J Rat-Emo Cognitive-Behav Ther (2009) 27:144–159
DOI 10.1007/s10942-009-0096-y

ORIGINAL ARTICLE

The Interaction of Mood and Rumination in Depression: Effects on Mood Maintenance and Mood-Congruent Autobiographical Memory

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Published online: 5 August 2009

Abstract Rumination is a response to distress in which individuals focus repetitively on their feelings and the causes and consequences of those feelings. When induced to ruminate, dysphorics exhibit more negative mood and recall more negative memories, but these effects are not seen in nondysphorics. This pattern of results could be due to trait-like differences between dysphoric and nondysphoric individuals, or to the high levels of negative affect that dysphorics are experiencing at the time of rumination. The purpose of this study was to evaluate the effects of pre-rumination mood on post-rumination mood and subsequent memory. Participants scoring high or low in depressive symptoms were assigned to either a positive or negative emotion induction prior to ruminating and completing an autobiographical memory task. Analysis of self-reported mood indicates that both emotion inductions were effective. Surprisingly, all participants returned to baseline mood levels following the rumination induction, and emotion induction had no effect on the negativity of the memories recalled. Dysphorics recalled significantly more negative memories than nondysphorics, regardless of whether positive, neutral, or negative memories were specifically prompted. Our results indicated that the prolonged experience of dysphoria may have greater effects on post-rumination mood and memory than the transitory experience of sadness.

Keywords Rumination · Mood maintenance · Mood-congruent autobiographical memory · Dysphoria

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Introduction

The response styles theory of depression proposes that a tendency to ruminate about depressive symptoms, or a ruminative response style, exacerbates negative mood and increases risk of depression (e.g., Nolen-Hoeksema 1991). Rumination is defined as a response to distress in which individuals focus repetitively on their feelings and the causes and consequences of those feelings, without engaging in active problem solving (e.g., Nolen-Hoeksema 1991). Rumination has been consistently associated with increased risk for the development of depression in a number of prospective, longitudinal studies (e.g., Just and Alloy 1997; Nolen-Hoeksema 2000; Nolen-Hoeksema et al. 1993, 1994; Schwartz and Koenig 1996; Spasojevic and Alloy 2001; Wisco and Nolen-Hoeksema 2008). When induced to ruminate in the lab, dysphoric individuals exhibit a variety of undesirable outcomes, including maintained or exacerbated negative mood, impaired problem-solving, inhibition of instrumental behavior, more negative thinking, and more negative memory recall (see Nolen-Hoeksema et al. 2008, for a review). These negative outcomes are not seen in nondysphoric individuals induced to ruminate. Similar effects have been replicated in clinically depressed individuals, compared to nondepressed individuals (Donaldson and Lam 2004; Lavender and Watkins 2004; Watkins and Baracaia 2002; Watkins and Moulds 2005; Watkins and Teasdale 2001).

Why does the rumination induction differentially affect dysphoric and nondysphoric individuals? The prompts of the rumination induction have been judged by independent raters to be self-relevant but emotionally neutral. Because depression is associated with negative views of the self (e.g., Beck 1967), dysphoric individuals may have more negative associations with the self which are primed by these self-relevant prompts. The self-relevance of the prompts will not lead to negative thoughts in nondysphoric participants, who do not have the same negative associations with the self.

Alternatively, the prompts of the rumination induction may be detrimental only in the context of negative affect. Because dysphoric individuals are experiencing negative emotions much of the time, it is likely that dysphorics are experiencing sadness when entering the laboratory and completing the rumination task. In fact, examination of the baseline mood ratings in previous studies comparing dysphoric and nondysphoric individuals indicates that dysphorics report higher sadness ratings at the beginning of the experimental session (e.g., Lyubomirsky and Nolen-Hoeksema 1993, 1995; Lyubomirsky et al. 1998, 1999). If dysphorics were not experiencing negative affect, the thoughts prompted by the rumination induction might not be negatively valenced, and thus might not lead to detrimental effects such as worsened mood and negative memory recall.

Post-Rumination Mood Effects

Induced rumination consistently exacerbates negative mood relative to distraction for dysphoric but not for nondysphoric individuals (e.g., Lyubomirsky and Nolen-Hoeksema 1993, 1995; Lyubomirsky et al. 1998, 1999; Nolen-Hoeksema and Morrow 1993). If the negative affect experienced by dysphorics is driving the

effects of rumination, similar effects would be expected for dysphorics and for nondysphorics experiencing negative emotions. Thus, if nondysphoric participants experience negative emotions prior to ruminating, rumination would be expected to prolong that experience of negative affect. Morrow and Nolen-Hoeksema (1990) investigated this possibility by giving an unselected sample a negative mood induction designed to increase feelings of sadness and then asked them either to ruminate or distract themselves. After receiving the negative mood induction, participants who ruminated reported more negative mood than those who distracted.

Rumination also exacerbates another negative emotion: anger. Rusting and Nolen-Hoeksema (1998) gave unselected participants a mood induction designed to increase feelings of anger followed by either rumination or distraction. In this case, rumination increased feelings of anger, whereas distraction either had no effect on anger (Experiment 1), or decreased anger (Experiments 3 and 4). Rumination, therefore, does worsen mood in nondysphoric individuals, but only if they are experiencing negative emotions prior to ruminating. These findings offer support for the theory that the negative affect experienced by dysphorics is driving the effects of rumination in this group. If dysphorics experienced positive emotions prior to ruminating, the exacerbation of negative mood typically associated with rumination might disappear. However, prior studies of induced emotion before ruminating have only examined the induction of negative emotions in nondysphoric samples, and have not examined the interaction of emotion and rumination in dysphorics. Prior studies have also focused exclusively on the effects of negative emotions and rumination on changes in mood, and have not examined the effects of negative emotions before ruminating on subsequent problem solving, implementation of instrumental behavior, negative thinking, or negative memory recall.

Post-Rumination Memory Effects

Memory might be especially likely to be influenced by the combination of negative emotions and rumination. Research on mood-congruent memory recall suggests that depression is marked by a negative memory bias that may be exacerbated by self-focused attention, such as rumination. A large body of literature indicates that depressed individuals recall more negative memories than nondepressed individuals on explicit memory tasks, including recall of autobiographical memories. Additionally, when unselected participants experience mood manipulations prior to memory recall, those who experience negative mood recall more negative memories than those who experience positive mood (see Blaney 1986; Matt et al. 1992 for reviews). Most studies of mood-congruent memory include either a trait-like measure of mood (e.g., dysphoria-status) or a state-like manipulation (e.g, a negative mood induction). However, Direnfeld and Roberts (2006) compared incidental recall between nondysphorics, nondysphorics after induced negative mood, and dysphorics. Compared to nondysphorics, both dysphorics and non-dysphorics experiencing negative mood recalled more negative memories, suggesting that mood-congruent memory recall is a function of both trait and state negative mood. The term mood-congruent memory has been used to describe both these trait and state-like mood effects. For the purposes of this paper, we will use the term

mood-congruent memory to refer to group differences in memory valence between dysphoric and nondysphoric individuals (i.e., an effect of trait mood), and effects due to state-like mood will be labeled as such.

One proposed explanation for mood-congruent memory in depression is that depressed individuals engage in more self-focused thought, which might promote recall of more negative information. Pyszczynski et al. (1989) investigated whether self-focus would explain mood-congruent memory effects. Dysphoric and nondysphoric participants were randomly assigned to either a self- or other-focus condition in which they were asked to write stories about themselves or about someone else. Dysphorics recalled significantly more negative autobiographical memories after the self-focus induction than after the other-focus induction. When compared to nondysphorics, dysphorics recalled more negative memories only in the self-focus condition, with no group difference in the other-focus condition. The authors offered this pattern of results as evidence that self-focus mediates the mood-congruent memory recall typically associated with depression. However, there is a large body of evidence suggesting that induced sadness can also lead to more negative recall (e.g., Blaney 1986; Matt et al. 1992). It is unclear how the increased levels of self-focus associated with depression could explain the memory effects of state-like mood in nondepressed individuals.

Both negative mood and the combination of negative mood with self-focused attention may lead to more negative memory, with self-focus exacerbating the effects of negative mood on memory. Lyubormirsky and colleagues (1998) found this pattern of results when they investigated the effect of rumination on memory recall. Dysphoric individuals asked to ruminate recalled significantly more negative memories than dysphorics who distracted themselves and who recalled significantly more negative memories than nondysphorics who either ruminated or distracted. Nondysphorics who ruminated or distracted did not differ from each other in terms of negativity of recall. These findings indicate that rumination alone does not produce more negative recall, but rather that rumination in the context of negative mood (dysphoria) produces this effect. Furthermore, this pattern of results suggests that rumination does not fully explain the relationship between dysphoria and negative memory recall, because dysphorics who distracted themselves still exhibited mood-congruent memory. However, rumination appeared to exacerbate mood-congruent memory.

The mechanism by which rumination exacerbates mood-congruent memory in depressed individuals is still unclear. Mood-congruent memory is thought to reflect biased processing resulting from negative schemas associated with depression, activation of an associative network of memories consistent with current mood state, or some combination of these mechanisms (see Beck 1967 and Bower 1981). Rumination could exacerbate mood-congruent memory through either or both of these mechanisms. As a form of self-focused attention, rumination could focus attention on negative self-schemas, priming negative recall. Alternatively, rumination could induce negative emotions in dysphorics, but not in nondysphorics, due to the negative associations with the self described above. These increased levels of negative emotions could then lead to more negative recall, consistent with the research investigating state mood effects on memory.

Alternatively, negative affect prior to ruminating may be driving the memory effects of rumination in dysphorics. Thus, rumination might not exacerbate mood-congruent memory in dysphorics who are experiencing positive affect prior to ruminating. Joormann and Siemer (2004) induced a positive or negative mood in dysphoric and nondysphoric participants, then induced them to ruminate, then examined their latency to recall autobiographical memories. The experimenters used three-word cues to elicit positive and negative memories of common events that participants were likely to have experienced (e.g., "a broken promise"). Nondysphoric participants were faster to recall positively cued memories than negatively cued memories after ruminating, whether they had experienced a positive or a negative mood induction prior to ruminating. This suggests that experiencing negative mood prior to ruminating does not increase the accessibility of negative memories for this group. Dysphoric participants recalled positive and negative memories equally quickly after ruminating, whether they were in a positive or a negative mood prior to ruminating. This suggests relatively greater accessibility of negative memories, or relatively reduced accessibility of positive memories, in dysphorics compared to nondysphorics. The fact that dysphorics' relative speed of recall is similar after both mood inductions suggests that experiencing positive affect prior to ruminating does not increase accessibility of positive memories for dysphorics.

However, Joormann and Siemer (2004) did not assess the negativity of the memories recalled in response to these positive and negative prompts. Even if participants respond with similar latencies to the same prompt (e.g., "a broken promise"), there could be considerable variability in the negativity of memories recalled in response to that cue (e.g., "My boyfriend promised to take out the garbage last night, but he didn't" versus "My boyfriend promised never to leave me, but he dumped me for my best friend."). It may be that although the accessibility of memories in response to positive and negative prompts were similar regardless of induced mood, the memories recalled after the positive mood induction were less negative than those recalled after the negative mood induction.

We sought to extend these findings by assessing the negativity of the memories recalled. We included both trait-like mood and state emotion manipulations in order to disentangle their effects on subsequent mood and autobiographical memory following rumination. Specifically, we investigated whether experiencing a positive emotion induction prior to ruminating would be associated with less negative recall in dysphoric participants, and whether negative emotions prior to ruminating would be associated with more negative recall in nondysphoric individuals. Additionally, we investigated whether experiencing positive emotions prior to ruminating would buffer dysphoric individuals against the exacerbated negative mood typically found after ruminating in this group.

We also sought to extend the findings of Joormann and Siemer (2004) by examining the effect of prompt type on memory negativity. Dysphorics and nondysphorics might be differentially sensitive to prompt types such that dysphorics recall negatively-valenced memories in response to all prompt types, whereas nondysphorics recall prompt-appropriate memories. If this is the case, it would be difficult to interpret group differences in latencies to positive and negative prompts. We included positive, negative, and neutral memory prompts in this study to

investigate the possibility of an interaction between dysphoria status and prompt type.

Method

Overview

Dysphoric and nondysphoric participants were randomly assigned to receive either a happiness- or sadness-inducing emotion manipulation. After completing the emotion induction, all participants then completed a rumination induction followed by an autobiographical memory task.

Participants

Ninety-seven individuals participated in this experiment and were compensated with either course credit or a payment of twenty US dollars. Participants were recruited through the Introductory Psychology pool and by advertisements posted on the university campus and in the community. Individuals who expressed interest in participating in this study were asked to complete a prescreening measure prior to participation. The prescreener was a modified version of the BDI-II (Beck et al. 1996), including all BDI-II items except for one item assessing suicidal ideation. Individuals scoring below a 9 or above a 16 on the prescreener were invited to participate in this study. At the time of the experiment, all participants completed the full BDI-II and individuals who no longer met the minimum/maximum BDI-II cut-off score were excluded from the final analyses, ensuring that participants had relatively stable high or low levels of depressive symptoms. Of all 97 participants in this study, 83 satisfied the cut-off criteria at the time of participation and were retained for the final analyses, leaving a final sample of 43 nondysphoric and 40 dysphoric participants. Of the nondysphorics, 22 were randomly assigned to the happiness-inducing emotion induction, and 21 to the sadness-inducing induction. The dysphorics were split evenly between the two induction conditions.

The final sample was composed of 31 men (37.3%) and 52 women (62.7%). The age of participants ranged from 18 to 57, with a mean age of 23.3 (SD = 7.1). Our sample was ethnically and racially diverse, with 48 participants identifying as White, nonhispanic (57.8%), 16 as Asian (19.3%), nine as Multiracial (10.8%), six as Black, nonhispanic (7.2%), and three as Hispanic or Latino (3.6%). One participant declined to provide racial or ethnic information. There were no significant differences in age, sex, or ethnic/racial group among the four experimental groups.

Materials

Mood Measure

Mood was assessed via self-report at four time points: prior to emotion induction, after emotion induction, after the rumination induction, and after the autobiographical

memory task. Participants were asked to complete a series of ratings of different adjectives on a Likert-type scale from 1 to 9 to describe themselves "right now." Embedded within several distractor ratings (e.g, not creative-very creative, tame-wild), were the three mood ratings of interest (not happy–happy, not sad–sad, and not depressed–depressed). The happiness rating was reverse-scored and the three highly correlated measures were combined to form a single mood rating. This particular mood measure was chosen in order to reduce demand characteristics of the repeated measure by hiding its purpose as a mood assessment. These Likert-type scales have been used extensively in previous research as measures of state-like mood (e.g, Lyubomirsky and Nolen-Hoeksema 1993, 1995; Lyubomirsky et al. 1998; Rusting and Nolen-Hoeksema 1998).

To validate the mood rating further, we also administered the expanded version of Positive and Negative Affect Scale (PANAS-X; Watson and Clark 1994). The PANAS-X was administered with the "moment instructions," such that participants are asked to rate how they are feeling "right now, at the present moment," and was given as part of a larger battery of questionnaires including filler questionnaires (e.g., about film preferences). The baseline mood rating on the Likert-type scales was significantly correlated with the sadness subscale of the PANAS-X, $r = .78$, $p < .001$.

Emotion Induction

The emotion inductions were short film clips from the video library developed by Gross and Levenson (1995). The amusing film clip was a scene from the comedy "When Harry Met Sally," and the sad film clip was a scene from the movie "The Champ." These film clips have been shown to induce amusement and sadness, respectively, in the absence of other emotions (e.g., Gross and Levenson 1995).

Rumination Induction

We used the rumination induction developed by Nolen-Hoeksema and Morrow (1993). The induction is described to participants as an "imagination task" in which they will be asked to spend a few moments thinking about each of a series of topics. Participants are asked to read a sequence of prompts focused on themselves and the causes and consequences of their current feelings at their own pace for a total of eight minutes (e.g., "Think about the level of motivation you feel right now," "Think about your character and who you strive to be").

Autobiographical Memory Task

The participants' autobiographical memories were prompted by single words which had been judged to be negative, neutral, and positive in valence in previous research (e.g., "hopeless," "bread," and "happy;" Jones et al. 1999). The experimenter explained that she would be reading a list of words, and asked participants to recall a specific memory from their past in response to each word. The experimenter asked participants to recall the first memory that came to mind. Six prompts of each type

were given in a standardized order, with neutral, positive, and negative prompts alternating, giving a total of 18 memories. The participants' responses were audiotaped for later coding.

The valence of the memories was coded by two independent coders blind to the dysphoria status and mood condition of the participants. The coders rated how positive and how negative the memories were on two Likert-type scales from 1 to 7, ranging from not at all to extremely. The positivity rating was subtracted from the negativity rating to give the composite negativity rating. The coders demonstrated adequate inter-rater reliability on this composite rating ($r = .84$). All coder differences of more than one point for either positivity or negativity were resolved by consensus, and differences of one point were simply averaged together to give the consensus positivity and negativity ratings. The consensus positivity rating was subtracted from the consensus negativity rating to give the consensus rating of memory negativity, which was used in all analyses reported below.

Procedure

Participants were told that the purpose of the study was to investigate the relationship between imagination and memory, and that participation in this study would involve answering questions, watching a short film clip, completing an imagination task and completing a memory task. They were not informed of the study hypotheses regarding mood or rumination effects until after study completion. All participants met individually with the experimenter and began by completing a packet of questionnaires including filler measures, the BDI-II, and the PANAS-X. Next they viewed either the positive or negative emotion clip. In order to reduce demand characteristics, participants received no instructions other than to watch the film clip, and the experimenter responded to any questions about the purpose of the film by indicating that she would answer all questions at the end of experimental participation. All participants then completed the rumination induction, which was described as an "imagination task." Following the procedure established by Nolen-Hoeksema and Morrow (1993), the experimenter left the room during the rumination induction. Finally, all participants completed the autobiographical memory task with the experimenter, and their responses were audiorecorded for later coding.

Results

Mood Results

Figure 1 presents the mood rating data across the experimental session. A repeated-measures ANOVA was conducted including time of mood rating (pre-emotion induction, post-emotion induction, post-rumination, and post-memory task) as a within-subjects variable and dysphoria status (dysphoric, nondysphoric) and emotion induction (happy, sad) as between-subjects variables. There was no main effect of time of mood rating, $F(3, 237) < 1$, ns, $\eta_p^2 = .001$. There were significant

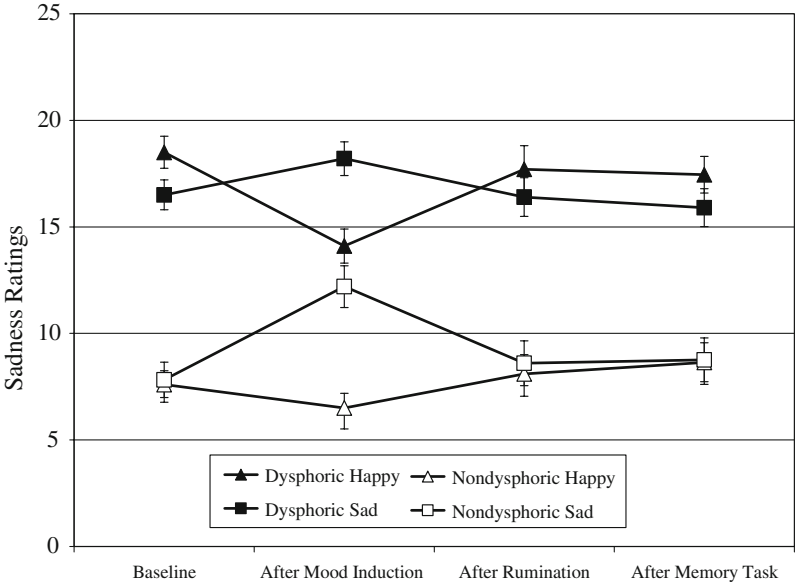

Fig. 1 Self-reported negativity of mood

time by dysphoria status, $F(3,\ 237) = 5.30$, $p = .001$, $\eta_p^2 = .06$, and time by emotion condition interactions $F(3,\ 237) = 26.14$, $p < .001$, $\eta_p^2 = .25$, but the predicted three-way interaction between time, dysphoria status, and emotion induction did not emerge, $F(3,\ 237) < 1$, ns, $\eta_p^2 = .001$. Investigation of the between-subjects variables revealed a significant main effect of dysphoria status, such that dysphoric participants reported significantly more negative mood during the experiment, $F(1,\ 79) = 126.02$, $p < .001$, $\eta_p^2 = .62$, but no main effect of emotion condition or dysphoria status by emotion condition interaction, Fs < 2, ns, η_p^2s $< .02$.

To follow-up the significant time by emotion condition interaction, simple effects analyses were performed. Mood ratings changed significantly across time in both the group who received the sad emotion induction, $F(3,\ 120) = 12.99$, $p < .001$, $\eta_p^2 = .25$, and the group who received the happy emotion induction, $F(3,\ 123) = 11.93$, $p < .001$, $\eta_p^2 = .23$. To determine when during the experimental sequence mood was changing for these two groups (following the emotion induction, following the rumination induction, or following the memory task), we conducted three separate follow-up analyses, with time of mood rating entered as a 2-level variable in each analysis. From pre- to post-emotion induction, mood ratings changed significantly for the groups who received both the sad, $F(1,\ 41) = 25.18$, $p < .001$, $\eta_p^2 = .38$, and the happy emotion induction, $F(1,\ 40) = 28.74$, $p < .001$, $\eta_p^2 = .42$. The significant mood effects were in the predicted directions: the sad group reported increased sadness and the happy group reported decreased sadness following the emotion induction. Following the rumination induction (post-emotion induction, post-rumination), mood ratings significantly changed again for the groups

who received both the sad, $F(1, 40) = 16.78$, $p < .001$, $\eta_p^2 = .30$, and the happy mood inductions, $F(1, 41) = 17.67$, $p < .001$, $\eta_p^2 = .30$. These effects were not in the predicted directions, with the group who had received the sad emotion induction prior to ruminating reporting decreased sadness after rumination, and the group who had received the happy emotion induction reporting increased sadness. Examination of Fig. 1 shows that all groups returned to baseline mood levels following the rumination induction. During the memory task (post-rumination, pre-memory task), mood ratings did not change significantly for either group, Fs < 1, ns, η_p^2s $= .002$.

Similarly, to follow up the significant time by dysphoria status interaction, simple effects analyses were again performed. In the dysphoric group, mood ratings did not change significantly during the experiment, $F(3, 117) = 1.27$, ns, $\eta_p^2 = .03$. In the nondysphoric group, mood changed significantly during the experimental session, $F(2.2, 93.79) = 3.12$, $p < .05$, $\eta_p^2 = .07$.[1] To determine when the mood of the nondysphorics changed (following the emotion induction, following the rumination induction, or following the memory task), we again conducted three separate follow-up analyses, with time of mood rating entered as a 2-level variable in each analysis. When mood ratings pre- and post-emotion induction were analyzed, nondysphorics reported significantly higher sadness ratings following the emotion induction, $F(1, 42) = 6.94$, $p < .05$, $\eta_p^2 = .14$. When mood ratings before and after the rumination induction, $F(1, 42) = 1.99$, ns, $\eta_p^2 = .05$, and before and after the memory task, $F(1, 42) = 0.66$, ns, $\eta_p^2 = .02$, were analyzed, the mood ratings of the nondysphorics did not change significantly.

Therefore, the results of the mood data indicate that our emotion inductions were successful in inducing positive and negative emotions, respectively. Dysphorics and nondysphorics were differentially affected by the emotion induction, with nondysphorics reporting increased sadness overall following the emotion induction, indicating greater sensitivity to the negative than to the positive emotion induction. Following the rumination induction, changes in mood were determined largely by which emotion induction had preceded the rumination period. Those participants who had received the sad emotion induction prior to ruminating experienced decreased sadness following rumination, while those who had received the happy emotion induction experienced increased sadness following rumination, indicating a return to baseline for both groups during this time. The predicted interaction between dysphoria status and emotion condition during rumination did not emerge. The exploratory analyses investigating mood during the memory task indicated no change in mood for any group following the memory task.

Memory Results

The composite memory negativity ratings are presented in Fig. 2. The memory ratings revealed main effects of memory prompt type, $F(2, 237) = 921.07$, $p < .001$, $\eta_p^2 = .89$, and dysphoria status, $F(1, 237) = 10.85$, $p = .001$, $\eta_p^2 = .04$, on the negativity of memories recalled. Bonferroni-corrected post-hoc analyses

[1] Because the sphericity assumption of repeated-measures ANOVA was violated, the F-value was adjusted using the Greenhouse-Geiser epsilon (.744).

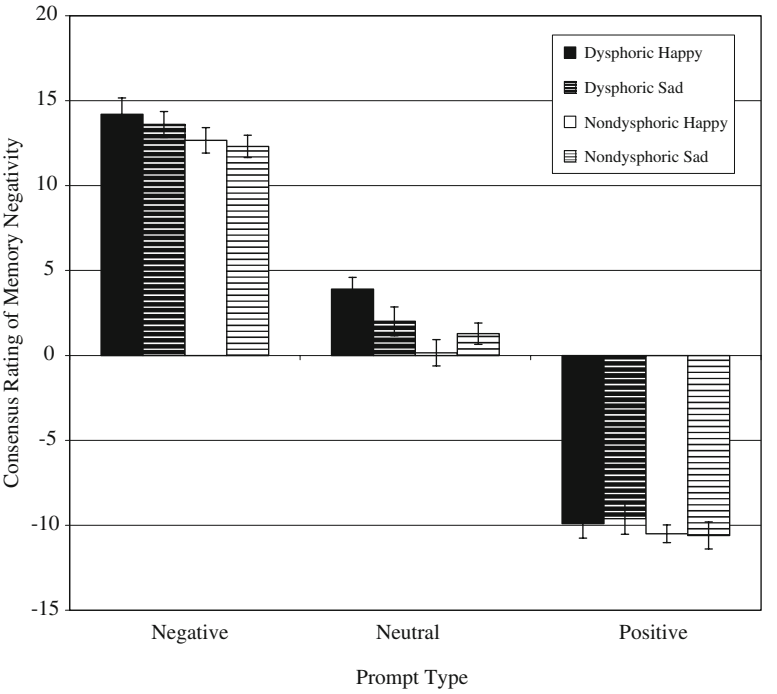

Fig. 2 Negativity of memories by prompt type

revealed that negative prompts led to significantly more negative memories than neutral prompts, which led to significantly more negative memories than positive prompts. The significant effect of dysphoria status was also in the expected direction, such that dysphorics recalled more negative memories than nondysphorics. No significant main effect of emotion condition, and no two- or three-way interactions between dysphoria status, emotion condition, or prompt type emerged, Fs < 1.5, ns, η_p^2s $< .02$. The lack of a significant interaction between dysphoria status and prompt-type and the small size of this effect, $F(2, 237) = .92$, ns, $\eta_p^2 = .008$, suggested that the negative memory bias associated with dysphoria was of similar magnitude for negatively, neutrally, and positively prompted memories.

Discussion

The main effect of dysphoria status on mood during the experiment suggests that dysphoric participants are experiencing more negative emotions while participating in the experiment. Our emotion induction was effective, but dysphorics and nondysphorics exhibited differential response to the emotion induction, with nondysphorics exhibiting a stronger response to the sad than happy emotion induction. Dysphorics did not report this increased sensitivity to the sad emotion induction, which could be due to the relative difficulty of exacerbating an existing mood-state in the dysphoric group.

These mood results can inform the study of emotion reactivity in major depression. Our findings are inconsistent with current models of depressive emotion reactivity, which propose that depressed individuals will report either reduced reactivity to positive stimuli, increased reactivity to negative stimuli, or reduced reactivity to both positive and negative stimuli, which has been termed emotion context-insensitivity (Rottenberg et al. 2005). Our findings suggest the opposite: *nondysphoric* individuals showed reduced reactivity to positive stimuli relative to negative stimuli. This discrepancy may be explained by the way we measured emotion reactivity in this study. In most of the research on depressive emotion reactivity, the mood ratings of depressed and nondepressed individuals are compared at one time point, following the administration of an emotion induction. Depressed individuals typically demonstrate higher sadness ratings than nondepressed individuals regardless of the emotion induced, which is taken as evidence that depression is associated with reduced reactivity to positive stimuli. When examining the sadness ratings after the emotion induction in our study, we find the same pattern of results. Dysphorics reported higher sadness levels than nondysphoric participants after both positive and negative emotion inductions. However, the repeated measures analysis indicates that this effect is due to the higher baseline of negative mood in the dysphoric group, rather than decreased reactivity to the positive emotion induction. Whether dysphoria is marked by increased reactivity to positive stimuli or decreased reactivity to negative stimuli, relative to nondysphoric individuals, is an important topic for future research.

During the rumination induction, participants who had received the sad emotion induction experienced decreased sadness, whereas participants who had received the happy emotion induction experienced increased sadness. In other words, all groups responded to the emotion induction, but then returned to their baseline sadness levels by the time of the next mood assessment following the rumination induction. This is contrary to our prediction that pre-rumination emotional experience would affect the content of ruminative thought and thus post-rumination mood. One possible explanation is that all groups returned to baseline mood because our emotion induction was not strong enough to carry over into the rumination period. The mood induction used by Morrow and Nolen-Hoeksema (1990) asked participants to imagine themselves in a situation involving the death of their mother while listening to sad music. This induction may have had a larger effect on participants, making it more difficult for them to repair mood following the induction. The induction used by Morrow and Nolen-Hoeksema was also more self-relevant than our induction, which simply asked participants to view a film clip. Similarly, the anger inductions used by Rusting and Nolen-Hoeksema (1998), which either instructed participants to read a passage and imagine themselves in an anger-provoking situation, or to recall idiographic experiences of anger, were also self-relevant. More personally relevant emotion inductions may be likely to persist during self-focused rumination and to affect the content of ruminative thought. In contrast, our results suggest that when participants' moods are temporarily changed by a non-self-relevant mood induction prior to ruminating, the self-relevant thoughts of rumination quickly bring their mood back to its baseline level.

The main effect of dysphoria status on valence of autobiographical recall is consistent with the large body of literature demonstrating mood-congruent memory recall. The effect of dysphoria status was consistent across all three prompt types, suggesting that dysphorics demonstrated mood-congruent memory regardless of whether positively, neutrally, or negatively-valenced memories were specifically prompted. There is no evidence in this study that dysphorics and nondysphorics are differentially sensitive to prompt type, given the absence of an interaction between prompt type and dysphoria status on memory negativity. Rather, both nondysphorics and dysphorics recalled memories of valence appropriate to the prompts given. Therefore, group comparisons between dysphoric and nondysphoric participants appear to be appropriate in study designs which prompt positively or negatively valenced memories, such as the study reported by Joormann and Siemer (2004). Joormann and Siemer's finding that nondysphorics showed faster recall of positively-cued than negatively-cued memories, and that dysphorics did not show this effect, is not likely due to reduced prompt sensitivity in the dysphorics. However, assessing both latency and memory negativity in the same study allows for the highest confidence that dysphorics and nondysphorics are equally distinguishing between negative and positive prompts.

No effects of emotion induction on memory negativity were found. This may be explained by the unexpected return to baseline mood levels in all groups after the rumination induction. Because there were no differences in mood at time of recall due to the emotion manipulation, it is not surprising that no memory differences emerged as a function of emotion induction. An investigation of this interaction with a stronger, more self-relevant emotion induction that is more likely to carry over into rumination would be an important topic for future research.

Our results have implications for clinicians working with depressed clients who tend to ruminate. Rumination appears to maintain negative mood, even if participants are temporarily experiencing positive affect prior to ruminating. Rather than trying to lift their mood prior to engaging in self-focused thought, clients should be encouraged to avoid rumination altogether. Behavioral activation and mindfulness-based treatments for depression are consistent with this approach and have been found to be effective in treating major depression (Jacobson et al. 1996) and preventing relapse in recurrently depressed clients (Teasdale et al. 2000). A key component of both behavioral activation and mindfulness interventions is that therapeutic techniques should be scheduled into clients' lives, and clients should follow through with these activities regardless of how they feel in the moment. In behavioral activation, clinicians encourage clients to engage in positively reinforcing activities rather than passive self-reflection. Behavioral activation theorists argue that behavior changes should occur before mood changes, and therapists encourage patients to engage in such activities even when they are feeling down and do not think they have the energy to complete such tasks (Jacobson et al. 2001).

Mindfulness-based cognitive therapy incorporates mindfulness meditation into more traditional cognitive-behavioral therapy, and is theorized to work in part by breaking the ruminative cycle (e.g., Teasdale et al. 1995). Proponents of such approaches warn that mindfulness exercises should not be used as a means of escape

from negative affect, but rather should be incorporated into everyday life (Segal et al. 2002). Similarly, Teasdale and colleagues (1995, p. 34) emphasize that mindfulness techniques can be "practised on a wide range of thoughts, feelings and experiences in addition to those specifically related to depression." Our results support the encouragement of behavioral activation and mindfulness techniques regardless of current mood state, albeit for a different reason. Because depressed individuals may quickly return to negative mood states after temporarily lifting their mood, depressed clients should practice positively rewarding activities and mindfulness even when they are already experiencing positive affect, in order to maintain that heightened mood rather than sinking into rumination.

Limitations of this study include the use of a dysphoric rather than a clinically depressed sample. Because the majority of studies investigating the effects of rumination on mood and memory have used dysphoric rather than clinically depressed samples (see Nolen-Hoeksema et al. 2008, for a review), we chose to recruit a dysphoric sample for this study to facilitate comparisons with previous research. When the effects of induced rumination in clinically depressed samples are investigated, the pattern of results remains the same (e.g., Donaldson and Lam 2004; Lavender and Watkins 2004; Watkins and Baracaia 2002; Watkins and Moulds 2005; Watkins and Teasdale 2001). However, it is possible that our results would not generalize to clinically depressed individuals, and replication of our results in a diagnosed depressed sample would be a useful direction for future research.

Our results indicate that dysphoria status predicts negativity of mood and autobiographical memory, with dysphoric participants reporting more negative mood and more negative memories than nondysphorics. The effect of dysphoria status on memory negativity was present regardless of whether positive, neutral, or negative memories were prompted. The effect of prompt type on memory negativity was present for both the dysphoric and nondysphoric groups, with no interaction between dysphoria status and prompt type, suggesting that dysphoria status does not affect sensitivity to prompt type. Positive and negative emotion inductions were both successful in eliciting the intended emotions; however, all groups returned to baseline mood levels following the rumination induction. Although previous research has indicated that emotional experience can alter the effects of rumination (Morrow and Nolen-Hoeksema 1990; Rusting and Nolen-Hoeksema 1998), our results suggest that the prolonged experience of dysphoria may have greater effects on mood and memory than the transitory experience of emotional states.

Acknowledgments The authors thank Jessica Thomas and Minh Tran for their work as coders and Teresa Treat and Marcia Johnson for their helpful comments on earlier drafts of this manuscript.

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