96$, $M = 3.60$, $SD = 1.69$).
Results

In all analyses of variance (ANOVAs) affect, certainty of affect, and affective sharing were factors in the design.

**Manipulation checks.** ANOVAs showed that more positive affect was felt in the positive affect condition \((M = 4.94, SD = 0.70)\) than in the negative affect condition \((M = 3.83, SD = 0.87)\), \(F(1, 147) = 78.27, p < .001, \eta^2 = .35\), and that more negative affect was felt in the negative affect condition \((M = 3.27, SD = 0.96)\) than in the positive affect condition \((M = 2.44, SD = 0.95)\), \(F(1, 147) = 29.73, p < .001, \eta^2 = .17\). Participants in the certain of affect condition felt more certain \((M = 6.00, SD = 0.69)\) than participants in the uncertain of affect condition \((M = 3.56, SD = 1.43)\), \(F(1, 147) = 187.02, p < .001, \eta^2 = .56\). Finally, participants in the affective sharing condition more strongly felt to have shared their feelings with other team members \((M = 5.08, SD = 0.62)\) than participants in the affective non-sharing condition \((M = 2.05, SD = 0.86)\), \(F(1, 147) = 637.37, p < .001, \eta^2 = .81\). No other effects but the ones reported were found, therefore, we conclude that our manipulations were successful.

**Creative Performance: Fluency**

An ANOVA on the number of ideas was performed. No main effects or two-way interactions were found, but the expected three-way interaction emerged, \(F(1, 147) = 8.18, p < .01, \eta^2 = .05\). Simple effects analyses (see Figure 3.2) revealed that, conform our hypothesis, participants who were uncertain of their affect were more creative when affect was positive \((M = 22.50, SD = 11.38)\) than when affect was negative \((M = 15.42, SD = 6.89)\) in the affective sharing condition, \(F(1, 153) = 8.44, p < .01, \eta^2 = .05\). When participants were certain of their affect no difference between positive \((M = 14.85, SD = 5.40)\) and negative affect \((M = 18.95, SD = 9.21)\) was found in the affective sharing condition, \(F(1, 153) = 2.75, ns, \eta^2 = .02\). Additionally, for participants who were uncertain of their affect no difference between positive \((M = 17.79, SD = 5.21)\) and negative affect \((M = 16.47, SD = 7.43)\) was found in the affective non-sharing condition, \(F(1, 153) < 1, ns, \eta^2 = .00\). Similarly, when participants were certain of their affect no difference between positive \((M = 20.11, SD = 7.82)\) and negative affect \((M = 15.95, SD = 5.21)\) was found in the affective non-sharing condition, \(F(1, 153) = 2.69, ns, \eta^2 = .02\).
Figure 3.2. Effects of three-way interaction of affect by certainty of affect by affective sharing on creative performance (fluency) for Study 1b.

Discussion

The results of Study 1a and Study 1b provide evidence for our hypothesis that positive affect is positively related to creativity with increasing affective sharing with others, especially for individuals who are uncertain of their experienced affect. However, as we will explain in the below, the missing empirical evidence on the process, issues related to generalizability, and our curiosity regarding the translatability to the group level, call for additional research.
First, Studies 1a and 1b fall short on providing empirical evidence on the underlying mechanism. We propose that the interplay between positive affect, its sharing, and affective certainty may feed into creativity through the cooperative tendencies it may evoke. Ample studies show that positive affect encourages the display of cooperative behaviors (for reviews see Isen & Baron, 1991; Lyubomirsky, King, & Diener, 2005). For instance, positive affect has been found to increase prosocial organizational behavior towards customers and coworkers (George, 1991), cooperative behavior in bargaining situations (Carnevale & Isen, 1986; Forgas, 1998b), and willingness of customers to help people in their surroundings (Isen & Levin, 1972). Moreover, available research not only shows that individual level affect feeds into cooperation, it also suggests that group affect (i.e., homogenous affective states among group members) feeds into group level cooperation (Barsade, 2002; George, 1990; Tanghe, Wisse, & Van der Flier, in press-b). We reason positive affect to feed into cooperative behaviors especially when people share their affective states and are uncertain of their feelings, because as mentioned earlier: (1) shared affect serves a validating function. This, according to the mood-as-input model strengthens the mood-behavior link and positive affect may convey a sense of security that invites to engage in agreeable and friendly behavior towards others; (2) under the condition of shared positive affect individuals may trust that others may also act on their moods in the same fashion. The instrumental social support (Van Zomeren et al., 2004) may feed into people's cooperative tendencies towards others. Again, we assume that affective sharing is especially relevant for the affective uncertain.

Past research also indicated that cooperative interactions among coworkers may stimulate creativity (e.g., Shalley, Zhou, & Oldham, 2004; Zhou & George, 2001). Several possible reasons for the positive relationship between cooperative tendencies and creativity may be offered. Firstly, cooperative behavior enhances employees' intrinsic motivation which stimulates creativity (e.g., Shalley et al., 2004). Secondly, coworkers' cooperative behavior often involves the sharing of knowledge and ideas, which enhances cognitive stimulation and, thereby, fosters creativity (e.g., Madjar, 2005, 2008; Paulus & Yang, 2000; Rice, 2006). Thirdly, cooperation of the one person, elicits cooperation of the others (e.g., Blau, 1964; Tsai, Chen, & Liu, 2007), which may facilitate perceptions of a psychologically safe working climate. Feelings of psychological safety are associated with higher levels of employees’ involvement in creative work (Kark & Carmeli, 2009; Rasulzada & Dackert, 2009). Based on the above we come to our second hypothesis concerning the question why positive affect influences creativity.

Hypothesis 2: The effect of positive affect on creativity will be mediated by cooperative tendencies, specifically for those who are high in affective sharing and low in certainty of affect.
Second, the experimental set-ups in Study 1a and 1b enabled us to draw conclusions about causality and to obtain objective measures of performance, however, it does not allow us to determine whether the proposed relationships genuinely occur in organizational settings. Field studies could provide the ecological validity that is lacking.

Third, so far we focused on how affective processes are influenced by the fact that they are often embedded within a group context. As such, Study 1a and 1b focused on how an individual’s positive affect feeds into this individual’s creative performance, depending on the extent to which this person perceived to have shared his or her affect with others and on his or her affective certainty. Thus, Study 1a and 1b applied an individual level of analysis. However, as the investigated processes largely occur as a result of group based influence, one may wonder if investigated relationships may also actually translate to the group level. This question may arise particularly because previous research showed that relationships between affect and creativity (Grawitch et al., 2003a, 2003b) and affect and cooperation (e.g., Barsade, 2002) also exist at the group level. Therefore, we like to explore the idea that work groups’ positive affect may feed into group creativity with increasing within group affective sharing, especially when the group is comprised of group members who are uncertain of their experienced affect. A study with the work group as the unit of analyses may serve that purpose.

In light of the above, we opted for conducting two additional organizational surveys. Our main goals were: (1) to provide evidence for the proposed mediating process (Study 2a and Study 2b), (2) to replicate the findings of the scenario study and the laboratory study in an organizational setting (Study 2a and Study 2b), and (3) to examine the proposed relationships at the group level (Study 2b). For the organizational surveys we did not obtain behavioral measures of creativity. Instead, we measured employees’ creative work involvement, which has been defined as an employee’s motivation to be engaged in creative processes at work and reflects a subjective assessment of the degree to which an employee is engaged in creative tasks (Kark & Carmeli, 2009; p.787). Creative work involvement is considered a major determinant of actual creative behavior (Kark & Carmeli, 2009).

**Study 2a**

**Method**

*Sample and procedure.* Respondents were 116 employees \(M_{age} = 28.7, SD = 9.28, 37\% \text{male}, M_{\text{job tenure in current organization}} = 3.58 \text{ year, SD} = 5.39; \text{response rate 94}\%\) mainly derived from customer-service oriented organizations such as work agencies (31.9%), stores (31.1%), and banks (12.1%). Employees were approached at work and asked to participate in a study...
about organizational life. Participation was voluntary and anonymity was ensured. Participants were asked to reflect on their thoughts and feelings in relation to their current work and current group members. Participants filled out the questionnaire individually and returned it to the research assistant upon completion. Because people were approached at work and had to fill out the questionnaire on the spot, we kept the survey short and to the point.

**Measures.** All responses were assessed on 7-point scales (1 = completely disagree, 7 = completely agree). Positive affect was measured with five items of the PANAS (Watson, Clark, & Tellegen, 1988). For each item, participants were asked to describe how they felt at work during the past week. Items included ‘I feel proud’ and ‘I feel energetic’ (Cronbach’s α = .76). Certainty of affect was measured with four items similar to the ones used in Study 1b, but adapted to the field setting (Cronbach’s α = .82). Affective sharing was assessed with a six-item version of the scale we used in Study 1b (Cronbach’s α = .80).

Our proposed mediator, cooperative tendencies, was measured with seven items based on the interpersonal helping scale of Moorman and Blakely (1995) and the willingness to cooperate scale of Tanghe et al. (in press-b). Items include: ‘I do my best to help colleagues of this team with work related problems’ and ‘I am willing to invest in a good working relationship with these team members’; Cronbach’s α = .81).

To measure group members’ creative work involvement we formulated three items: ‘In this team I am a good source of creative ideas that are useful in our job’, ‘I often have a fresh approach to problems that this team encounters at work’, and ‘I take risks while performing my job in order to try out new things in this team’ (Cronbach’s α = .79; cf. Kark & Carmeli, 2009).

**Results**

Means, standard deviations, intercorrelations, and internal consistency reliabilities of the scales are depicted in Table 3.1.\(^2\)

\(^2\) Principal-components analysis (PCA) with OBLIMIN rotation confirmed the hypothesized factor structure for items comprising the dependent variables. All items loaded between |.57| and |.86| on the intended component and cross-loadings were below |.31|. The eigenvalues of the two factors were greater than one, explaining a total of 56.97% of the variance. PCA with OBLIMIN rotation for items comprising the independent variables showed that all items loaded between |.51| and |.86| on the intended component and cross-loadings were below |.23|. The eigenvalues of the three factors were greater than one, explaining a total of 57.34% of the variance.
Table 3.1. Means, Standard Deviations, and Intercorrelations between all Variables for Study 2a

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Positive Affect</td>
<td>5.05</td>
<td>0.93</td>
<td>.76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Certainty of Affect</td>
<td>5.66</td>
<td>0.82</td>
<td>.18</td>
<td>.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Affective Sharing</td>
<td>4.22</td>
<td>0.96</td>
<td>.09</td>
<td>-.04</td>
<td></td>
<td>(.80)</td>
<td></td>
</tr>
<tr>
<td>4. Creative Work Involvement</td>
<td>4.47</td>
<td>1.13</td>
<td>.18</td>
<td>.08</td>
<td>.23*</td>
<td>(.79)</td>
<td></td>
</tr>
<tr>
<td>5. Cooperative Tendencies</td>
<td>5.68</td>
<td>0.75</td>
<td>.30**</td>
<td>.17</td>
<td>.28**</td>
<td>.36**</td>
<td>(.81)</td>
</tr>
</tbody>
</table>

Note. N = 116 (listwise). Internal consistency reliabilities are in parentheses along the diagonal.
* p < .05. ** p < .01. (two-tailed).

Creative Work Involvement

To test our first hypothesis we conducted hierarchical regression analysis\(^3\) using standardized values of the variables. Creative work involvement was the dependent variable and the three main effect terms (positive affect, certainty of affect, and affective sharing), the three two-way interaction terms, and the three-way interaction term were entered into the equation as predictors (see Table 3.2).

Apart from the main effect of affective sharing (\( \beta = .34, p < .01 \)), we found the expected three-way interaction (\( \beta = -.29, p < .05 \)). Simple slopes analyses (Aiken & West, 1991) showed that when certainty of affect is low (1 SD below the mean) and affective sharing is high (1 SD above the mean), positive affect is positively associated with creativity (\( \beta = .61, p < .05 \)). Positive affect was unrelated to creativity when (1) certainty of affect is low and affective sharing is low (\( \beta = -.02, ns \)), (2) certainty of affect is high and affective sharing is low (\( \beta = .15, ns \)), and (3) certainty of affect is high and affective sharing is high (\( \beta = -.09, ns \)). Thus, the results showed that positive affect is positively related to creative work involvement with increasing affective sharing with fellow team members, specifically for the affectively uncertain (see Figure 3.3).

\(^3\) Entering the control variables gender (1 = male, 2 = female), age (in years), and job tenure in the current organization (in years) into the equation did not influence the reported pattern of results.
Table 3.2. Results of Hierarchical Regression Analysis for Creative Work Involvement for Study 2a

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>ΔR²</th>
<th>t</th>
<th>β</th>
<th>ΔR²</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Affect (PA)</td>
<td>.16</td>
<td>.02</td>
<td>1.58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certainty of Affect (CA)</td>
<td>.07</td>
<td>.00</td>
<td>0.69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective Sharing (AS)</td>
<td>.34</td>
<td>.09</td>
<td>3.32**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA × CA</td>
<td>-.14</td>
<td>.01</td>
<td>-1.23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA × AS</td>
<td>.12</td>
<td>.01</td>
<td>0.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA × AS</td>
<td>-.15</td>
<td>.02</td>
<td>-1.47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA × CA × AS</td>
<td>-.29</td>
<td>.04</td>
<td>-2.09*</td>
<td>-.21</td>
<td>.02</td>
<td>-1.54</td>
</tr>
<tr>
<td>Cooperative Tendencies</td>
<td></td>
<td>.25</td>
<td>2.50*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 116 (listwise). ΔR² is the variance explained by each predictor after the other predictors have been entered into the equation.

* p < .05. ** p < .01. (two-tailed).

Figure 3.3. Effects of three-way interaction of positive affect by certainty of affect by affective sharing on creative work involvement for Study 2a.
In addition, we hypothesized that the effect of positive affect on creativity would be mediated by cooperative tendencies as a function of the interplay between affective sharing and certainty of affect (cf. Muller, Judd, & Yzerbyt, 2005). To test our second hypothesis we first added the proposed mediator to Step 2 of the regression analysis (see Table 3.2). Results indicated that the effect of cooperative tendencies was significant ($\beta = .25, p < .05$), whereas the three-way interaction no longer was ($\beta = -.21, ns$). Also, the three-way interaction had the expected significant effect on the mediator ($\beta = -.30, p < .05$). To examine whether mediation occurred particularly in the hypothesized condition (i.e., when certainty of affect is low and affective sharing is high), we tested for conditional indirect effects (cf., Muller et al., 2005; Preacher, Rucker, & Hayes, 2007). We employed Edwards and Lamberts’ (2007) bootstrapping procedure to calculate estimates of indirect effects and to test their significance by using 95% confidence intervals. As expected, results from bootstrapping yielded a significant mean indirect effect of positive affect on creative work involvement through cooperative tendencies ($\beta = .22, p < .001$) when certainty of affect is low (1 SD below the mean) and affective sharing is high (1 SD above the mean). In all other conditions indirect effects were non-significant (see Table 3.3). Figure 3.4 shows how all combinations of moderator variables influence the paths that constitute the direct, total, and residual effects of mediated models.

**Table 3.3. Bootstrapped Indirect Effects of Positive Affect on Creative Work Involvement through Cooperative Tendencies at Specific Combinations of the Moderators for Study 2a**

<table>
<thead>
<tr>
<th>Combinations of Moderators</th>
<th>$\beta$</th>
<th>$SE$</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certainty of Affect low (-1 SD)</td>
<td>.01</td>
<td>.08</td>
<td>-.15</td>
<td>.13</td>
</tr>
<tr>
<td>Affective Sharing low (-1 SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certainty of Affect low (-1 SD)</td>
<td>.22***</td>
<td>.12</td>
<td>.08</td>
<td>.50</td>
</tr>
<tr>
<td>Affective Sharing high (+1 SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certainty of Affect high (+1 SD)</td>
<td>.05</td>
<td>.07</td>
<td>-.03</td>
<td>.18</td>
</tr>
<tr>
<td>Affective Sharing low (-1 SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certainty of Affect high (+1 SD)</td>
<td>.02</td>
<td>.05</td>
<td>-.03</td>
<td>.12</td>
</tr>
<tr>
<td>Affective Sharing high (+1 SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. ** $p < .001$; $N = 10,000$ Bootstrapping resamples. LLCI and ULCI = Lower Level and Upper Level of the bias Corrected 95% confidence Interval.*
Figure 3.4. Mediated models for Study 2a showing simple effects (direct, total, and residual effects) for all combinations of low and high certainty of affect and low and high affective sharing. For each model, X represents positive affect, M signifies cooperative tendencies, and Y indicates creative work involvement. Panel B shows a path of positive affect on creative work involvement mediated by cooperative tendencies. Numbers in brackets are regressions weights of the direct effects after the mediator has been controlled for.

* p < .05.  *** p < .001. (two-tailed).

Study 2b

Method

Sample and procedure. Our sample hosted 42 work groups (126 employees; \( M_{\text{age}} = 32.3, SD = 12.53, 46\% \) male, \( M_{\text{employment in current organization}} = 6.23 \text{ year}, SD = 7.67 \) \( M_{\text{employment in current team}} = 4.13 \text{ year}, SD = 5.28 \)). Work groups were mainly derived from commercially orientated service-organizations, such as shops (40.5%) and offices (19%). Participation was restricted to work groups that had at least three members willing to fill out the questionnaire. All work groups that were approached were willing to participate in the current study. We used the same procedure as in Study 2a.

Measures. All responses were assessed on 7-point scales (1 = completely disagree, 7 = completely agree). Positive affect was measured with the same nine items we also used in Study 1b (Cronbach’s \( \alpha = .77 \)). Certainty of affect was assessed with the same items that were used in Study 2a (Cronbach’s \( \alpha = .89 \)). Affective sharing was assessed with nine items of the
affective sharing scale of Klep et al. (2007) that we also used in Study 1b and 2a (Cronbach’s α = .70).

Cooperative tendencies was measured with four items of the scale used in Study 2a (Cronbach’s α = .89).

To measure creative work involvement we used the three items of Study 2a and added an extra item in order to more explicitly include the idea that the engagement in creative processes at work refers to generating ideas that are both novel and useful (cf. George & Zhou, 2002; ‘In this team I often have new ideas, which are of use for the team’s task performance’; Cronbach’s α = .87).

Results

To examine the justification for aggregating individual responses to the group level we calculated $r_{wg}$ values (James, Demaree, & Wolf, 1984). $r_{wg}$ measures were above .75 for all variables and thus exceeded the suggested .70 cut-off value for aggregating ratings from the individual level to the group level (James et al., 1984). These results justify aggregation to the group level. Means, standard deviations, Cronbach’s alphas, and intercorrelations for the aggregated scores are depicted in Table 3.4.

Creative Work Involvement

To test our first hypothesis we conducted hierarchical regression analysis using standardized values of the group level variables with creative work involvement as the dependent variable. The three main effect terms and all two- and three-way interaction terms were entered into the equation as predictors (see Table 3.5).

---

4 $r_{wg}$ measures were .87 for positive affect, .76 for certainty of affect, .81 for affective sharing, .75 for creative work involvement, and .84 for cooperative tendencies.

5 PCA with OBLIMIN rotation confirmed the hypothesized factor structure for items comprising the dependent variables. All items were above |.70| on the intended factor, and all cross-loadings were below |.20|. The eigenvalues of the two factors were greater than one, explaining a total of 73.97% of the variance. PCA with OBLIMIN rotation for items comprising the independent variables showed that: certainty of affect items explained 75.93% of the variance, positive affect items explained 38.94% of the variance, and affective sharing items explained 33.91% of the variance, with all items loading above |.85| and |.37| on the one factor.

6 Entering the control variables gender (1 = male, 2 = female), age (in years), job tenure in the current organization (in years), and working period in the current team (in years) into the equation did not influence the reported pattern of results.
Specify the Mood-Creativity Link

Table 3.4. Means, Standard Deviations, and Intercorrelations between all Group Level Variables for Study 2b

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Positive Affect</td>
<td>4.91</td>
<td>0.51</td>
<td>.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Certainty of Affect</td>
<td>5.43</td>
<td>0.82</td>
<td>.31*</td>
<td>.91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Affective Sharing</td>
<td>4.09</td>
<td>0.55</td>
<td>.07</td>
<td>-.03</td>
<td>.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Creative Work Involvement</td>
<td>4.46</td>
<td>0.80</td>
<td>.44**</td>
<td>.36*</td>
<td>-.09</td>
<td>.90</td>
<td></td>
</tr>
<tr>
<td>5. Cooperative Tendencies</td>
<td>5.54</td>
<td>0.68</td>
<td>.30†</td>
<td>.66**</td>
<td>.18</td>
<td>.59**</td>
<td>.93</td>
</tr>
</tbody>
</table>

Note. N = 42 (listwise). Internal consistency reliabilities at the group level are in parentheses along the diagonal. † p < .10. * p < .05. ** p < .01. (two-tailed).

Table 3.5. Results of Hierarchical Regression Analysis at the Group Level for Creative Work Involvement for Study 2b

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>ΔR²</th>
<th>t</th>
<th>β</th>
<th>ΔR²</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Affect (PA)</td>
<td>.36</td>
<td>.09</td>
<td>2.34*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certainty of Affect (CA)</td>
<td>.43</td>
<td>.14</td>
<td>2.92*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective Sharing (AS)</td>
<td>-.19</td>
<td>.03</td>
<td>-1.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA × CA</td>
<td>.14</td>
<td>.02</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA × AS</td>
<td>.32</td>
<td>.06</td>
<td>1.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA × AS</td>
<td>.45</td>
<td>.11</td>
<td>2.59*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA × CA × AS</td>
<td>-.52</td>
<td>.12</td>
<td>-2.67**</td>
<td>-.29</td>
<td>.03</td>
<td>-1.69</td>
</tr>
<tr>
<td>Cooperative Tendencies</td>
<td>.66</td>
<td>.19</td>
<td>4.17***</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 42 (listwise). ΔR² is the variance explained by each predictor after the other predictors have been entered into the equation. * p < .05. ** p < .01. (two-tailed).
Main effects of positive affect (β = .36, p < .05) and certainty of affect (β = .43, p < .05) showed that both factors are positively related to group creative work involvement. A Certainty of Affect × Affective Sharing interaction indicated that certainty of affect is significantly related to creativity when affective sharing is high (1 SD above the mean, β = .88, p < .01), but was not related to creativity when affective sharing is low (1 SD below the mean, β = -.03, ns).

Moreover, and consistent with our first hypothesis, the three-way interaction was significant (β = -.52, p < .01). Simple slopes analyses (Aiken & West, 1991) showed that when certainty of affect is low (1 SD below the mean) and affective sharing is high (1 SD above the mean), positive affect is positively associated with creativity (β = 1.03, p < .01). Moreover, positive affect is unrelated to creativity when (1) certainty of affect is low and affective sharing is low (β = -.58, ns), (2) certainty of affect is high and affective sharing is low (β = .63, ns), and (3) certainty of affect is high and affective sharing is high (β = .34, ns). Thus, the results clearly corroborate the hypothesis that work groups’ positive affect may feed into group creativity with increasing affective sharing, especially when groups are uncertain of their experienced affect (see Figure 3.5).

Figure 3.5. Effects of three-way interaction of group level affect variables (positive affect, certainty of affect, affective sharing) on group level creative work involvement for Study 2b.
To test whether the work groups’ cooperative tendencies may serve as a mediator in this process, we first added the proposed mediator in Step 2 of the regression analysis (see Table 3.5). The effect of cooperative tendencies was significant ($\beta = .66, p < .001$), whereas the three-way interaction no longer was ($\beta = -.29, ns$). Also, the three-way interaction had the expected significant effect on the mediator ($\beta = -.35, p < .05$). To examine whether mediation occurred particularly in the hypothesized condition (i.e., when certainty of affect is low and affective sharing is high), we again employed Edwards and Lamberts’ (2007) bootstrapping procedure. As expected, results from bootstrapping yielded a significant mean indirect effect of group level positive affect on group creative work involvement through cooperative tendencies ($\beta = .39, p < .01$) when within group certainty of affect is low (1 SD below the mean) and affective sharing is high (1 SD above the mean). In all three other combinations of the moderators indirect effects were non-significant (see Table 3.6 as well as Figure 3.6).

Table 3.6. Bootstrapped Indirect Effects of Positive Affect on Creative Work Involvement through Cooperative Tendencies at Specific Combinations of the Moderators for Study 2b

<table>
<thead>
<tr>
<th>Combinations of Moderators</th>
<th>Creative Work Involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$</td>
</tr>
<tr>
<td>Certainty of Affect low (−1 SD) Affective Sharing low (−1 SD)</td>
<td>-.26</td>
</tr>
<tr>
<td>Certainty of Affect low (−1 SD) Affective Sharing high (+1 SD)</td>
<td>.39**</td>
</tr>
<tr>
<td>Certainty of Affect high (+1 SD) Affective Sharing low (−1 SD)</td>
<td>.19</td>
</tr>
<tr>
<td>Certainty of Affect high (+1 SD) Affective Sharing high (+1 SD)</td>
<td>-.02</td>
</tr>
</tbody>
</table>

Note. ** $p < .001$. ; $N = 10,000$ Bootstrapping resamples. LLCI and ULCI = Lower Level and Upper Level of the bias Corrected 95% confidence Interval.
Figure 3.6. Mediated models for group level Study 2b showing simple effects (direct, total, and residual effects) for all combinations of low and high certainty of affect and low and high affective sharing. For each model, $X$ represents positive affect, $M$ signifies cooperative tendencies, and $Y$ indicates creative work involvement. Panel B shows a path of positive affect on creative work involvement partially mediated by cooperative tendencies. Numbers in brackets are regressions weights of the direct effects after the mediator has been controlled for. * $p < .05$. ** $p < .01$. *** $p < .001$. (two-tailed).

General Discussion

Prior research seemed to call for more insight into when and why positive affect may engender creativity. In the present paper we present one scenario study, one laboratory experiment and two field studies that consistently show that positive affect is positively related to creativity with increasing affective sharing with others, specifically for those who are low on certainty of affect. In addition, our two field studies show that cooperative tendencies (partially) mediated the effects of positive affect on employees’ creative work involvement under these circumstances. Moreover, the investigated relationships were not only to be found at the individual level of analysis (Study 1a, Study 1b, and Study 2a), showing that individual group member’s creative performance is contingent on his or her affective state, affective certainty and affective sharing, they were also to be found at the group level of analysis (Study 2b), showing that groups’ creative performance is contingent on group level affective state, affective certainty and affective sharing. Furthermore, our findings were consistent for three different measures of creativity: originality (Study 1a), fluency (Study 1b),
and creative work involvement (Study 2a and 2b). The fact that our results can be generalized over different measures of creativity, across studies that applied different methods, and over different levels of analysis strengthens the idea that affective sharing and affective certainty play an important role in the mood-creativity link.

The current study extends earlier studies on when mood influences creativity in several ways. First, prior research on moderators of the mood-creativity link have mainly focused on task-related factors such as, task type (Vosburg, 1998a), problem solving strategies (Vosburg, 1998b), and task framing (Friedman, Förster, & Denzler, 2007), or on organizational characteristics, such as supervisor behaviors (e.g., Madjar et al., 2002; Zhou, 2003). However, although this research has provided new and relevant insights, it is surprising that relatively few empirical studies (for a review see Baas et al., 2008) focused on affect-related factors when trying to understand the effects of affective states on creativity. Therefore, in the present study, we brought together three key affect variables: (a) positive affect which compasses the hedonic tone of the mood state, (b) affective sharing which reflects the social processes in which affect is embedded, and (c) certainty of affect which is concerned with the reflective processes associated with feelings, and show that their interplay may explain the link between affect and creativity.

The current study testifies to the value of adapting a contextual perspective on the mood-creativity link. We found that positive affect may indeed feed into creativity but only under particular circumstances. However, and importantly, our findings do not speak against potential positive effects of negative affect on creativity. George and Zhou (2002), also advocating a contextual perspective, clearly show that in particular circumstances (when both perceived recognition and rewards for creative performance and clarity of feelings were high) negative affect may indeed feed into creativity. Moreover, negative moods may also produce more creativity to the extent that they are activating (high arousal) instead of de-activating (low arousal) in nature (De Dreu et al., 2008).

Earlier studies on the mood-creativity link have largely neglected that affect (positive or negative in valence) may be shared among group members, and this sharing of affect may play a prominent role in explaining mood effects on creativity. The present study shows that the sharing of affect may strengthen the effect of mood on creativity when affective certainty is low. In this case, as we concentrated on positive affect, creativity levels benefit from affective sharing under high affective uncertainty. However, earlier theorizing suggested that sharing of affect may also be dysfunctional and discourages creativity when groups are working on complex tasks that need creative input (George & King, 2007). Future research should tease out the circumstances in which sharing may have beneficial or detrimental effects.
Moreover, our findings show that affective sharing is especially relevant for people who are uncertain of their experienced affect, which aligns well with earlier research stating that affectively uncertain people are motivated to seek mood relevant information from similar others (Gump & Kulik, 1997; Schachter, 1959). Note that in addition to prior research that characterizes certainty of affect as relatively stable and enduring, the current study shows that certainty of affect may also be perceived as a more fleeting state-like variable as it was successfully manipulated both in a scenario study (Study 1a) and a laboratory setting (Study 1b) and measured within a specific time frame and specific work context (Study 2a and Study 2b). Thereby, we add to scant research investigating momentary affective certainty (Lischetzke et al., 2005) and extend existing literature on meta-mood experiences (e.g., Marsh & Webb, 1996; Mayer, Salovey, Gombergen-Kaufman, & Blainey, 1991; Salovey et al., 2005). Besides valence of affect, affective sharing and affective certainty, several other aspects of affective experiences, such as emotional ambivalence, absorption, intensity, attention, and expression (cf. Gohm & Clore, 2000; Ting Fong, 2006) may be considered as fruitful avenues for future research concerning the mood-creativity link.

The present study also examined why positive affect may feed into creativity. Although theorists have suggested several possible underlying processes explaining the positive mood-creativity link, empirical evidence on mechanisms behind this relationship is scarce. Recently, Hirt et al. (2008) found that individuals in a happy mood were more creative due to strategic efforts to maintain their happy mood, thereby providing evidence for a hedonic contingency perspective. In addition, a recent study of the De Dreu et al. (2008) shows that positive activating moods increased creativity via enhanced cognitive flexibility, which supports a cognitive tuning view stating that positive affect allows individuals to be inclusive in their thinking and explore novel pathways. The current study adds to the literature by providing first evidence that cooperative tendencies may mediate the effects of positive mood on creativity in specific circumstances. Moreover, the mediating effect of cooperative tendencies was not only found at the individual level of analysis (Study 2a), but also at the group level of analysis (Study 2b).

Some previous studies seem to suggest that cooperation may at times diminish creative performance (e.g., Goncalo & Staw, 2006; Nemeth & Kwan, 1987). For instance, Beersma & De Dreu (2005) found that, after having been subjected to intragroup conflict, proself groups performed better than prosocial groups on a creativity task. However, the results from our studies suggest that willingness to cooperate may also feed into creative performance, through its effect on creative work involvement. The finding that cooperation with other group members encourages creativity is in line with literature on brainstorming which shows that collaborating on idea development stimulates the generation of additional
novel ideas (e.g., Dugosh, Paulus, Roland, & Yang, 2000; Paulus, 2000). Moreover, our results align well with recent theoretical analyses suggesting that sharing of positive group emotions enhances creativity by building on each others ideas, morale-building communication, and active affirmation, all of which may be related to cooperation (cf., Rhee, 2007). Hence, our study emphasizes the importance of cooperative interactions between team members as a mediating process of the positive affect-creativity link.

As every study, the present study has its strengths and limitations. We employed a scenario study, a laboratory study, and two organizational surveys so that the strengths of the one method may compensate for the weaknesses of the other (Dipboye, 1990). First, weaknesses of our experimental studies (Study 1a and 1b) concern the fact that the experimental set-ups let participants to either imagine (Study 1a) or to believe (Study 1b) that they were interacting in a team without actually seeing their team members. Although we used media that are less ‘rich’ as compared to the richness that can be obtained by face-to-face interaction (Daft & Lengel, 1984), similar manipulations have successfully been used by other researchers and our manipulation checks reveal that affective sharing may well be manipulated without face-to-face interaction (Peters & Kashima, 2007). Yet, even stronger effects may be obtained with higher levels of informational richness (Daft & Lengel, 1984), and we would therefore expect future research that uses real interacting teams to replicate our current findings. Furthermore, the concerns in Study 1a and 1b pose less of a threat to the overall conclusions of the study because we added two field studies to our research. Correlational surveys allowed us to study employees from a wide range of organizations, thereby increasing generalizability and enhancing external validity.

This last issue is particularly important because some authors have argued that it may be difficult to generalize creativity that is measured in the laboratory to creativity that is measured in the field (George & Zhou, 2002, 2007). Yet, we concur with Paulus (2008) when he states that even though work teams in organizations involve more complexity than ad hoc laboratory groups, they may be susceptible to the same forces that govern groups in general. However, we recognize that participants are not real employees, and thus that the use of multiple methods for the study of creativity should be encouraged (Zhou & Shalley, 2008).

Studies 2a and 2b had a mono source/mono method design, and as a consequence, relationships between variables may be inflated. The main effects of affective sharing (Study 2a), positive affect and certainty of affect (Study 2b) may therefore be overestimated. It is important to note, however that common source/method bias cannot easily account for statistical interactions – indeed, because it may inflate main effects, it leads to an underestimation of the effect size of interactions, and lowers the power for the test of
interactions (Evans, 1985; McClelland & Judd, 1993) – and thus forms no threat to the validity of our conclusions about the interplay between affective sharing, positive affect and certainty of affect.

Conclusion

All in all, the present study denotes the complexity and the intricacy of the study of the influence of affect on behavior. Indeed, it shows that it may not be sufficient to regard affect in terms of valence alone to explain the mood-creativity relationship. Instead affect may have differential effects to the extent that it is shared with others and to the extent that people feel certain about their feelings. These findings point to the need to come to a more complete picture of affect variables where the link between affect and behavior is concerned. In the present study, we brought together three key affect variables: valence of affect, sharing of affect and certainty of affect, and identified why these interactive effects occur. Our results suggest that future research may benefit from employing a broader affective framework when trying to specify the complex mood-creativity link.