

Group brainstorming: When regulatory nonfit enhances performance

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Abstract

In a study investigating motivational factors in group brainstorming, we investigated the impact on performance of regulatory fit/nonfit (based on the group's focus and task strategy). All members of three-person groups were placed in either a promotion focus or a prevention focus and then were all given either an eager strategy or a vigilant strategy for performing a brainstorming task (with an expectancy stop rule). As predicted, groups experiencing nonfit (promotion/vigilant, prevention/eager) spent more time working on the task and generated more nonredundant ideas than did groups experiencing fit (promotion/eager, prevention/vigilant). Also as predicted, task persistence mediated the joint impact of regulatory focus and task strategy on idea generation. Parallel results for idea diversity and quality were accounted for by number of ideas generated. These findings shed light on motivational aspects of group brainstorming and demonstrate the utility of regulatory fit theory for explaining small group phenomena.

Keywords

brainstorming, creativity, groups, regulatory fit

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The ability to generate novel and useful ideas is a critical component of group effectiveness. Some 60 years ago, Alex Osborn (1953, 1957) suggested that “brainstorming” can be a useful technique for stimulating group creativity. He argued that idea-generating groups adopting four procedural rules (criticism is ruled out, free-wheeling is welcomed, quantity is wanted, and combination and improvement are sought) could be much more effective than individuals in generating creative ideas. Unfortunately, Osborn's optimism about the effectiveness of brainstorming groups was not confirmed by decades of subsequent

research, which demonstrated that nominal groups (composed of individuals working alone) typically generate more total ideas and more high-quality ideas than do interacting groups of the same size (see reviews by Larson, 2010; Mullen,

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Johnson, & Salas, 1991; Stroebe, Nijstad, & Rietzschel, 2010).

Initial research on brainstorming sought to clarify why interacting groups suffer productivity losses vis-à-vis nominal groups. Two general mechanisms were investigated—coordination loss and motivation loss. The former involves production blocking, which occurs because members of interacting groups must take turns when expressing their ideas. The latter can involve several processes, including evaluation apprehension, social loafing and free riding, and performance matching. Evidence suggests that, although both coordination and motivation problems can contribute to the productivity losses of interacting groups, the former has a larger impact (Larson, 2010; Stroebe et al., 2010).

Notwithstanding this general conclusion, the impact of motivational factors on group (as well as individual) creativity continues to elicit considerable attention. Two recent theories illustrate this trend. One is Paulus and Dzindolet's (2008) group creativity model, which posits that several classes of variables (i.e., member characteristics, group structure and climate, external demands) influence group creativity via their impact on members' cognitive and motivational processes, as well as their social interactions in the group (see also Paulus, Dzindolet, & Kohn, 2011). The model has proven useful in integrating various lines of work on group creativity. The second theory is De Dreu, Nijstad, and van Knippenberg's (2008) motivated information processing in groups (MIP-G) model, which was developed to explain a wide array of group judgment and decision making phenomena. The model posits that both social motivation (pro-self vs. prosocial) and epistemic motivation (low to high) influence information dissemination and integration during group interaction and thereby the quality of group performance. According to the model, social motivation influences, or biases, which information is processed, whereas epistemic motivation affects how deeply this information is processed. The model has proven useful in integrating prior work on group creativity and generating novel hypotheses about the creativity process (e.g., Bechtoldt, De Dreu, Nijstad, & Choi, 2010; De Dreu, Nijstad, Bechtoldt, & Baas, 2011).

Current work on motivational factors underlying group creativity has moved beyond the early question of why interacting groups are less effective than nominal groups to the questions of why some interacting groups are more effective than others and what interventions might be used to enhance the creativity of such groups. These questions are quite important, because interacting groups are used to generate ideas in a wide variety of organizational settings, either because group members (or their convenors) are not aware of the brainstorming literature or because they believe collaborative idea generation has important secondary benefits (e.g., Sutton & Hargadon, 1996).

Regulatory Fit Theory and Creativity

In the present paper, we use regulatory fit theory, which has proven useful for predicting and explaining a wide range of motivational phenomena (see Higgins, 2012), to generate hypotheses about the conditions under which group brainstorming will be more or less effective in generating creative ideas. Regulatory fit theory builds on regulatory focus theory (Higgins, 1997, 1998), which proposes that individuals can have two distinct motivational orientations during goal pursuit: a promotion focus, which involves striving to ensure gains and ensure against nongains, and a prevention focus, which involves striving to ensure non-losses and ensure against losses. Individuals who have a promotion focus represent goals as hopes or aspirations, and they are concerned about advancement and accomplishment. In contrast, individuals who have a prevention focus represent goals as duties or obligations, and they are concerned about protection and safety.

The impact of regulatory focus on creativity and related constructs has been investigated in several studies, some involving individuals and others involving groups. In both cases, evidence indicates that promotion focus generally stimulates creativity (e.g., Crowe & Higgins, 1997; Faddegon, Ellemers, & Scheepers, 2009; Friedman & Forster, 2001; see also Baas, De Dreu, & Nijstad, 2008) as

well as risk-taking (e.g., Faddegon, Scheepers, & Ellemers, 2008; Hamstra, Bolderdijk, & Veldstra, 2011; Levine, Higgins, & Choi, 2000; Rietzschel, 2011; Werth & Forster, 2007). Importantly, however, the strength of this relationship varies as a function of other factors. For example, in organizational settings, the positive impact of promotion focus on creativity is influenced by individuals' job demands (Sacramento, Fay, & West, 2013) and the extent to which they feel a sense of organizational participation and receive intellectual stimulation from supervisors (Zhou, Hirst, & Shipton, 2011). It has also been found that, under certain conditions, prevention focus can enhance risk taking. This occurs, for example, when a person is in a state of loss and a risky option offers the only route for returning to the status quo (Scholer, Zou, Fujita, Stroessner, & Higgins, 2010). In a related vein, work on the emotional underpinnings of creativity indicates that prevention-focused mood states can enhance creativity under certain conditions, for example when these states lead to activation and effort due to failure to fulfill prevention goals (Baas, De Dreu, & Nijstad, 2011; see also De Dreu, Baas, & Nijstad, 2008).

A potentially critical determinant of the impact of regulatory focus on creativity is suggested by regulatory fit theory (Higgins, 2000, 2005, 2012). According to this formulation, motivation depends on *both* an individual's regulatory focus *and* the strategies that he or she employs to achieve the goal activated by this focus. These strategies are important, because they can either sustain or disrupt a current regulatory orientation, thereby producing either "fit" or "nonfit." Two dominant strategies for goal attainment are eagerness and vigilance. Eager strategies, which involve approach strategies of advancement, maximize gains and minimize nongains. In contrast, vigilant strategies, which involve avoidance strategies of being careful, maximize nonlosses and minimize losses. According to regulatory fit theory, fit is experienced by promotion-focused people using an eager strategy and by prevention-focused people using a vigilant strategy, because in both cases the strategy sustains the current goal orientation. In contrast, nonfit is experienced by promotion-focused people using a vigilant

strategy and by prevention-focused people using an eager strategy, because in both cases the strategy disrupts the current goal orientation. Evidence indicates that fit can even be produced by someone else's goal pursuit strategy, as when a person in a promotion (vs. prevention) focus receives a communication that uses an eager (vs. a vigilant) style of advocacy (e.g., Cesario & Higgins, 2008).

Regulatory fit has been found to influence a wide range of affective, cognitive, and behavioral responses (see Higgins, 2012). Although much of this work has examined the responses of individuals, there is increasing interest in how regulatory fit operates in intragroup and intergroup settings (see Sassenberg & Woltin, 2008). Thus, regulatory fit theory has been applied to such diverse group phenomena as leadership (e.g., Hamstra, Sassenberg, van Yperen, & Wisse, 2014), negotiation (e.g., Appelt, Zou, Arora, & Higgins, 2009), power (e.g., Sassenberg, Jonas, Shah, & Brazy, 2007), team performance (e.g., Dimotakis, Davison, & Hollenbeck, 2012), attitudes toward members of stigmatized groups (e.g., Falomir-Pichastor, Mugny, Gabarrot, & Quiamzade, 2011), responses to stereotype threat (e.g., Grimm, Markman, Maddox, & Baldwin, 2009), and collective action (e.g., Zaal, van Laar, Stahl, Ellemers, & Derks, 2012).

How might regulatory fit affect idea generation in groups? Although this question has not been investigated, prior work on regulatory fit in other contexts, including individual idea generation, suggests interesting hypotheses about the motivational underpinnings of group brainstorming effectiveness. There is substantial evidence that regulatory fit increases both strength of engagement in goal pursuit and a feeling of "rightness" about one's actions (see Higgins, 2006). Stronger engagement, in turn, produces better performance on a wide variety of tasks (see Higgins, 2012). One exception to this generalization involves cases in which a strategy is not effective for achieving a particular goal. Here, the increased engagement produced by fit may be harmful rather than helpful (Freitas, Liberman, & Higgins, 2002). A more subtle exception, which is particularly relevant to idea generation tasks,

involves the rule used to decide when to stop working on the task. Two such rules are the enjoyment rule (continue until you no longer enjoy the task) and the expectancy rule (continue until you run out of ideas; Nijstad, Stroebe, & Lodewijckx, 1999; see also Nijstad, van Vianen, Stroebe, & Lodewijckx, 2004).

The notion that stop rules might affect the impact of regulatory fit on individuals' idea generation was tested by Vaughn, Malik, Schwartz, Petkova, and Trudeau (2006). These investigators predicted that individuals using an enjoyment rule would generate more ideas when they experienced regulatory fit than nonfit, whereas individuals using a sufficiency stop rule (Nijstad et al.'s expectancy rule, 1999) would generate more ideas when they experienced nonfit than fit. Vaughn et al. (2006) reasoned that, in the enjoyment rule case, people experiencing fit would feel a sense of "rightness" indicating that the task is enjoyable, which would increase their motivation to continue. This feeling would not occur for people experiencing nonfit, leading to lower motivation to continue. In contrast, in the sufficiency rule case, people experiencing fit would feel a sense of rightness indicating they had generated as many ideas as they could, which would decrease their motivation to stay engaged with the task. However, people experiencing nonfit would feel a sense of "wrongness" indicating that they had not generated as many ideas as they could, which would increase their motivation to stay engaged with the task. Vaughn et al. obtained evidence supporting their predictions. The idea that goal fulfillment can affect creativity is consistent with Baas et al.'s (2011) work cited earlier as well as broader analyses of motivation (e.g., Koo & Fishbach, 2008).

The Present Study

The present study was designed to shed light on the motivational underpinnings of group brainstorming using ideas drawn from regulatory fit theory. We conducted an experiment in which all members of three-person groups were placed in either a promotion focus or a prevention focus (using a situational regulatory focus induction employed in prior

studies) and then were all given either an eager or a vigilant strategy for performing a brainstorming task. Thus, during the task, participants experienced either regulatory fit (promotion focus-eager strategy, prevention focus-vigilant strategy) or nonfit (promotion focus-vigilant strategy, prevention focus-eager strategy). The task employed an expectancy stop rule, because most people who are not given an explicit rule implicitly adopt it (Nijstad et al., 1999) and because it is more likely than other rules (e.g., enjoyment) to be assigned to natural groups.

We predicted that, using the expectancy stop rule, groups experiencing regulatory nonfit would perform better on the brainstorming task than would groups experiencing fit, because nonfit produces a sense of "wrongness" that increases motivation to stay engaged with the task whereas fit produces a sense of "rightness" that decreases motivation to stay engaged with the task. Although the hypothesized relationship between regulatory fit/nonfit and idea generation has been verified using individuals as the unit of analysis (Vaughn et al., 2006), it has not been tested using groups. Given the ample evidence that groups and individuals often respond differently to the same stimuli, it cannot be assumed that regulatory fit/nonfit will produce the same pattern of results in the two cases.

Moreover, prior work with individuals did not test a crucial theoretical mechanism—motivation to stay engaged with the task—by which regulatory fit/nonfit presumably affects idea generation. According to regulatory fit theory, fit/nonfit enhances task performance to the extent that it increases strength of engagement in goal pursuit (Higgins, 2006, 2012). Therefore, in the present study, we operationalized engagement as task persistence (i.e., the amount of time group members spent on the task) and predicted that (a) nonfit would produce greater persistence than would fit and (b) persistence would mediate the impact of nonfit on performance.

Finally, Vaughn et al. (2006) restricted their attention to the impact of fit/nonfit on the number of ideas that individuals generated. Although brainstorming studies typically give substantial

weight to the number of nonredundant ideas that groups generate, they often include other performance measures (e.g., idea diversity and quality) as well. Because our engagement analysis of regulatory nonfit is most directly applicable to the number of nonredundant ideas generated by the group, our hypotheses focused on this measure. However, for exploratory purposes, we also examined the impact of nonfit on the diversity and quality of ideas that groups generated.

Method

Design and Participants

A 2 (group regulatory focus: promotion vs. prevention) \times 2 (brainstorming strategy: eager vs. vigilant) between-participants design was used. One hundred and eighty-six female undergraduates at a large urban university participated in the experiment for course credit. Three-person groups were randomly assigned to the four conditions. One group was dropped due to recording equipment malfunction, leaving 183 total participants (61 groups). Final group *n*s in the four conditions were: promotion–eager: 15; promotion–vigilant: 15; prevention–eager: 15; prevention–vigilant: 16.

Procedure and Materials

To obscure the connection between the independent and dependent variables, participants were informed that they would be taking part in two separate experiments—the first designed to provide general information about undergraduates at their university and the second designed to investigate group decision making.

Group regulatory focus manipulation. In the “first” experiment, before interacting with other group members, participants individually completed a regulatory focus manipulation that has been successfully used in previous research (e.g., Cesario, Grant, & Higgins, 2004; Freitas & Higgins, 2002). In this manipulation, participants were asked to write about either a current “hope or aspiration”

(promotion induction) or a current “duty or obligation” (prevention induction). All three participants in each group were given the same regulatory focus induction.

Brainstorming strategy manipulation. At the beginning of the “second” experiment, participants were informed that they would be brainstorming as a group on the topic, “How can the campus community be improved for [university’s name] students?” They were then presented with one of two sets of brainstorming rules that they should follow during the brainstorming session. Both sets contained the same rules (adapted from Osborn, 1957), but differed in whether they suggested an eager versus a vigilant strategic orientation during brainstorming. Groups in the eager condition read, “Be open to ideas without criticism.... Freewheeling is welcome.... Maximizing the quantity of ideas is wanted.... Combination and improvement advances the goal.... Stay eagerly focused on the task.” In contrast, groups in the vigilant condition read, “Be careful not to criticize.... Don’t be afraid to say anything that comes to mind.... Don’t lose any ideas.... Don’t be afraid to combine and improve on others’ ideas.... Avoid engaging in irrelevant thought processes and discussions.” Following presentation of the brainstorming rules, participants were instructed to begin the brainstorming discussion using the expectancy stop rule. Instructions stated: “You should go on brainstorming until you feel that you are running out of ideas. Thus, you should stop brainstorming when you do not expect to generate new ideas if you go on. Please do not stop when you think that going on will lead to new ideas. You may talk for up to 30 minutes.” The brainstorming discussions were audiotaped.

Measures

Length of group discussion. This variable was operationalized as the amount of time (in seconds) that each group engaged in brainstorming. Because of nonnormality, log transformed discussion times were used in the analyses. For clarity, nontransformed scores are presented.

Brainstorming performance. The audiotaped discussions were transcribed, and transcription information was used to generate three indices of brainstorming performance.

Quantity of nonredundant ideas. A rater blind to hypotheses and conditions counted the number of nonredundant ideas produced by each group (i.e., ideas mentioned two or more times by a group were counted only once). A second rater counted the number of nonredundant ideas in a subset of 12 group transcripts (20%) to allow assessment of interrater agreement ($r = .985$, $p < .001$). Given the high level of interrater agreement, the first rater's count was deemed accurate. Because of nonnormality, log transformed quantity scores were used in the analyses. Nontransformed scores are presented.

Categorical diversity of ideas. After the nonredundant ideas for each group were identified, the diversity of these ideas was coded. Two raters read all of the transcripts and identified topical areas into which ideas could be categorized (e.g., parking, housing, dining). A final list of 25 categories was generated after discussions between raters. A new rater then coded each nonredundant idea that a group generated into one of these categories. Another new rater categorized the nonredundant ideas in a subset of 16 group transcripts (26%) to allow assessment of interrater agreement, defined as the degree to which the two raters assigned a given idea to the same category (Cohen's $\kappa = .724$). Given the acceptable level of interrater agreement, the first rater's judgment of the number of different categories of ideas used by each group was deemed accurate.

Quality of ideas. A rater evaluated each idea on both originality and feasibility using 5-point Likert scales (1 = *not at all original [feasible]*; 5 = *highly original [feasible]*). A second rater repeated this task with a subset of 16 transcripts (26%). Raters were considered to be in agreement if their ratings differed by no more than 1 point (Diehl & Stroebe, 1987). Raters exhibited 86.5% and 91.8% agree-

ment for originality and feasibility, respectively (ICC = .761 and .771). Given the acceptable level of interrater agreement, the first rater's judgments were used to assess idea originality and feasibility. High-quality ideas were defined as those rated 3 or higher on *both* originality and feasibility (Rietzchel, Nijstad, & Stroebe, 2007), and each group's quality score was simply the number of high-quality ideas it generated. Because of nonnormality, log transformed quality scores were used in the analyses. Nontransformed scores are presented.

Results

We predicted that regulatory nonfit would increase group members' task persistence, as indexed by the amount of time they spent in discussion. Moreover, we expected that nonfit would increase the number (quantity) of nonredundant ideas that the group generated. Finally, we predicted that task persistence would mediate the relationship between nonfit and idea production. We also examined the effect of nonfit on two additional indices of brainstorming performance—number of different categories of ideas used (diversity) and number of high-quality ideas (quality).

Initial Tests of the Effects of Regulatory Nonfit

To test the predictions that nonfit (revealed by the interaction between regulatory focus and brainstorming strategy) would increase both the amount of time that group members spent in discussion and the number of nonredundant ideas they generated, we conducted 2 (group regulatory focus: promotion vs. prevention) \times 2 (brainstorming strategy: eager vs. vigilant) analyses of variance on discussion times and idea quantity scores. The same analyses were also conducted on diversity and quality scores.

Regarding discussion times, neither the group regulatory focus main effect, $F(1, 57) = 0.001$, $p = .972$, $\eta_p^2 = .000$, nor the brainstorming strategy main effect, $F(1, 57) = 2.044$, $p = .158$,

Table 1. Brainstorming performance.

Measure	Promotion focus		Prevention focus	
	Eager strategy	Vigilant strategy	Eager strategy	Vigilant strategy
	<i>M</i> (<i>SD</i>)			
Discussion length	862.47 (358.22)	1063.13 (614.58)	1275.60 (682.68)	831.38 (604.78)
Idea quantity	23.47 (10.33)	33.27 (17.01)	35.27 (29.73)	20.31 (10.54)
Idea diversity	10.20 (2.62)	12.00 (3.98)	11.07 (3.99)	8.56 (3.29)
Idea quality	11.27 (5.81)	16.00 (9.58)	19.47 (14.57)	10.31 (7.04)

Note. Promotion eager and prevention vigilant = fit; promotion vigilant and prevention eager = nonfit.

$\eta_p^2 = .035$, was significant. However, the interaction between these variables was significant, $F(1, 57) = 5.060$, $p = .028$, $\eta_p^2 = .082$. As predicted, discussion times were longer in nonfit conditions (promotion–vigilant, prevention–eager) than in fit conditions (promotion–eager, prevention–vigilant; 1,169.37 s and 846.93 s, respectively; see Table 1).

Regarding the number of ideas generated (idea quantity), neither the group regulatory focus main effect nor the brainstorming strategy main effect was significant, $F(1, 57) = 0.635$, $p = .429$, $\eta_p^2 = .011$, and $F(1, 57) = 0.202$, $p = .655$, $\eta_p^2 = .004$, respectively. However, the interaction between these variables was significant, $F(1, 57) = 4.289$, $p = .043$, $\eta_p^2 = .070$. The interaction indicated, as predicted, that groups in nonfit conditions produced more nonredundant ideas than did groups in fit conditions (34.27 and 21.89, respectively; see Table 1).

The analyses conducted on the diversity and quality scores yielded the same pattern of results as those just described. For the number of different categories of ideas used, neither main effect was significant, group regulatory focus: $F(1, 57) = 2.041$, $p = .159$, $\eta_p^2 = .035$; brainstorming strategy: $F(1, 57) = 0.153$, $p = .697$, $\eta_p^2 = .003$, whereas the interaction was significant, $F(1, 57) = 5.720$, $p = .020$, $\eta_p^2 = .091$. Diversity scores were higher in nonfit than in fit conditions (11.54 and 9.38, respectively; see Table 1). Similarly, for the number of high-quality ideas, neither main effect was significant, group regulatory focus: $F(1, 57) = 0.027$, $p = .871$, $\eta_p^2 = .000$; brainstorming strategy:

$F(1, 57) = 0.925$, $p = .340$, $\eta_p^2 = .016$, but the interaction was significant, $F(1, 57) = 5.075$, $p = .028$, $\eta_p^2 = .082$. Quality scores were higher in nonfit than in fit conditions (17.74 and 10.79, respectively; see Table 1).¹

In sum, for each of the four outcome measures, analyses revealed a significant Group Regulatory Focus x Brainstorming Strategy interaction effect but no significant main effects. Moreover, in each case, the pattern of the interaction was as predicted.

Task Persistence as a Mediator of Brainstorming Performance

Analyses were conducted to test whether task persistence mediated the relationship between regulatory nonfit and the three indices of brainstorming performance. The experimental design included two levels of group regulatory focus (promotion and prevention, coded -1 and 1 , respectively) and two levels of brainstorming strategy (eager and vigilant, coded -1 and 1 , respectively). Regulatory fit was coded as the interaction between these variables (fit = promotion–eager and prevention–vigilant; nonfit = promotion–vigilant and prevention–eager). The effect of regulatory fit on brainstorming performance was expected to be mediated by length of group discussion. (In each of the regressions described next, the main effects of group regulatory focus and brainstorming strategy were entered along with their interaction in the prediction of length of group discussion and the performance measure. However, given

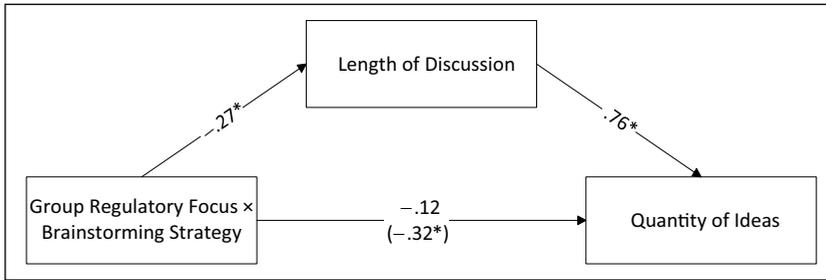


Figure 1. Mediation of the Group Regulatory Focus \times Brainstorming Strategy interaction effect on quantity of ideas by length of group discussion. The value in parentheses indicates the total effect prior to inclusion of the mediator.

* $p < .05$.

that the main effects were uniformly nonsignificant in the analyses reported earlier [and in the regression models that follow], we do not again report their coefficients in the text or the figures, although the main effects were included in each model.) The analyses followed the procedure recommended by Baron and Kenny (1986), examining each effect in isolation prior to running the full mediation model using path analysis. Both the direct and indirect (i.e., mediation) effects were tested using a bootstrapping procedure (Shrout & Bolger, 2002), using 1,000 bootstrap replications. The significance of direct and indirect effects was assessed by examining 95% confidence intervals. If the confidence interval of an effect did not include 0, then it was deemed significant at $\alpha = .05$.²

Quantity of nonredundant ideas. Consistent with the analyses of variance reported before, Group Regulatory Focus \times Brainstorming Strategy significantly influenced the length of group discussion, $\beta = -.27$, 95% CI = $[-.49, -.03]$ (see Figure 1).³ In addition, Group Regulatory Focus \times Brainstorming Strategy also significantly influenced idea quantity scores, $\beta = -.32$, 95% CI = $[-.49, -.11]$. Moreover, discussion length was positively and significantly related to idea quantity scores after adjusting for the effect of Group Regulatory Focus \times Brainstorming Strategy, $\beta = .76$, 95% CI = $[.61, .90]$. Finally, the effect of Group Regulatory Focus \times Brainstorming Strategy on idea

quantity scores was mediated by discussion length, indirect effect ($\Delta\beta$) = $-.20$, 95% CI = $[-.40, -.02]$, and there was no significant effect of Group Regulatory Focus \times Brainstorming Strategy on quantity scores after adjusting for discussion length, $\beta = -.12$, 95% CI = $[-.26, .03]$.

Diversity of ideas. The analysis on the number of different categories of ideas used paralleled that for productivity (see Figure 2). Given that one path in the model was identical in both analyses, results again indicated that Group Regulatory Focus \times Brainstorming Strategy significantly influenced the length of group discussion, $\beta = -.27$, 95% CI = $[-.49, -.03]$. Moreover, Group Regulatory Focus \times Brainstorming Strategy significantly influenced diversity scores, $\beta = -.29$, 95% CI = $[-.51, -.04]$. Also, discussion length was positively and significantly related to diversity scores after adjusting for the effect of Group Regulatory Focus \times Brainstorming Strategy, $\beta = .59$, 95% CI = $[.43, .76]$. Finally, the effect of Group Regulatory Focus \times Brainstorming Strategy on diversity scores was mediated by discussion length, $\Delta\beta = -.16$, 95% CI = $[-.33, -.02]$, and Group Regulatory Focus \times Brainstorming Strategy did not significantly influence diversity scores after adjusting for discussion length, $\beta = -.13$, 95% CI = $[-.35, .10]$.

Quality of ideas. The analysis on the number of high-quality ideas yielded the same pattern of

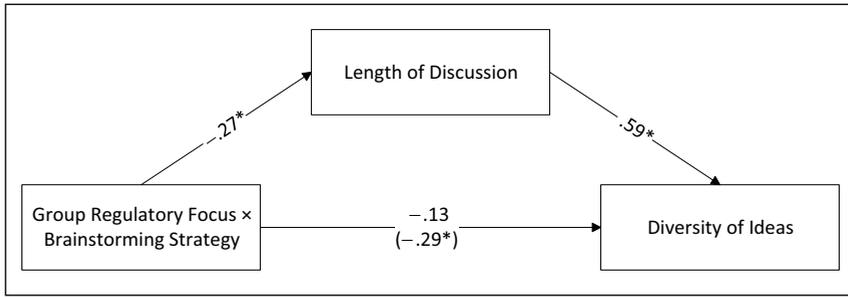


Figure 2. Mediation of the Group Regulatory Focus \times Brainstorming Strategy interaction effect on diversity of ideas by length of group discussion. The value in parentheses indicates the total effect prior to inclusion of the mediator.
* $p < .05$.

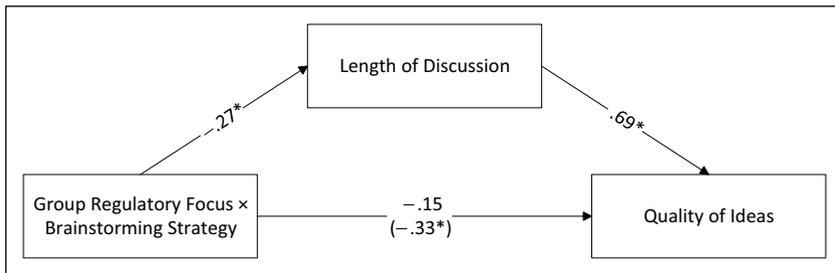


Figure 3. Mediation of the Group Regulatory Focus \times Brainstorming Strategy interaction effect on quality of ideas by length of group discussion. The value in parentheses indicates the total effect prior to inclusion of the mediator.
* $p < .05$.

results as obtained on idea quantity and diversity (see Figure 3). Besides once more significantly influencing the length of group discussion, $\beta = -.27$, 95% CI = $[-.49, -.03]$, Group Regulatory Focus \times Brainstorming Strategy also significantly influenced quality scores, $\beta = -.33$, 95% CI = $[-.52, -.11]$. Discussion length also was positively and significantly related to quality scores after adjusting for the effect of Group Regulatory Focus \times Brainstorming Strategy, $\beta = .69$, 95% CI = $[.50, .83]$. Finally, the effect of Group Regulatory Focus \times Brainstorming Strategy on quality scores was mediated by discussion length, $\Delta\beta = -.18$, 95% CI = $[-.34, -.02]$, and there was no significant effect of Group Regulatory Focus \times Brainstorming Strategy on quality scores after adjusting for discussion length, $\beta = -.15$, 95% CI = $[-.31, .03]$.

Quantity of Ideas as a Mediator of Diversity and Quality

As noted earlier, our theoretical analysis of the impact of regulatory nonfit is most directly applicable to the number of nonredundant ideas generated by the group. However, our mediational analyses revealed that nonfit had the same effects on the diversity and quality of ideas as on their quantity. Why might this have occurred? A possible explanation is that the diversity and quality effects are by-products of the quantity effect, such that the more ideas a group generates the more categories it will use in generating these ideas and the more high-quality ideas it will produce. To assess this possibility, we tested quantity of ideas as a proximal mediator of their diversity and quality, accounting for the relationship

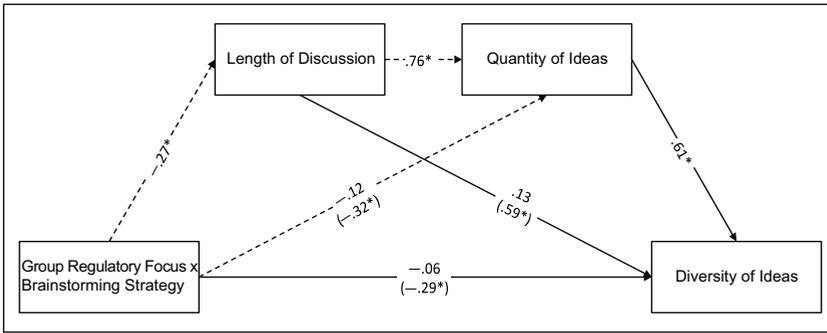


Figure 4. Mediation of the Group Regulatory Focus × Brainstorming Strategy interaction effect on diversity of ideas by length of group discussion and quantity of ideas. Dashed lines indicate results from previously estimated mediation model with quantity of ideas as outcome. Solid lines indicate newly estimated paths. The value in parentheses indicates the total effect prior to inclusion of the mediator. * $p < .05$.

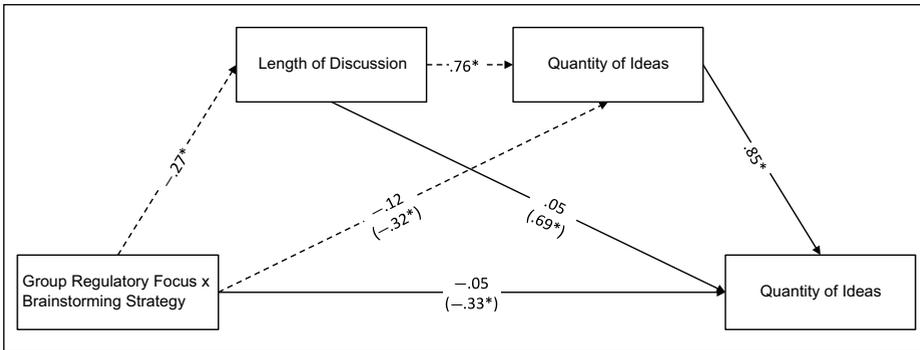


Figure 5. Mediation of the Group Regulatory Focus × Brainstorming Strategy interaction effect on quality of ideas by length of group discussion and quantity of ideas. Dashed lines indicate results from previously estimated mediation model with quantity of ideas as outcome. Solid lines indicate newly estimated paths. The value in parentheses indicates the total effect prior to inclusion of the mediator. * $p < .05$.

between length of discussion and diversity/quality (see Figures 4 and 5).

Diversity of ideas. Some paths in this model (see dashed lines in Figure 4) were previously estimated in the mediation model using quantity of ideas as the outcome (see Figure 1). Additional paths were previously estimated in the model using diversity of ideas as the outcome (see Figure 2); these paths are the direct effect of Group Regulatory Focus × Brainstorming Strategy on diversity of ideas and the direct effect of length of discussion on diversity of

ideas. The novel path of interest in Figure 4 is the significant effect of quantity of ideas on diversity of ideas, $\beta = .61$, 95% CI = [.37, .86]. After including this path, there was no longer a significant effect of discussion length on diversity of ideas, $\beta = .13$, 95% CI = [-.13, .39], and the effect of Group Regulatory Focus × Brainstorming Strategy on diversity of ideas was similarly nonsignificant, $\beta = .06$, 95% CI = [-.23, .11]. As in previous models, there was no significant effect of Group Regulatory Focus × Brainstorming Strategy on diversity scores after adjusting for discussion length and quantity of

ideas, $\Delta\beta = -.23$, 95% CI = $[-.37, -.10]$. Of the three paths that might have contributed to this effect, only the path from Group Regulatory Focus \times Brainstorming Strategy to diversity of ideas through discussion length and quantity of ideas was significant, $\Delta\beta = -.13$, 95% CI = $[-.25, -.002]$.

Quality of ideas. As in the diversity analysis, several of the key paths in Figure 5 were estimated in previous models (see Figures 1 and 3). The novel path of interest in Figure 5 is the significant effect of quantity of ideas on quality of ideas, $\beta = .85$, 95% CI = $[.70, .99]$. After including this path, there was no longer a significant effect of discussion length on quality of ideas, $\beta = .05$, 95% CI = $[-.12, .22]$, and the effect of Group Regulatory Focus \times Brainstorming Strategy on quality of ideas was similarly nonsignificant, $\beta = -.05$, 95% CI = $[-.17, .06]$. As in previous models, there was no significant effect of Group Regulatory Focus \times Brainstorming Strategy on quality scores after adjusting for discussion length and quantity of ideas, $\Delta\beta = -.28$, 95% CI = $[-.45, -.13]$. Of the three paths that might have contributed to this effect, only the path from Group Regulatory Focus \times Brainstorming Strategy to quality of ideas through discussion length and quantity of ideas was significant, $\Delta\beta = -.17$, 95% CI = $[-.34, -.01]$.

Discussion

The goal of this study was to investigate the motivational underpinnings of group brainstorming. On the basis of regulatory fit theory, we predicted that, in groups using the expectancy stop rule, brainstorming performance would be higher in nonfit than in fit conditions. In addition, we predicted that nonfit would produce greater task persistence than would fit and that persistence would mediate the impact of nonfit on performance. To test these hypotheses, we conducted an experiment in which members of three-person groups were all placed either in a promotion focus or a prevention focus and then all used either an eager strategy or a vigilant strategy for performing a brainstorming task (with an expectancy stop rule). Participants in the promotion-eager and prevention-vigilant

conditions experienced regulatory fit, whereas those in the promotion-vigilant and prevention-eager conditions experienced regulatory nonfit.

Results supported our hypotheses. As predicted, on our primary measure of brainstorming performance, idea quantity, groups in nonfit conditions generated more nonredundant ideas than did groups in fit conditions. Moreover, groups in nonfit conditions also exhibited greater task persistence (as assessed by the length of their discussions) than did those in fit conditions, and, importantly, persistence mediated the impact of nonfit on idea quantity scores. The same pattern of results was obtained on two additional measures of brainstorming performance, idea diversity (the number of categories used in generating ideas) and idea quality (the number of ideas that were both original and feasible).

In an effort to understand the mechanism underlying the impact of nonfit on diversity and quality scores, we examined the possibility that these effects were driven by the quantity scores, namely that the more ideas a group generated the more these ideas represented diverse categories and were of high quality. Analyses using quantity scores as a proximal mediator of diversity and quality scores supported this conjecture.

The present data are interesting for several reasons. First, they shed new light on the motivational bases of group brainstorming by demonstrating that the degree of “fit” between group members’ regulatory focus and the task strategy they use can importantly influence the quality of their performance. In so doing, they extend prior work on regulatory fit in group contexts to the important domain of idea generation. Second, they demonstrate that, at least when an expectancy stop rule is operating, nonfit produces better group performance than does fit. These findings are important because they highlight how not only “feeling right” from fit but also “feeling wrong” from nonfit can, depending on the nature of the task, enhance performance (see also Vaughn et al., 2006). In the present study, in which participants were instructed to continue brainstorming until they ran out of ideas, we

expected that people experiencing fit would feel a sense of “rightness,” which would *decrease* their motivation to stay engaged with the task and thus decrease their performance. In contrast, we expected that people experiencing nonfit would feel a sense of “wrongness,” which would *increase* their motivation to stay engaged with the task and thus increase their performance. Our results indicated, as expected, that nonfit was indeed more motivating than fit. Finally, by assessing task persistence as an index of task engagement and including this measure in mediated moderation analyses, we were able to test a core assumption of regulatory fit theory, namely that regulatory fit/nonfit affects brainstorming performance via its impact on group members’ engagement in their task. As expected, task persistence (engagement) did play such a mediating role in this study.

Our finding that task persistence enhances brainstorming performance is broadly consistent with other analyses of idea generation. For example, according to the dual pathway to creativity model, which was developed to explain individual creativity, persistence (as well as flexibility) plays a critical role in idea generation (Nijstad, De Dreu, Rietzschel, & Baas, 2010; see also De Dreu, Baas, & Nijstad, 2008; Nijstad et al., 1999). The model posits that generation of novel (and appropriate) ideas can be enhanced by cognitive persistence, defined as “the degree of sustained and focused task-directed cognitive effort” (Nijstad et al., 2010, p. 42). Persistence, in turn, is influenced by such factors as personal need for structure (Rietzschel, De Dreu, & Nijstad, 2007) and negative affectivity (Baas, Roskes, Sligte, Nijstad, & De Dreu, 2013). The current study documents the importance of yet another determinant of persistence, namely the degree of fit between group members’ regulatory focus and task strategy.

Three potential limitations of the present study suggest interesting directions for future research. One concerns the fact that the impact of regulatory fit on group brainstorming performance was assessed only under the expectancy stop rule. Extrapolating from Vaughn et al.’s (2006) findings, brainstorming groups (as well as individuals) using the enjoyment stop rule might

work harder and be more productive in fit than in nonfit conditions. However, a different pattern of results might occur under a third stop rule—satisfaction (continue until you are satisfied with your performance; Nijstad et al., 1999; Nijstad et al., 2004). Here, participants in nonfit conditions might well feel less satisfied with their performance than those in fit conditions. If so, brainstorming groups using the satisfaction stop rule (like those in the present study using the expectancy rule) would be expected to work harder and be more productive in nonfit than in fit conditions.

A second potential limitation concerns the fact that we did not have an explicit measure of the feeling of rightness and wrongness that is presumed to accompany regulatory fit and nonfit, respectively. Although our task persistence findings were quite consistent with the existence of these feelings, it would be useful in future studies to assess perceived rightness and wrongness directly.

Third, the present study used only female participants. There is no theoretical reason to assume that males would have responded differently to our manipulations of group regulatory focus and brainstorming strategy (e.g., by showing more persistence under fit than nonfit). However, it is interesting that Nijstad et al. (2004) found gender differences in group brainstorming as a function of the manipulated stop rule. For example, females were more persistent than males under the satisfaction rule, whereas males were more persistent than females under the expectancy rule. These findings suggest that, although females and males in brainstorming groups are likely to respond similarly to regulatory fit manipulations, the magnitude of these effects may vary depending on the stop rule in force. For example, regulatory nonfit may elevate females’ persistence *less* than males’ persistence under the satisfaction rule and *more* than males’ persistence under the expectancy rule.

Finally, casting our net more broadly, our findings have interesting implications for the impact of group heterogeneity (diversity) on members’ interactions and performance. There is evidence

that diversity can make group interactions both *less* comfortable and *more* productive (e.g., Lount & Phillips, 2007; Phillips, Liljenquist, & Neale, 2009). Diverse groups increase the likelihood that different members have different goal pursuit orientations (e.g., promotion vs. prevention) and different strategic preferences for performing the task (e.g., eager vs. vigilant). Therefore, compared to homogeneous groups, heterogeneous groups increase the likelihood of *nonfit* social interactions between members that both make the interaction “feel wrong” (*less* comfortable) and increase motivation to stay engaged with the task (given expectancy or satisfaction stop rules), thereby enhancing performance (*more* productive). This intriguing possibility should be examined in future research.

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Notes

1. Based on raters' evaluations of the originality and feasibility of each idea (discussed earlier), mean originality and feasibility scores across all ideas for each group were calculated. Analyses of variance on these scores did not reveal any significant main effects or interactions. For originality: group regulatory focus, $F(1, 57) = 0.317, p = .576, \eta_p^2 = .006$; brainstorming strategy, $F(1, 57) = 0.072, p = .789, \eta_p^2 = .001$; GRF \times BS, $F(1, 57) = 0.134, p = .716, \eta_p^2 = .002$. For feasibility: group regulatory focus, $F(1, 57) = 3.061, p = .086, \eta_p^2 = .051$; brainstorming strategy, $F(1, 57) = 0.996, p = .323, \eta_p^2 = .017$; GRF \times BS, $F(1, 57) = .322, p = .573, \eta_p^2 = .006$.
2. The following are technically “mediated moderation” analyses, because the predictor variable in each case (regulatory fit) was coded as the interaction between the two independent variables—group regulatory focus (promotion, prevention) and brainstorming strategy (eager, vigilant).
3. Negative coefficients linking Group Regulatory Focus \times Brainstorming Strategy to length of discussion and other measures indicate that nonfit led to higher means on the variables than did fit.

References

- Appelt, K. C., Zou, X., Arora, P., & Higgins, E. T. (2009). Regulatory fit in negotiation: Effects of “prevention-buyer” and “promotion-seller” fit. *Social Cognition, 27*, 365–384. doi:10.1521/soco.2009.27.3.365
- Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2008). A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus? *Psychological Bulletin, 134*, 779–806. doi:10.1037/a0012815
- Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2011). When prevention promotes creativity: The role of mood, regulatory focus, and regulatory closure. *Journal of Personality and Social Psychology, 100*, 794–809. doi:10.1037/a0022981
- Baas, M., Roskes, M., Sligte, D., Nijstad, B. A., & De Dreu, C. K. W. (2013). Personality and creativity: The dual pathway to creativity model and a research agenda. *Social and Personality Psychology Compass, 7*, 732–748. doi:10.1111/spc3.12062
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1192. doi:10.1037/0022-3514.51.6.1173
- Bechtoldt, M. N., De Dreu, C. K. W., Nijstad, B. A., & Choi, H. S. (2010). Motivated information processing, social tuning, and group creativity. *Journal of Personality and Social Psychology, 99*, 622–637. doi:10.1037/a0019386
- Cesario, J., Grant, H., & Higgins, E. T. (2004). Regulatory fit and persuasion: Transfer from “feeling right.” *Journal of Personality and Social Psychology, 86*, 388–404. doi:10.1037/0022-3514.86.3.388
- Cesario, J., & Higgins, E. T. (2008). Making message recipients “feel right”: How nonverbal cues can increase persuasion. *Psychological Science, 19*, 415–420. doi:10.1111/j.1467-9280.2008.02102.x
- Crowe, E., & Higgins, E. T. (1997). Regulatory focus and strategic inclinations: Promotion and prevention in decision-making. *Organizational Behavior and Human Decision Processes, 69*, 117–132. doi:10.1006/obhd.1996.2675
- De Dreu, C. K. W., Baas, M., & Nijstad, B. A. (2008). Hedonic tone and activation level in the mood-creativity link: Toward a dual pathway to creativity model. *Journal of Personality and Social Psychology, 94*, 739–756. doi:10.1037/0022-3514.94.5.739
- De Dreu, C. K. W., Nijstad, B. A., Bechtoldt, M. N., & Baas, M. (2011). Group creativity and innovation: A motivated information processing perspective.

- Psychology of Aesthetics, Creativity, and the Arts*, 5, 81–89. doi:10.1037/a0017986
- De Dreu, C. K. W., Nijstad, B. A., & van Knippenberg, D. (2008). Motivated information processing in group judgment and decision making. *Personality and Social Psychology Review*, 12, 22–49. doi:10.1177/1088868307304092
- Diehl, M., & Stroebe, W. (1987). Productivity loss in brainstorming groups: Toward the solution of a riddle. *Journal of Personality and Social Psychology*, 53, 497–509. doi:10.1037/0022-3514.53.3.497
- Dimotakis, N., Davison, R. G., & Hollenbeck, J. R. (2012). Team structure and regulatory focus: The impact of regulatory fit on team dynamics. *Journal of Applied Psychology*, 97, 421–434. doi:10.1037/a0026701
- Faddegon, K., Ellemers, N., & Scheepers, D. (2009). Eager to be the best, or vigilant not to be the worst: The emergence of regulatory focus in disjunctive and conjunctive group tasks. *Group Processes & Intergroup Relations*, 12, 653–671. doi:10.1177/1368430209339922
- Faddegon, K., Scheepers, D., & Ellemers, N. (2008). If we have the will, there will be a way: Regulatory focus as a group identity. *European Journal of Social Psychology*, 38, 880–895. doi:10.1002/ejsp.483
- Falomir-Pichastor, J. M., Mugny, G., Gabarrot, F., & Quiamzade, A. (2011). A regulatory fit perspective in majority versus minority support to attitudes toward homosexuals. *Group Processes & Intergroup Relations*, 14, 45–62. doi:10.1177/1368430210376077
- Freitas, A. L., & Higgins, E. T. (2002). Enjoying goal-directed action: The role of regulatory fit. *Psychological Science*, 13, 1–6. doi:10.1111/1467-9280.00401
- Freitas, A. L., Liberman, N., & Higgins, E. T. (2002). Regulatory fit and resisting temptation during goal pursuit. *Journal of Experimental Social Psychology*, 38, 291–298. doi:10.1006/jesp.2001.1504
- Friedman, R. S., & Forster, J. (2001). The effects of promotion and prevention cues on creativity. *Journal of Personality and Social Psychology*, 81, 1001–1013. doi:10.1037/0022-3514.81.6.1001
- Grimm, L. R., Markman, A. B., Maddox, W. T., & Baldwin, G. C. (2009). Stereotype threat reinterpreted as a regulatory mismatch. *Journal of Personality and Social Psychology*, 96, 288–304. doi:10.1037/a0013463
- Hamstra, M. R. W., Bolderdijk, J. W., & Veldstra, J. L. (2011). Everyday risk taking as a function of regulatory focus. *Journal of Research in Personality*, 45, 134–137. doi:10.1016/j.jrp.2010.11.017
- Hamstra, M. R. W., Sassenberg, K., van Yperen, N. W., & Wisse, B. (2014). Followers feel valued—When leaders' regulatory focus makes leaders exhibit behavior that fits followers' regulatory focus. *Journal of Experimental Social Psychology*, 51, 34–40. doi:10.1016/j.jesp.2013.11.003
- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, 52, 1280–1300. doi:10.1037/0003-066X.52.12.1280
- Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 30, pp. 1–46). New York, NY: Academic Press.
- Higgins, E. T. (2000). Making a good decision: Value from fit. *American Psychologist*, 55, 1217–1230. doi:10.1037/0003-066X.55.11.1217
- Higgins, E. T. (2005). Value from regulatory fit. *Current Directions in Psychological Science*, 14, 208–213. doi:10.1111/j.0963-7214.2005.00366.x
- Higgins, E. T. (2006). Value from hedonic experience and engagement. *Psychological Review*, 113, 439–460. doi:10.1037/0033-295X.113.3.439
- Higgins, E. T. (2012). *Beyond pleasure and pain: How motivation works*. New York, NY: Oxford.
- Koo, M., & Fishbach, A. (2008). Dynamics of self-regulation: How (un)accomplished goal actions affect motivation. *Journal of Personality and Social Psychology*, 94, 183–195. doi:10.1037/0022-3514.94.2.183
- Larson, J. R., Jr. (2010). *In search of synergy in small group performance*. New York, NY: Psychology Press.
- Levine, J. M., Higgins, E. T., & Choi, H. S. (2000). Development of strategic norms in groups. *Organizational Behavior and Human Decision Processes*, 82, 88–101. doi:10.1006/obhd.2000.2889
- Lount, R., Jr., & Phillips, K. W. (2007). Working harder with the out-group: The impact of social category diversity on motivation gains. *Organizational Behavior and Human Decision Processes*, 103, 214–224. doi:10.1016/j.obhdp.2007.03.002
- Mullen, B., Johnson, C., & Salas, E. (1991). Productivity loss in brainstorming groups: A meta-analytic integration. *Basic and Applied Social Psychology*, 12, 3–24. doi:10.1207/s15324834baspp1201_1
- Nijstad, B. A., De Dreu, C. K. W., Rietzschel, E. F., & Baas, M. (2010). The dual pathway to creativity model: Creative ideation as a function of flexibility and persistence. *European Review of Social Psychology*, 21, 34–77. doi:10.1080/10463281003765323

- Nijstad, B. A., Stroebe, W., & Lodewijckx, H. F. M. (1999). Persistence of brainstorming groups: How do people know when to stop? *Journal of Experimental Social Psychology*, *35*, 165–185. doi:10.1006/jesp.1998.1374
- Nijstad, B. A., van Vianen, A. E. M., Stroebe, W., & Lodewijckx, H. F. M. (2004). Persistence in brainstorming: Exploring stop rules in same-sex groups. *Group Processes & Intergroup Relations*, *7*, 195–206. doi:10.1177/1368430204046107
- Osborn, A. F. (1953). *Applied imagination: Principles and procedures of creative thinking*. New York, NY: Scribners.
- Osborn, A. F. (1957). *Applied imagination: Principles and procedures of creative thinking* (Rev. ed.). New York, NY: Scribners.
- Paulus, P. B., & Dzindolet, M. T. (2008). Social influence, creativity, and innovation. *Social Influence*, *3*, 228–247. doi:10.1080/15534510802341082
- Paulus, P. B., Dzindolet, M. T., & Kohn, N. (2011). Collaborative creativity: Group creativity and team innovation. In M. D. Mumford (Ed.), *Handbook of organizational creativity* (pp. 325–354). New York, NY: Elsevier.
- Phillips, K. W., Liljenquist, K., & Neale, M. A. (2009). Is the pain worth the gain? The advantages and liabilities of agreeing with socially distinct newcomers. *Personality and Social Psychology Bulletin*, *35*, 336–350. doi:10.1177/0146167208328062
- Rietzschel, E. F. (2011). Collective regulatory focus predicts specific aspects of team innovation. *Group Processes & Intergroup Relations*, *14*, 337–345. doi:10.1177/1368430210392396
- Rietzschel, E. F., De Dreu, C. K. W., & Nijstad, B. A. (2007). Personal need for structure and creative performance: The moderating influence of fear of invalidity. *Personality and Social Psychology Bulletin*, *33*, 855–866. doi:10.1177/0146167207301017
- Rietzschel, E. F., Nijstad, B. A., & Stroebe, W. (2007). Relative accessibility of domain knowledge and creativity: The effects of knowledge activation on the quantity and quality of generated ideas. *Journal of Experimental Social Psychology*, *43*, 933–946. doi:10.1016/j.jesp.2006.10.014
- Sacramento, C. A., Fay, D., & West, M. A. (2013). Workplace duties or opportunities? Challenge stressors, regulatory focus, and creativity. *Organizational Behavior and Human Decision Processes*, *121*, 141–157. doi:10.1016/j.obhdp.2013.01.008
- Sassenberg, K., Jonas, K. J., Shah, J. Y., & Brazy, P. C. (2007). Why some groups just feel better: The regulatory fit of group power. *Journal of Personality and Social Psychology*, *92*, 249–267. doi:10.1037/0022-3514.92.2.249
- Sassenberg, K., & Woltin, K.-A. (2008). Group-based self-regulation: The effects of regulatory focus. *European Review of Social Psychology*, *19*, 126–164. doi:10.1080/10463280802201894
- Scholer, A. A., Zou, X., Fujita, K., Stroessner, S. J., & Higgins, E. T. (2010). When risk seeking becomes a motivational necessity. *Journal of Personality and Social Psychology*, *99*, 215–231. doi:10.1037/a0019715
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, *7*, 422–445. doi:10.1037/1082-989X.7.4.422
- Stroebe, W., Nijstad, B. A., & Rietzschel, E. F. (2010). Beyond productivity loss in brainstorming groups: The evolution of a question. In M. P. Zanna & J. M. Olson (Eds.), *Advances in experimental social psychology* (Vol. 43, pp. 157–203). San Diego, CA: Academic Press.
- Sutton, R. I., & Hargadon, A. (1996). Brainstorming groups in context: Effectiveness in a product design firm. *Administrative Science Quarterly*, *41*, 685–718. doi:10.2307/2393872
- Vaughn, L. A., Malik, J., Schwartz, S., Petkova, Z., & Trudeau, L. (2006). Regulatory fit as input for stop rules. *Journal of Personality and Social Psychology*, *91*, 601–611. doi:10.1037/0022-3514.91.4.601
- Werth, L., & Forster, J. (2007). The effects of regulatory focus on braking speed. *Journal of Applied Social Psychology*, *37*, 2764–2787. doi:10.1111/j.1559-1816.2007.00280.x
- Zaal, M. P., van Laar, C., Stahl, T., Ellemers, N., & Derks, B. (2012). Social change as an important goal or likely outcome: How regulatory focus affects commitment to collective action. *British Journal of Psychology*, *51*, 93–110. doi:10.1111/j.2044-8309.2010.02006.x
- Zhou, Q., Hirst, G., & Shipton, H. (2011). Context matters: Combined influence of participation and intellectual stimulation on the promotion focus–employee creativity relationship. *Journal of Organizational Behavior*, *33*, 894–909. doi:10.1002/job.779