COGNITION AND EMOTION, 1996, *10* (4), 437–444

BRIEF REPORT

Mood Regulation and Memory: Repairing Sad Moods with Happy Memories

Braden R. Josephson
Hofstra University, USA

Jefferson A. Singer
Connecticut College, USA

Peter Salovey
Yale University, USA

A total of 106 undergraduates participated in a study examining how individuals retrieve memories to repair negative moods. Participants first completed a measure of depression. Two weeks later, participants were assigned to either a sad or neutral mood induction. After mood induction, they recalled two memories, rated their affective responses to the memories, and indicated why they chose the valence and order of the memories. Consistent with mood-congruent recall, participants in the sad condition reported sadder memories than those in the neutral condition. However, participants with prior low depression scores tended to recall more positive second memories, whereas participants with higher prior depression scores recalled consecutive negative memories. Sixty-eight per cent of sad participants who retrieved a negative first and positive second memory mentioned mood repair as motivating the recruitment of the more positive second memory.

INTRODUCTION

Bower (1981) described a mood congruency effect in which stimuli matching in affective valence with mood are encoded and recalled better than stimuli of different valence. Although many subsequent studies have demonstrated congruency for both happy and sad moods (Bower, 1981; Gilligan & Bower, 1984; Singer & Salovey 1988), others have found congruency only for happy moods and positively toned material, and more equivocal results for negative mood congruency (Matt, Vasquez, & Campbell, 1992). Isen (1985) has suggested that

Requests for reprints should be sent to Jefferson A. Singer, Department of Psychology, Connecticut College, New London, CT 06320, USA.

difficulties in demonstrating negative mood-congruent recall may be due to nondepressed individuals' motivation to repair negative mood states by summoning more positive memories. In support of this position, studies from our own and other laboratories have found that individuals with elevated depression scores demonstrate less access to positive memories, suggesting a possible deficit in their reparative abilities (Moffitt, Singer, Nelligan, Carlson, & Vyse, 1994; Salovey & Singer, 1989; Teasdale & Barnard, 1993; Williams & Broadbent, 1986; Williams & Scott, 1988).

Building on this argument, mood researchers have proposed a temporal sequence in mood repair; initial negative mood congruency is followed by a repair process that gathers momentum over time to counteract the sad mood (Forgas, 1995; Sedikides, 1994; Wegner, Erber, & Zanakos, 1993). This reparative shift should be most obvious in nondepressed individuals and delayed or inactive in more depressed individuals.

To examine this possibility of sequential mood repair and its variation depending on prior level of depresion, we first assessed a group of participants' self-ratings of depression. Two weeks later, we assigned participants to a sad or neutral mood induction, asked them to recall two memories, and then to rate each memory for its affective valence. They were then asked to explain their reasons for recalling the memories they chose. We predicted that both nondepressed and depressed participants in the sad condition would recall a first memory of more negative valence than participants in the neutral condition. However, when these same sad participants were presented with an opportunity to recall a second memory, we predicted that those with prior low scores in depression would summon a more positive memory, whereas the participants with prior higher depression scores would recall a second negative memory.

METHOD

Participants

Participants in this study were 106 students enrolled in introductory psychology at Connecticut College (32 males and 74 females). All participants received course credit for their participation.

Measures

Beck Depression Inventory (Beck, 1967). The BDI consists of 21 questions used to measure state depression. We changed the directions from "circle the number (0, 1, 2, 3) next to the one statement in each group that best describes how you felt the last week including today" to "circle the number that best describes the way you generally feel".

Multiple Affective Adjective Checklist—Revised (Zuckerman & Lubin, 1985). Only the depression subscale of the MAACL-R was used; its internal consistency (Cronbach's alpha) was 0.82.

Mood Manipulation Check. Induced mood states were verified by six items on 7-point Likert scales (1 indicated "not" and 7, "very"). The items were happy, exhilarated, sad, satisfied, content, and disappointed (Rosenhan, Salovey, & Hargis, 1981). A positive affect score was created by summing the positive and reversed negative items.

Mood induction

Videotapes from sad or neutral movies were used to induce the mood state. Participants in the sad mood condition viewed a $12\frac{1}{2}$ minute melancholy clip from the motion picture *Terms of Endearment* (Palfai & Salovey, 1993). The participants in the neutral condition viewed a $12\frac{1}{2}$-minute clip on making a table from *This Old House.*

Memory Rating Sheet

Participants indicated their emotional responses to both memories with 0–6 ratings of 12 emotions: happy, sad, angry, fearful, surprised, ashamed, disgusted, guilty, interested, embarrassed, contempt, and proud.

Procedure

Session 1. In the first session, participants were told that they were participating in a study looking at their creativity and imagination. They then completed the BDI.

Session 2. Participants returned two weeks later for a group session of five participants. Each participant sat at a desk with a large divider blocking any view of the other participants. They were given the MAACL-R before receiving their mood induction. They then watched either the sad or neutral videotape (assignment to mood condition was random). After mood induction, participants were given the first mood manipulation check. Participants then wrote down a memory according to the following instruction: "Please write down a memory that is at least one year old. This memory should be strongly negative or positive. It is completely up to you to decide which memory you choose (i.e. whether you write down a negative or positive memory)." The order of the modifiers "negative" and "positive" was counterbalanced. On completing the first memory, participants were asked to write down a second memory. Participants then rated their memories, and after completing the ratings, received the second mood manipulation check. Finally, participants were asked: "Please describe the reasons why you chose to make your first memory either positive or negative, and your second memory either positive or negative."

RESULTS

Mood Manipulation Check

A separate one-way ANOVA by mood condition (Sad vs. Neutral) revealed no difference in the MAACL-R scores for the two groups [Sad, $M = 66.92$; Neutral = 71.91, $F(1, 104) = 0.63$, n.s.] prior to mood induction. We then conducted a 2×2 analysis on participants' mood check ratings with mood condition (Sad vs. Neutral) as a between-subjects' factor and Time (Time 1: The first mood check after induction and Time 2: The second mood check after retrieval of the two memories) as a within-subjects factor. This analysis revealed significant main effects for both mood condition [$F(1, 104) = 49.28$, $P < 0.0001$] and Time [$F(1, 104) = 16.24$, $P < 0.0001$], as well as a significant Condition $\times$ Time interaction [$F(1, 104) = 7.91$, $P < 0.01$]. Participants in the sad condition were less happy than participants in the neutral mood condition ($M = 18.24$ vs. $M = 25.34$, respectively) and participants were happier at Time 2 (post-memory retrieval) than at Time 1 (post-mood induction), ($M = 23.01$ vs. $M = 20.57$, respectively). Analysis of simple effects tests revealed that although there was no significant change in mood from the time of first mood check to the time of second mood check for participants in the neutral mood condition, participants in the sad condition were significantly happier at the second mood check than immediately after the mood induction [$F(1, 104) = 21.77$, $P < 0.0001$].

Mood Congruency and Affective Responses to Memories

Participants labelled each of their two memories as either positive or negative.[1] Thirty-six participants in the sadness induction and 19 participants in the neutral induction recalled a negative first memory; 13 participants in the sadness induction and 38 participants in the neutral induction recalled a positive first memory. Thus, there was a strong mood congruency effect on subject's first memory [$\chi^2(1, N = 106) = 16.73$, $P < 0.01$]. Twenty-three participants in the sadness induction and 19 participants in the neutral induction recalled a negative second memory; 26 participants in the sadness induction and 38 participants in the neutral condition recalled a positive second memory. Evidence for mood congruency was not found in second memories [$\chi^2(1, N = 106) = 2.14$, n.s.].

A principal components analysis was conducted on the 12 adjectives that participants used to rate their memories. "Sad", "Fearful", and the reverse of "Happy" and "Proud" loaded on Factor 1, which might be characterised as a

[1] Because participants' reports of their affective responses to their memories could themselves be influenced by the mood induction, we decided to ask independent raters to evaluate the affective quality of the memories recalled. These raters, blind to condition and hypotheses, rated 49 memories each and rated their affective quality for distress. The inter-rater reliability was 0.89. The correlation of the raters' scores with the participants' own ratings of their memories was 0.83. This finding suggests that the memories were judged appropriately by participants despite any potential affective influence on their judgement processes.

distress factor (Cronbach's alpha, after factor scoring using unit weights = 0.85). "Ashamed", "Disgusted", and "Guilty" loaded on Factor 2, which might be considered a social anxiety factor (Cronbach's alpha = 0.85). A third factor yielded just two items, "Interested" and "Surprised", with a Cronbach's alpha of 0.45, and so these items were excluded from subsequent analyses.

The mean distress and social anxiety scores for first memories in the sad versus neutral conditions were compared in a one-way MANOVA [Wilks' $L = 0.81$, $F(3, 102) = 7.96$, $P < 0.001$]. Univariate analyses showed that participants reported a more distressed first memory when in the sad condition ($M = 3.75$) as opposed to the neutral condition [($M = 2.12$), $F(1, 104) = 22.40$, $P < 0.001$]. Social anxiety ratings of memories, however, did not differ [$F(1, 104) = 3.02$ n.s.].

Mood Repair

A two-way mixed model ANOVA, Mood Condition (sad vs. neutral induction) × Memory Solicitation (first vs. second memory) was conducted on ratings of memory distress. There was a main effect for mood condition (participants in the sad condition rated their memories more distressing than participants in the neutral condition), [$F(1, 104) = 19.25$, $P < 0.0001$], but none for memory solicitation [$F(1, 104) = 2.36$, n.s.]. The interaction of Condition × Memory Solicitation was significant [$F(1, 104) = 5.59$, $P < 0.05$]. Analysis of simple effects revealed that participants in the sad mood induction rated their second memories as less distressing than their first memories [$M = 2.85$ vs. $M = 3.76$, respectively, $F(1, 104) = 7.07$, $P < 0.01$], but that neutral participants showed no change from their first to second memories [$M = 2.13$ vs. $M = 2.32$, respectively, $F(1, 104) = 0.37$, n.s.].

To demonstrate mood repair, we need to look more closely at participants in the sad mood condition ($n = 49$). Is it possible that all participants experienced an attenuation of the sad mood regardless of whether or not they recalled a positive second memory? The 36 participants in the sad mood condition who recalled a first negative memory displayed mood congruency after the sad mood induction. We then split these participants into two goups—negative memory followed by positive memory (NP, $n = 19$) and negative memory followed by another negative memory (NN, $n = 17$).

We expected that the NP group should be in a better mood at the second mood check after memory retrieval than the NN group, controlling for differences at the first mood check immediately after induction. At the first mood check, the NN group was less positive ($M = 13.82$) than the NP group ($M = 17.16$). At the second mood check, the difference between the groups grew even larger; the NP group's mood check increased to 23.32 (+ 6.16), whereas the NN group's mood check scores increased by only 0.59 to 14.41. An ANCOVA controlling for the difference in mood immediately after induction was significant [$F(1, 34) = 10.06$, $P < 0.005$], indicating that the difference at the second mood check is not dependent on their immediate post-induction response and may be, in part, a function of subsequent memory choices.

Open-ended Responses

We first considered the sad mood condition participants' reasons for recalling their first memory. Twenty-one of the 36 who recalled a negative memory first (58%) mentioned the sad video as having influenced their memory choice. In contrast, 2 of the 13 who recalled a positive memory (15%) mentioned the influence of the mood induction. Turning to the second memory, 13 of the 19 NP participants (68%) indicated a desire to change their negative moods as the explicit reason they selected a positive memory.[2] These participants were able to articulate a conscious strategy to repair their negative mood by retrieving a second memory that was more positive in affect. In comparison, none of the 17 NN participants indicated any mood repair strategies. Considering the remaining 13 participants in the sad condition, 33% of the PN participants (n = 6) described an initial attempt at mood repair that was not effective, and 14% of the PP participants (n = 7) mentioned a conscious effort at mood repair.

Depression

We predicted that participants with higher scores on the BDI would have more difficulty generating a positive memory to repair negative mood after the sad induction. We compared the BDI scores for the NN group to the NP group in the sad condition. The mean BDI score for NNs was 11.00 and for NPs, 6.63; this difference was in the predicted direction, but did not reach significance (t, 34 = 1.62, P = 0.055, one-tailed test). The mean score for the NNs (11.00) is considered "partially symptomatic" of depression on the BDI (Brown, Schulberg, & Madonia, 1995). The mean BDI scores were 4.00 and 7.50 for the PP and PN participants in the sad condition, respectively.[3]

DISCUSSION

Although recent papers have postulated a mood repair process in memory, the present experiment may be the first empirical study to demonstrate that individuals deliberately recruit positive memories to counteract negative moods and accompanying negative memories. After a sad mood induction, participants who followed a negative memory with a positive one reported a more positive mood than participants who recalled two consecutive negative memories. Additionally, 68% of the participants who recalled a positive memory after a negative memory made

---

[2] For participants who chose a positive memory after recalling a first negative memory following the sad mood induction, open-ended responses were examined for possible repair statements. Those participants who explicitly used a combination or part of the following phrases: "I wanted to change my bad mood"; "I decided to try to make myself feel better"; "I wanted to lift my mood"; and "I did not want to stay in a bad mood" were classified as engaging in repair.

[3] The mean BDI scores for the neutral condition participants were as follows: NN = 14.00 (n = 6); NP = 5.15 (n = 13); PN = 9.77 (n = 13); PP = 5.28 (n = 13).

explicit statements indicating their conscious intention to lift their mood by recalling a more happy experience from their past.

There are several alternative explanations for our findings. First, participants simply may have experienced an attenuation of their sad mood, and as a result, felt better by the time they recalled their second memory, and other participants, perhaps because they were more affected by the sad videotape, remained sad even as they recalled their second memories. Secondly, it is possible that our instructions to recall a positive *or* negative memory may have caused some participants to attempt to balance their memories by recalling one of each valence. However, only 6% of the participants stated explicitly that they had engaged in this strategy.

The first explanation, differential mood attenuation, is militated against by the fact that only those participants who chose to recall a second positive memory showed a significantly elevated mood at the second mood check. One could say that for these participants, their mood wore off more quickly or that they also showed less of an effect of the mood induction initially, but what does mood attenuation really mean? Mood may dissipate due to ongoing reparative effects in consciousness. It would be difficult for a reseracher to control participants' moment-by-moment cognitive activity, which may be recruited to change their mood. In addition to the process studied in this experiment (recruitment of countervailing memories), individuals might also rely on distracting thoughts and imagery to change aversive mood states. Future studies will need to distinguish between mood change that is a result of strategic repair versus passive attenuation.

Implications and Future Research

Future studies might employ a less content-driven mood induction; participants' memories showed some evidence of association to the film clip's content. Additionally, the request for two memories was an admittedly arbitrary starting point to examine mood repair; future studies could request a larger number of memories or simply employ a thought sampling technique. This more extensive sampling of participants' thought processes would also help to distinguish how often participants employ mood repair as a conscious strategy. Parrott (1993) has suggested that some emotional regulation strategies may be so well learned that they are activated below the level of consciousness. It would be important as well to remove our request for memories of strong affective content in order to see if participants would spontaneously generate these types of memories.

This study provided support for a temporal model of mood repair (cf. Sedikides, 1994). By looking at two memories in sequence, we replicated an associational model of mood congruency, but we also identified mediating cognitive activity after the initial congruent response. Moreover, the results of this study highlight Isen's (1985) and Singer and Salovey's (1988) cautions that mood-memory models may need to account for motivational influences. As Isen (1985, p. 389) has suggested, depression may not be simply about a case of the "blues", but as much about a failure to "chase the blues away".

Manuscript received 9 June 1995
Revised manuscript received 28 December 1995

REFERENCES

Beck, A.T. (1967). *Depression, clinical, experimental, and theoretical aspects.* New York: Hoeber.

Bower, G.H. (1981). Mood and memory. *American Psychologist, 36,* 129–148.

Brown, C., Schulberg, H.C., & Madonia, M.J. (1995). Assessing depression in primary care practice with the Beck Depression Inventory and the Hamilton Rating Scale for Depression. *Psychological Assessment, 7,* 59–65.

Forgas, J.P. (1995). Mood and judgment: The affect infusion model (AIM). *Psychological Bulletin, 117,* 39–66.

Gilligan, S.G., & Bower, G.H. (1984). Cognitive consequences of emotional arousal. In C.E. Izard, J. Kagan, & R. Zajonc (Eds.), *Emotion, cognition and behavior* (pp. 547–588). New York: Cambridge University Press.

Isen, A.M. (1985). Asymmetry of happiness and sadness in effects on memory in normal college students: Comment on Hasher, Rose, Zacks, Sanft, and Doren. *Journal of Experimental Psychology: General, 114,* 388–391.

Matt, G.E., Vazquez, C., & Campbell, W.K. (1992). Mood-congruent recall of affectively toned stimuli: A meta-analytic review. *Clinical Psychology Review, 12,* 227–255.

Moffitt, K.H., Singer, J.A., Nelligan, D., Carlson, M., & Vyse, S., (1994). Depression and memory narrative type. *Journal of Abnormal Psychology, 103,* 581–583.

Palfai, T.P., & Salovey, P. (1993). The influence of depressed and elated mood on deductive and inductive reasoning. *Imagination, Cognition, and Personality, 13,* 57–71.

Parrott, W.G. (1993). Beyond hedonism: Motives for inhibiting good moods and for maintaining bad moods. In D.M. Wegner & J.W. Pennebaker (Eds.), *Handbook of mental control* (pp. 278–305). Englewood Cliffs, NJ: Prentice Hall.

Rosenhan, D.L., Salovey, P., & Hargis, K. (1981). The joys of helping: Focus of attention mediates the impact of positive affect on altruism. *Journal of Personality and Social Psychology, 40,* 899–905.

Salovey, P., & Singer, J.A. (1989). Mood congruency effects in childhood versus recent autobiographical memories. *Journal of Social Behavior and Personality, 4,* 99–120.

Sedikides, C. (1994). Incongruent effects of sad mood on self-conception valence: It's a matter of time. *European Journal of Social Psychology, 24,* 161–172.

Singer, J.A., & Salovey, P. (1988). Mood and memory: Evaluating the network theory of affect. *Clinical Psychology Review, 8,* 211–251.

Teasdale, J.D., & Barnard, P.J. (1993). *Affect, cognition, and change: Re-modeling depressive thought.* Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

Wegner, D.M., Erber, R., & Zanakos, S. (1993). Ironic processes in the mental control of mood and mood-related thought. *Journal of Personality and Social Psychology, 65,* 1093–1104.

Williams, J.M., & Broadbent, K. (1986). Autobiographical memory in suicide attempters. *Journal of Abnormal Psychology, 95,* 144–149.

Williams, J.M.G., & Scott, J. (1988). Autobiographical memory in depression. *Psychological Medicine, 18,* 689–695.

Zuckerman, M., & Lubin, B. (1985). *Manual for the Multiple Affect Adjective Checklist-Revised.* San Diego, CA: Edits.