

Some Good News About Rumination:

Task-Focused Thinking After Failure Facilitates Performance Improvement

Natalie J. Ciarocco

Monmouth University

Kathleen D. Vohs

University of Minnesota

Roy F. Baumeister

Florida State University

Author Note

Natalie J. Ciarocco, Department of Psychology, Monmouth University; Kathleen D. Vohs, Marketing Department, Carlson School of Management, University of Minnesota; Roy F. Baumeister, Department of Psychology, Florida State University.

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Correspondence concerning this article should be addressed to Natalie Ciarocco, Monmouth University, 400 Cedar Avenue, West Long Branch, New Jersey 07764. E-mail: nciarocc@monmouth.edu

Abstract

Is there an adaptive side to rumination? We tested whether rumination that is focused on correcting past mistakes and active goal achievement could produce positive outcomes; this is in contrast to rumination that focuses on the implications of failure (i.e., state rumination) and task-irrelevant rumination. In all studies, participants received failure feedback on an initial task. A second task similar to the first provided an opportunity for improvement. Studies 1 and 2 manipulated type of ruminative thought such that it was action-focused, state-focused, or task-irrelevant. Action-focused rumination led to performance improvement relative to the other two conditions. Experiment 3 allowed participants to ruminate naturalistically. The more that participants' rumination contained action-focused thoughts, the more their performance improved. Hence, rumination can yield benefits if it focuses on correcting errors and goal attainment.

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Rumination is a fact of human life and common experience for many people. One puzzle is why it occurs. A wealth of research has shown rumination to be harmful in many ways and has found little or no evidence of any benefit. The present investigation sought to show a possible benefit from task-focused rumination in the hopes of helping those who chronically ruminate channel their thoughts into a healthier form of rumination.

Defining Rumination

As defined by Martin and Tesser (1989, 1996) rumination is an ongoing conscious thought that is focused on a single topic or theme that may continue even in the absence of immediate environmental demands requiring those thoughts. Rumination is repetitious, intrusive, and often aversive, and may prevent people from focusing on other more immediate matters. Rumination often concerns goals or desired outcomes, including counterfactual outcomes associated with recent problems, failures, or blocked goals. Automatic, unwanted, and intrusive, as well as controlled, deliberate, and conscious thought processes are typically included in the definition of rumination (Martin & Tesser, 1989). Rumination can have important consequences in one's life.

Building on Martin and Tesser's (1989) understanding of rumination as a response to blocked goals, Mikulincer (1996) distinguished three categories of rumination. Action rumination is task oriented, focusing on how to achieve the goal and how past missteps possibly could have been rectified. State rumination focuses on current feelings and implications of failure. Task-irrelevant rumination may serve to distract the person from the failure by thinking of events or persons unrelated to the blocked goal.

Related Constructs

The ruminative process shares features with other constructs. Mentally simulating hypothetical scenarios, known as episodic future thought, helps in coping with stress and goal achievement (Szpunar, 2010). However, episodic future thought involves mentally creating on-time personal events that have the potential of occurring in the future. Unlike rumination, this process is controlled and intentional, not repetitive in nature, and focused on possible futures, as opposed to problematic past events.

The notion of cognitive processing is similar to rumination in that both involve the active exploration of thoughts and feelings associated with a trauma and its implications (Greenberg, 1995). Cognitive processing connects with both the action and state rumination types, in that it involves both a concentration on the process of what went wrong (action) and its consequences (state). Cognitive processing, and the resulting ability to find meaning in an event, is linked to better psychological adjustment (Mendola, Tennan, Affleck, McCann, & Fitzgerald, 1990) and physical health (Affleck, Tennon, Croog, & Levine, 1987; Bower, Kemeny, Taylor, & Fahey, 1998). Although cognitive processing can involve repetitive and intrusive thoughts, it is triggered by a traumatic event, not the goal blockage that often triggers rumination.

Emotional approach coping, used to manage a stressful event, is another concept similar to rumination. One strategy of emotional approach coping is called emotional processing, which includes the understanding of one's emotions surrounding the stressful event (Averill & Thomas-Knowles, 1991), and in this way emotional processing might resemble state rumination. Stanton, Kirk, Cameron, and Danoff-Burg (2000) found that emotional approach coping did help in overall adjustment to stressful events and increased ruminative thoughts and behaviors.

The concept that best overlaps with action rumination is process-simulation, which is one form of mental simulation. Process-simulation is a conscious process in which a person mentally rehearses and imaginatively visualizes the steps involved in accomplishing a goal (Taylor, Pham,

Rivkin & Armor, 1998). This process increases the behaviors associated with actually accomplishing the long-range goal. Mental simulation differs from rumination insofar as the former is a controlled type of thinking that involves actively working to create mental images of hypothetical or past events. Rumination is a less controlled and more repetitive process in which mental imagery may or may not be involved. Studies involving process simulation have instructed participants to visualize themselves engaging in specific events and even prompted participants with sample details to consider during the mental simulation (Pham & Taylor, 1997).

Problems Associated with Rumination

Ample evidence has associated rumination with adverse outcomes, especially for depressed and otherwise dysphoric people. Dysphoric ruminators have poor problem-solving skills, exhibit negative biases in recall and thinking, are unduly pessimistic, lack cognitive flexibility, and show academic performance deficits (Davis & Nolen-Hoeksema, 2000; Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Lyubomirsky, Kasri, & Zehm, 2003; Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell, & Berg, 1999). Chronic rumination negatively impacts one's cognitive abilities and appears to contribute to interpersonal problems as well.

Ruminators are disparaged by peers (Schwartz & McCombs-Thomas, 1995). They report low social support (Nolen-Hoeksema, Parker, & Larson, 1994) and high interpersonal distress (Lam, Schuck, Smith, Farmer, & Checkley, 2003). Compared to others, ruminators form less effective solutions to interpersonal problems (Lyubomirsky & Nolen-Hoeksema, 1995) and are more likely to seek revenge against relationship partners (McCullough, 1998). Relationship-specific rumination is associated with mistrust and possessiveness (Carson & Cupach, 2000). Rumination undoubtedly hinders interpersonal relationships.

Taken together, the literature has painted rumination as an unpleasant, costly, useless, and sometimes self-destructive form of thought. Finding an adaptive function to rumination may help to explain why this seemingly harmful pattern of thought is so common. Still, it is hazardous to generalize from dysphoric rumination to all styles of rumination. Moreover, Seligman (1993) has suggested that many pathological responses are based on adaptive patterns that are carried to dysfunctional extremes or applied in inappropriate circumstances. If that is correct, there could be adaptive benefits of rumination in some circumstances. These would depict rumination as an adaptive pattern with a dysfunctional side, or as an often adaptive response that becomes dysfunctional when carried to excess.

The Present Study

Rumination leads to a number of cognitive and social difficulties. Therefore, finding a way to help those who ruminate is an important endeavor. Merely suppressing ruminative thinking is not a promising answer. The suppression of even a simple thought leads to a preoccupation with the thought (Wegner, Schneider, Carter, & White, 1987). Instead of attempting to stop rumination, one might be able to channel these thoughts into more beneficial and healthier forms of rumination.

The majority of findings depicting rumination as bad have emphasized state ruminations. Among Mikulincer's categories, action rumination seems the most promising for delivering adaptive benefits because it has a strong problem-solving element. Prior research supports this hypothesis in showing that repetitive mental activity that is focused on possible ways of coping with a health crisis and creates a problem-solving mental state, mental and physical health seems to benefit (Segerstrom, Stanton, Alden, & Shortridge, 2003).

The hypothesis for the present investigation was that action rumination, due to its focus on analyzing and rectifying recent failure, will produce positive benefits in terms of improved

performance. To be sure, an opposing prediction could be made based on the assumption that ruminating about why one failed could lead participants into a state of high self-consciousness that might precipitate a bad mood, desires to escape from the self, or a self-defeating spiral – all of which might result in a worsening of performance (for reviews of pathological consequences, see Baumeister, 1990, 1997; Heatherton & Baumeister, 1993; Ingram, 1990). Meanwhile, state and task-irrelevant rumination following the same failures were not predicted to yield benefits, in line with past work.

Experiment 1

Participants

Thirty-four undergraduate students (21 women) participated individually. Data from four were discarded because of disbelieving false feedback or not following instructions, resulting in a sample of 30 (20 women).

Materials

Two creativity tasks, adapted from the Torrance Test of Creative Thinking (Torrance, 1966), served as premeasure and postmeasure tests. Both required the creation of an original list of items. They involved listing possible uses for junked automobiles and problems that would ensue if people could fly. It was assumed that most participants would not know their official level of creativity and therefore would believe the false negative feedback received. In addition, this task was selected because there were two highly similar versions to administer.

The sequence was counterbalanced. Number of items listed during the task served as the dependent variable.

Procedure

The experimenter gave initial instructions and emphasized the importance of creativity for overall life success to induce participants' motivation to do well on the task. All participants

performed the creativity premeasure for 3 minutes. The experimenter then collected the answer sheet and explained that she would score the test according to objective, standardized scoring criteria. After 2 minutes she returned and gave false negative feedback. Participants were told their creativity performance was exceptionally poor, creating a situation in which a goal has been blocked and thereby encouraging rumination. The experimenter hesitated and then decided to continue with the experiment.

Next, participants were given a thought-listing task based on random assignment. Each participant was asked to list five thoughts following one of three sets of instructions. Participants in the state rumination condition listed thoughts about how the skills used on the creativity task would impact their future (thus drawing attention to implications of their failure). Participants in the action rumination condition listed how they might improve on the creativity task. Participants in the task-irrelevant condition listed the first things they would want to experience if they suddenly switched genders. Participants were left alone to complete this task.

Afterwards, participants were given an additional 3 minutes to work on the second creativity task (postmeasure). Before being debriefed and thanked, a post-experimental questionnaire was administered.

Results and Discussion

A one-way analysis of variance (ANOVA) on premeasure (baseline) performance found no evidence of significant variation across conditions, $F(2, 27) = 1.83, ns$. Performance change was calculated by subtracting premeasure performance scores (number of items listed) from performance on the second task (number of items listed). Thus, positive numbers indicate improvement. An ANOVA on change scores found significant variation among the three conditions, $F(2, 27) = 10.92, p < .001, partial \eta squared = .54$. Planned comparisons indicated that improvement was greater in the action rumination ($M = 3.50, SD = 1.58, 95\% CI [2.37,$

4.63]), condition than in either the state rumination condition ($M = 1.30$, $SD = 2.16$), 95% CI [- .25, 2.85], $t(27) = 4.61$, $p < .001$, $d = 1.77$, or the task-irrelevant rumination condition ($M = .10$, $SD = .99$, 95% CI [-.61, .21]), $t(27) = 2.98$, $p < .01$, $d = 1.75$.

An analysis of covariance (ANCOVA) was also conducted to examine the relationships between type of rumination and postmeasure performance, while controlling for premeasure performance. Type of rumination predicted performance on the postmeasure when premeasured performance was taken into account, $F(2, 27) = 10.01$, $p = .001$, *partial eta squared* = .44. Thus, covariance and change score analyses yielded the same conclusion; therefore the covariation analysis was eliminated from subsequent studies.

One-sample *t*-tests comparing participants' change scores against zero change in performance confirmed that action rumination led to significant positive improvement, $t(9) = 7.00$, $p < .001$, $d = 4.67$. Neither state rumination, $t(9) = 1.90$, $p = .09$, nor task-irrelevant rumination, $t(9) < 1$, produced significant improvement.

The (counterbalanced) order of the two creativity tasks did not affect change in performance, $t(28) = 1.11$, *ns*. On the post-experimental questionnaire, the three rumination tasks were rated as about the same difficulty, $F < 1$. Also, there was no difference in ratings of how helpful the thought-listing task was for the second task, $F < 1$. Thus, action rumination participants were apparently unaware that their thoughts did in fact help.

The results indicate that action rumination led to significant improvements in performance, although participants seemed unaware of this benefit. State-oriented and task-irrelevant rumination had no such beneficial effects, which is consistent with the generally negative picture of rumination that has emerged from prior work (Davis & Nolen-Hoeksema, 2000; Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Lyubomirsky, Kasri, & Zehm, 2003; Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell, & Berg, 1999).

Experiment 2

The focus of Experiment 2 was to replicate Experiment 1 and find further support for the idea that type of rumination has a differing affect on task performance. As changes in task performance and not actual creativity were the main focus, we used a different measure of performance in Experiment 2. A mood measure was also included to assess possible mood effects of the rumination manipulation.

Participants

Twenty-eight undergraduates (15 females) were randomly assigned among conditions and participated individually.

Materials

Two word search puzzles were created to measure performance both before and after the rumination manipulation. The puzzles involved finding words related to the themes of candy or music in a grid of seeming-random letters. Performance was based on the number of correct words found. This activity was novel enough for participants to not have preconceived notions on their performance, and therefore believe the negative feedback. It was also important to have two very similar activities to note changes in performance. The puzzles were counterbalanced. To assess mood the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988) was administered. The measure asks participants to rate the amount they feel 16 different emotions on a 7-point scale.

Procedure

The experimenter explained the importance of verbal ability for life success to increase the desire for participants to do well on the task. As an ostensible measure of verbal ability, a word search puzzle was administered. Participants were given three minutes to complete the task. Next, the experimenter returned and said that the task is known to be a valid measure of

verbal intelligence and that scoring depended on multiple factors including number, rarity, and orientation of the word (e.g., diagonal, backwards) within the matrix of letters. The experimenter left briefly and returned to administer false negative feedback. All participants were told they had done quite poorly on the puzzle.

The same rumination manipulation found in Experiment 1 was employed followed by the administration of the BMIS as a mood measure (Mayer & Gaschke, 1988). Participants were given another three minutes to complete the alternate word search (finding words on the other theme). Afterward participants were debriefed, thanked, and dismissed.

Results and Discussion

Again, the main measure was performance change (number of words found on the second word search minus number found on the first). ANOVA on change scores indicated significant variation among conditions, $F(2, 25) = 9.69, p = .001, \text{partial } \eta^2 = .44$. Planned comparisons confirmed that participants in the action rumination condition ($M = 2.60, SD = 2.27, 95\% \text{ CI } [.98, 4.22]$) improved significantly more than did participants in either the state ($M = -.67, SD = 1.80, 95\% \text{ CI } [-2.05, .72]$) or task-irrelevant ($M = -1.00, SD = 1.80, 95\% \text{ CI } [2.39, .39]$) rumination conditions, $t(25) = 3.58, p = .001, d = 1.43$; $t(25) = 3.95, p = .001, d = 1.58$. The latter two did not differ, $t < 1$. A separate ANOVA found no significant variation among conditions on premeasured scores, $F(2, 25) = 0.55, ns$.

The action rumination condition's improvement score differed significantly from zero, $t(9) = 3.62, p < .01, d = 2.41$, whereas neither task-irrelevant nor state ruminations improved ($t(8) = 1.66, p = .14$; $t(8) = 1.11, p = .30$). If anything, state and task-irrelevant ruminations tended to make performance worse (hence the negative means). These poor performances are consistent with previous findings that rumination is often counterproductive, especially when it does not focus on task-relevant actions. The order of the two word searches was

counterbalanced. As expected, analysis revealed no effect of order on change in performance, $F(1, 26) = 0.13, ns$.

Baron and Kenny's (1986) guidelines were used to test for possible mediation by mood. Two ANOVAs were conducted using the arousal and valence subscales on the BMIS as dependent measures and condition as the independent variables. No mood differences by condition were detected for either the Arousal subscale, $F(2, 25) = .86, ns$, or the Valence subscale, $F(2, 25) = .48, ns$. Mood valence and arousal did not differ among the action, task irrelevant, and state rumination conditions following the manipulation. Therefore, mood could not have mediated the effects of experimental condition on task performance.

This study provides further support to the idea that rumination can be beneficial. Action rumination, as compared to state and task-irrelevant, led to significant improvements on a different measure of performance. This finding was not mediated by the state mood of participants.

Experiment 3

Because participants were forced into a particular type of rumination, the induction manipulation used (i.e., the thought-listing task) in the previous studies did not give participants the opportunity to use their naturally occurring type of rumination after the failure feedback. Rather than telling participants how to focus their ruminations, Experiment 3 allowed them to ruminate however they chose. Coding by independent judges established the independent variable of type of rumination. This procedure was intended to complement the previous studies with a more ecologically typical sort of rumination, resembling how in everyday life people are free to ruminate wherever their thoughts lead. To offer additional confirmation that mood was not manipulated along with rumination condition, a different measure of mood was used.

Participants

Fifty-eight participants (26 females) participated individually. An additional eight were lost due to equipment (audio recording) failure, disbelieving the failure feedback, or not following instructions.

Procedure

The word search task, instructions, cover story, and bogus negative feedback were the same as in Experiment 2. After the first word search, participants were instructed to verbalize into a tape recorder every thought that came to mind. They were encouraged to think about the task they had just completed, such as how to improve or its implications for the future. They were also told they could think about things unrelated to the task. Thus, permission and suggestion extended to all three categories of rumination. They were also told thinking the same thoughts repeatedly was acceptable. The PANAS (Watson, Clark, & Tellegen, 1988) was administered between the rumination induction (verbalization) and the second word search.

Two judges categorized each thought into one of four categories: action, state, task-irrelevant, or other (i.e., task-relevant but neither action nor state rumination). Interrater agreement was moderate: action $ICC = .64, p < .03$; state $ICC = .88, p < .001$; task-irrelevant $ICC = .92, p < .001$; and other $ICC = .63, p < .03$.

Results and Discussion

As before, performance change was calculated as number of words found for task 2 minus number found in task 1. After the second word search, participants were asked how much of the rumination period they had spent mulling over the failure feedback as a manipulation check. Action and state rumination scores were positively correlated with reliving the failure, $r = .28$ and $.40, p < .05$, and task-irrelevant rumination scores were negatively correlated with it, $r = -.42, p < .01$. (The “other” category was unrelated, $r = .03$.) These correlations can be regarded as favorable manipulation checks.

Proportion of action ruminations (from judges' coding) predicted performance change, such that the more thoughts that were action-ruminative, the more the participant improved, $r = .28, p < .05$. State rumination yielded a trend in the opposite direction, such that more state-ruminative thoughts led to greater decrements in performance, $r = -.24, p = .07$. Task-irrelevant and other ruminations had no relation to performance change, $r = .02$ and $-.06$, respectively.

Order of task (counterbalancing) did not impact change in performance, $t < 1$. Performance change was not correlated with positive mood, $r = .03$, or negative mood, $r = .14$ as measured by the PANAS. The benefits of action rumination remained significant after controlling for both mood subscales.

Experiment 3 continued to support that idea that rumination can be beneficial. In this study, a more naturalistic design was employed to increase ecological validity and establish a link between rumination and performance. Action rumination alone was positively correlated to changes in task performance.

General Discussion

Across three experiments, action rumination alone led to positive changes in performance. Mood did not play a role in these findings. When goal blockage was followed by ruminating about one's feelings, about the negative implications of the blockage, or about task-irrelevant, self-distracting issues, little benefit was observed in these studies. Such fruitless ruminations may well constitute the bulk of the rumination in previous studies (cited above), and our findings support theirs. The bad reputation of rumination is thus well deserved.

Action rumination was helpful to participants, however. This pattern suggests that active rumination shares with cognitive processing activities that bring about psychological benefits – namely, the active exploration of thoughts. Action rumination is however a very specific and focused form of cognitive processing. Whereas almost every sort of thought could be described

as cognitive processing, action rumination involves a specific pattern of thought focused on task performance, goal achievement, and fixing problems or mistakes from recent performances so as to improve on future occasions. It would be inappropriate and indeed reckless to generalize from our findings to suggest that all forms of cognitive processing can improve performance, and indeed we found that several other patterns of rumination (which also involve cognitive processing) provided no benefit.

The processing that occurs in emotional approach coping may be similar to the process of state rumination. Given that emotional processing is known to help people cope with stressful events (Stanton, Kirk, Cameron, & Danoff-Burg, 2000), one might expect state rumination to be helpful for performance. Yet across all three experiments, state rumination did not impact performance and in one experiment (Experiment 3), there was a downward trend toward state rumination harming outcomes. Hence, we found that state rumination was not beneficial to performance in these contexts. In order for performance to improve after goal blockage, focusing on and understanding one's emotions about the event are apparently not advantageous.

Mental simulation of performance processes has been shown to benefit future performance in some cases (Pham & Taylor, 1997; for review, see Baumeister, Masicampo, & Vohs, in press). The helpful aspect appears to be mentally imagining the specific activities that can lead to success. We cannot know whether some of our participants did that during the rumination period. If action rumination were to consist partly of the mental simulation of performance activities conducive to success, that would help explain its benefits. It is also noteworthy that our instructions to ruminate did not contain the sorts of specific instructions used in mental simulation research. Therefore, participants would have had to find their own way to such thoughts. Future research may elucidate whether action rumination generally tends to converge spontaneously on conducting mental simulations of specific behaviors conducive to

improvement in performance. That would possibly help explain some of the beneficial effects we observed.

It would be surprising if rumination, as defined by Martin and Tesser (1989, 1996), is as uniformly bad as it has sometimes been depicted. Why would the human mind have general patterns of thought whose only effects were counterproductive and upsetting? The present investigation identified one category of rumination that consistently led to improvements in performance. Specifically, ruminating about task-relevant actions may have adaptive utility. By reflecting on what went wrong and how to rectify it, people may be able to discover sources of error or alternative strategies, ultimately leading to not repeating mistakes and possibly doing better in future. Confidence may also be enhanced. Such retrospective ruminations may be broadly adaptive, insofar as it may be impossible to reflect on alternate strategies and other aspects of performance during the performance itself, when one's full energies are directed toward doing the best one can. Rumination and the repetitive and uncontrollable thought patterns associated with it may actually be an adaptive pattern of thought that is sometimes engaged inappropriately.

The present findings thus offer possible insight as to why rumination may be a common human response, even though it is often dysfunctional and sometimes even counterproductive. If people always focused directly on the task at hand and ceased to think about it as soon as it ended, learning would be substantially curtailed. It may often be impossible to analyze all possible options and strategies in the heat of the moment. Moreover, failures are aversive, so people may naturally be reluctant to think about them afterward. Having a built-in impulse to think back on failures and analyze what went wrong may be a powerful aid to adaptive learning and improvement in performance. Individuals who learn from their mistakes via continued rumination may succeed better subsequently, and so the impulse to ruminate after failure may

have had a broad advantage in natural selection. These findings fit a broad pattern in the literature, namely that offline processing about past and future events seems central to most of the beneficial effects of conscious thought on behavior (Baumeister, Masicampo, & Vohs, in press). The fact that some people ruminate on unhelpful things (e.g., feelings, implications, irrelevancies) may be an unavoidable side effect of what is at its core a valuable adaptation.

Indeed, the present results may help shed light on why rumination causes dysphoric individuals such woe despite its potential for benefit. Theorists such as Nesse (2000) have begun to understand depression as rooted in inextricable commitments to unattainable goals. If the core purpose of rumination is to discover alternate pathways to blocked goals, this would be quite useful and adaptive when goals are attainable but would remain doomed and futile when goals are in fact unattainable. Although such sweeping conclusions are beyond the scope of this investigation, they would be consistent with both the widely documented detrimental effects of rumination and with the highly specific benefits found in our three studies.

The current work is the first to use Mikulincer's (1996) classification of rumination to test whether different forms of rumination may benefit psychological health. An important consideration is the potential clinical implications this work may have. Based on the work on Wegner et al. (1987), it seems likely that the suppression of ruminative thinking would be an ineffective strategy. Instead of suppression, the current findings recommend the approach of rechanneling rumination into the apparently more helpful form of action rumination. As our data attest, people can enter into a state of action rumination if so prompted. Whether this process would be as easily entered into by depressed or anxious individuals, though, is a question that awaits further study.

The limitations of this work should be noted. Our studies depended on participants being naive to the cover story. As a consequence, in order to avoid potential corruption of the

participant pool, we collected data on a small number of participants, which was justified given the large effect sizes of the manipulations. Another limitation is that the studies involved ruminating about a relatively unimportant event. This limits our ability to generalize the results to the blockage of more self-relevant goals. Last, we should point out that our participants were drawn from a nonclinical population. Research on clinical samples using this typology of rumination style would be welcomed.

Future research could look for the benefits of rumination in domains other than task performance. Because rumination negatively impacts social relationships (Carson & Cupach, 2000; Lam, Schuck, Smith, Farmer, & Checkley, 2003; Lyubomirsky & Nolen-Hoeksema, 1995; McCullough, 1998; Schwartz & McCombs-Thomas, 1995), knowing the benefits and costs of specific types of rumination in the interpersonal domain would be valuable. In particular, it would be enlightening to establish that some forms of rumination can be helpful to interpersonal relationships, paralleling the present findings of benefit to task performance.

In conclusion, thinking about goal blockage is a common form of rumination, and the present results suggest it is not invariably bad. In fact, reflecting on one's failure and how it might have been avoided can apparently contribute to significant improvements on subsequent performances.

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