

# Misery Loves Company: When Sadness Increases the Desire for Social Connectedness

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## Abstract

In three experiments, the authors investigated the effects of sadness on the desire for social connectedness. They hypothesized that sadness serves an adaptive function by motivating people to reach out to others and preferentially attend to information related to one's current level of social connectedness, but only when it is instigated by social loss. Consistent with this hypothesis, the authors observed that sadness induced by an emotional depiction of social loss enhanced (a) attention to nonverbal cues, an important source of information concerning an individual's current level of social connectedness (Experiment 1), and (b) the desire to engage in social behaviors (Experiment 2). In Experiment 3 the authors found that sadness that results from imagined social loss uniquely produced this pattern of effects. Sadness that resulted from imagined failure had different effects on motivation and no effect on sensitivity to nonverbal cues. These results support and refine functional explanations for the universality of sadness.

## Keywords

sadness, affiliation, vocal tone, nonverbal communication, situation-symptom congruence hypothesis

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Functional theories propose that emotions trigger a cascade of response tendencies that prepare the mind and body to respond adaptively to eliciting events (Levenson, 1994; Nesse, 1990; Plutchik, 1980; Tooby & Cosmides, 1990). Emotions are presumed to trigger a coordinated set of adaptive response tendencies, including changes in attention, motivation, expressive behavior, and higher mental processes (Keltner & Gross, 1999; Levenson, 1999). Importantly, these models do not suggest that emotions and their behavioral manifestations are *always* adaptive; rather, they suggest that the capacity to experience and express emotions tended to confer a selective advantage to our ancestors.

Theoretical and empirical work has provided compelling descriptions of the function of many emotions (Izard, Lewis, & Haviland, 1993). However, the potential function of “normal” sadness (i.e., sadness experienced in the absence of chronic dysphoria or depression) has proved more difficult to specify (Leary, Koch, & Hechenbleikner, 2001). Appraisal theorists such as Frijda (1986) and Lazarus (1991) predict that because it arises in response to a loss that has already taken place, sadness will typically involve withdrawal and disengagement from activities rather than active engagement in the social world. Lazarus noted that in sadness “there seems to be no clear action tendency—except inaction, or withdrawal into oneself” (p. 251). Nesse (1990) further theorized that

“the sad person is lethargic, pessimistic, submissive, *socially withdrawn*, excessively realistic about personal abilities, and has little initiative for new relationships or projects” (p. 273, emphasis added). According to this viewpoint, sadness promotes quality of life in part by facilitating social withdrawal and promoting the conservation of remaining resources.

On the other hand, other scholars suggest that sadness may provoke attentional, cognitive, and behavioral response tendencies that strengthen and reinforce social bonds rather than withdrawal from the interpersonal sphere. According to this view, the sadness and grief provoked by the loss of a loved one heightens the probability of survival by serving as a compelling reminder of the value of family and friendships (Averill, 1968; Izard et al., 1993). In line with the attachment viewpoint, Leary et al. (2001) speculate that the function of normal sadness is to motivate people to avoid the

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distress that comes from relationship loss by engaging in behaviors that sustain and strengthen interpersonal relationships.

### *The Situation-Symptom Congruence Hypothesis*

One way to reconcile these alternative proposals is to consider the antecedents that elicit sadness. Although the subjective state of sadness is generally associated with experiencing a painful loss, the loss can come in different forms. Two specific events often linked to sadness are social loss (i.e., the loss of valued social relationship) and status loss (i.e., experiencing failure or setbacks at an important goal; Haidt & Keltner, 1999). According to the situation-symptom congruence hypothesis (SSC; Keller & Nesse, 2005, 2006), both social loss and status loss produce the subjective state of sadness, and “the aversiveness of emotional pain is its *raison d’être*” (Keller & Nesse, 2006, p. 318). However, sadness elicited by social loss is predicted to be more strongly associated than sadness elicited by status loss with responses that foster social connectedness, particularly crying and seeking social support. On the other hand, sadness that results from failure at an important goal is predicted to be more strongly associated with reactions that are helping in reassessing failing strategies and minimizing future wasted effort, particularly feelings of guilt, rumination, pessimism, and fatigue. In accordance with this view, Keller and Nesse (2006, Experiment 3) observed that participants who imagined a social loss were more likely to endorse depressive symptoms that are consistent with the goal of making or strengthening social bonds (i.e., emotional pain, crying, seeking social support) as compared to symptoms that are inconsistent with this goal (i.e., fatigue, pessimism, anhedonia, guilt, and anxiety). In contrast, participants who imagined failing at an important goal reported being more likely to feel fatigue, pessimism, anhedonia, and guilt than to cry and seek social support.

A first step toward specifying the potential functions of any given emotion is to experimentally induce the emotion and examine resulting effects on a variety of response tendencies (Plutchik, 1980). The current work examines the potential effects of induced sadness, relative to neutral mood, on attention (Experiments 1 and 3) and motivation (Experiments 2 and 3). We made predictions about attention and motivation based in part on the SSC.

### *Potential Effects on Attention*

To make predictions about the effects of sadness on attention, we draw upon work by Pickett and colleagues (2004), who proposed the existence of a social monitoring system (SMS). The SMS is believed to guide information processing when the desire for social connection is especially salient. In terms of attentional changes, Pickett, Gardner, and Knowles (2004) reported that individuals who are particularly concerned with fortifying social connections selectively

deployed their attention selectively to the tone of voice. Given widespread cultural prohibitions against the communication of negative evaluations (Blumberg, 1972), speakers are generally reluctant to directly express any signs that they may wish to sever social ties with a listener. However, vocal tone is more difficult for a speaker to control than verbal content. Therefore, it is a source of highly veridical information regarding a speaker’s true feelings, beliefs, and attitudes (Rosenthal & DePaulo, 1979). In implicit recognition of this fact, people generally rely on vocal tone when word meaning and tone convey conflicting messages—as when, for example, a critical comment is spoken in a pleasant tone of voice (Bugental, Kaswan, & Love, 1970; Mehrabian, 1972). In cultures that strongly emphasize interdependence and group harmony, listeners spontaneously allocate their attention more toward vocal tone vis-à-vis word meaning (Ishii, Reyes, & Kitayama, 2003; Kitayama & Ishii, 2002), consistent with other cultural differences in the use of language to promote affiliation and relational harmony (Ambady, Koo, Lee, & Rosenthal, 1996).

The first experiment in this article examines the effects of normal sadness on attentional resources. Recall that the SSC states that sadness elicited by social loss is associated responses that foster social connectedness. Therefore, this form of sadness might spontaneously direct attention to the source of communication that is most indicative of a speaker’s true feelings, resulting in an attentional bias toward vocal tone. In Experiment 1, we measured the extent to which people in happy, sad, or neutral mood states spontaneously directed their attention to vocal tone. We induced sadness using a vivid portrayal of social loss. In Experiment 3, we expanded our investigation by inducing two forms of sadness, one elicited by social loss and one elicited by status loss, and examining potential effects on attention to vocal tone.

### *Potential Effects on Motivation*

The second experiment takes up the question of motivational changes. Recall that the resource conservation and attachment theories of the function of sadness make contrasting predictions about effects on motivation. Some scholars suggest that sadness promotes resource conservation because it is often elicited by irrevocable loss and is therefore unlike a true motivational state in which the goal is yet to be attained (Frijda, 1986, 1994; Lazarus, 1991). Other scholars suggest that although the loss is often irrevocable, sad mood may still be functional in motivating the individual to attempt to replace the lost resource and to prevent future, similar losses (Averill et al., 1994; Nesse, 2006), both of which can be accomplished by investing time, energy, and resources in establishing new relationships and preserving preexisting ones. Again, a consideration of the eliciting event might help resolve this apparent discrepancy. The SSC predicts that efforts to replace lost resources will be especially acute following social loss; in these cases, the individual should be

motivated to form and strengthen social bonds (Keller & Nesse, 2006), which can help replace lost social resources. Failure, on the other hand, is speculated to produce feelings of both sadness and fatigue; the fatigue is believed to be functional when “continued striving is unlikely to be rewarded” (Keller & Nesse, 2006, p. 318). No work, to our knowledge, has tested the hypothesis that induced sadness (relative to neutral mood) can increase motivation to form and strengthen social bonds, but only when it is elicited by social loss. We tested this hypothesis in Experiment 2, inducing sadness, along with two other emotions (i.e., happiness and sadness), and examining potential changes in the self-reported desire for affiliation. In Experiment 3, we expanded our investigation by inducing two forms of sadness, one elicited by social loss and one elicited by status loss, and examining potential effects on motivation.

## Experiment 1

We tested our prediction in Experiment 1 by inducing happy, sad, and relatively neutral moods before asking participants to complete the modified Stroop task developed by Ishii and colleagues (Ishii et al., 2003; Kitayama & Ishii, 2002). Consistent with the logic of most Stroop-based tasks, this task examines the degree to which a channel of communication captures attention even when the listener is explicitly asked to ignore it. In our study, happy, sad, or control-group participants were asked to ignore either the semantic meaning or vocal tone conveyed by emotional utterances.

## Method

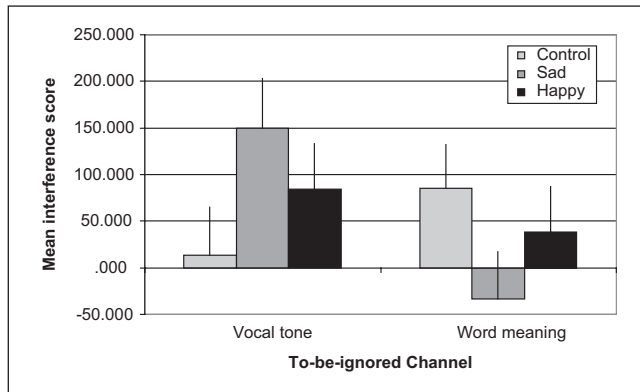
**Participants.** Ninety-seven college students (61 women) participated in exchange for pay or partial course credit. Those participating in exchange for course credit were recruited from introductory psychology courses via an online announcement. Those participating in exchange for pay were recruited from the broader student population via online announcements and flyers.

**Procedure.** Participants were instructed that they would be completing two separate studies, and two Statements of Informed Consent were used to bolster the cover story. The first study, they were told, was aimed at pretesting several film clips for use in future studies (Forgas & Cromer, 2004; Forgas, Laham, & Vargas, 2005). The second study was described as an investigation of “the perception of spoken words.” Participants assigned to the sadness condition viewed short scenes from *Terms of Endearment* (portraying a dying mother) and *Patch Adams* (portraying a friend’s death). In the happiness condition, participants viewed scenes of similar length from the movie *Hoosiers* and the television series *Mr. Bean*. Those in the control condition watched a scene from a nature documentary. To control for general arousal, all participants first watched a 3-min car chase scene from the film *Bullit* (Halberstadt & Niedenthal, 1997). After

viewing the film clips, participants completed the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988), which asks for self-reports of emotional states. We used 7.5-cm lines anchored with the terms *definitely do not feel* and *definitely feel*. Instructions were to “read each item and put a mark on the line to indicate how you feel. Indicate to what extent you feel this way right now, in the present moment. Please work as quickly as possible.” Following Niedenthal and Setterlund (1994), we computed a happy composite by averaging responses to the happy, active, lively, peppy, and content items ( $\alpha = .91$ ) and a sad composite by averaging responses to the drowsy, gloomy, sad, and tired items ( $\alpha = 0.65$ ). Following Mayer and Gaschke (1988), we computed an empathy composite by averaging responses to the loving and caring items ( $\alpha = 0.87$ ), and we computed an anxiety composite by averaging responses to the jittery and nervous items ( $\alpha = 0.66$ ). Next, participants were presented with the Stroop task developed by Ishii et al. (2003). This task consisted of 32 trials, preceded by 10 practice trials. Each trial consisted of a warning signal, followed by a word presented through headphones. The words varied simultaneously along two dimensions: valence of meaning (positive or negative) and valence of vocal tone (pleasant or unpleasant). Participants were randomly assigned to judge word meaning while ignoring vocal tone or to judge vocal tone while ignoring word meaning. They were further instructed to press one of two response keys corresponding to the two response options as quickly as possible without sacrificing accuracy. Response time was measured in milliseconds from the onset of each word, and there was a 1,500-ms interstimulus interval. The stimuli used in this task were words were spoken in English by Japanese-English bilinguals (two females and two males). Pleasantly spoken words were characterized by a smooth and round tone, while unpleasantly spoken words were characterized by a harsh and constricted tone. In the selection of words to be recorded, care was taken to equate the emotional polarity of emotional word content and emotional vocal tone. For a more detailed description of the Stroop stimuli, please see Ishii et al. (2003).

## Results and Discussion

**Manipulation check.** For ease of interpretation, in each of the studies reported in this paper, we first converted BMIS responses into a percentage of the total possible score. A 3 (condition)  $\times$  2 (gender) ANOVA revealed that groups scored differently on the BMIS happy composite,  $F(2, 91) = 10.64$ ,  $p < .001$ ,  $\eta^2 = 0.19$ , with means in the expected direction (happy group  $M = 57.92$ ,  $SD = 22.46$ ; sad group  $M = 32.20$ ,  $SD = 20.78$ ; control group  $M = 48.57$ ,  $SD = 17.27$ ). Groups also scored differently on the BMIS sad composite,  $F(2, 91) = 14.01$ ,  $p < .001$ ,  $\eta^2 = 0.24$ , again with means in the expected direction (happy group  $M = 33.38$ ,  $SD = 18.57$ ; sad group  $M = 54.41$ ,  $SD = 19.87$ ; control group  $M = 33.11$ ,



**Figure 1.** Mean interference as a function of mood and to-be-ignored channel. Positive scores indicate greater interference. Bars represent standard errors of the mean.

$SD = 16.62$ ). There were no effects regarding gender. By contrast, the manipulation had no effect on self-reported empathy,  $F(2, 91) = 1.68$ ,  $ns$ ,  $\eta^2 = 0.04$ , or anxiety,  $F(2, 91) = 1.32$ ,  $ns$ ,  $\eta^2 = 0.03$ . It appears our manipulation was successful in inducing feelings of happiness or sadness but did not affect empathetic or anxiety feelings. There were no effects involving gender in any of these analyses.

**Response times.** We first report analyses of response times (in milliseconds), which included only data for correct responses. Following the procedures set forth by Ishii et al. (2003), we statistically controlled for utterance length and then computed mean response times for congruous trials (i.e., positive meaning + pleasant tone; negative meaning + negative tone) and incongruous trials (i.e., positive meaning + unpleasant tone; negative meaning + positive tone), using only data from correct responses (Ishii et al., 2003). Response times were longer for incongruous trials ( $M = 1425.16$ ,  $SD = 343.38$ ) than for congruous trials ( $M = 1369.63$ ,  $SD = 335.50$ ),  $F(1, 96) = 7.23$ ,  $p < .01$ ,  $\eta^2 = 0.07$ . We computed an interference score by subtracting the mean response time for congruous utterances from the mean response time for incongruous responses. Positive scores indicate greater interference by information in the to-be-ignored channel. We subjected interference scores to an ANOVA with three between-subjects factors (mood, judgment type, and gender). A significant interaction between mood and judgment type emerged,  $F(2, 85) = 4.42$ ,  $p < .05$ ,  $\eta^2 = 0.09$ . As displayed in Figure 1, sad participants experienced more interference than control-group participants when instructed to respond to word meaning and ignore vocal tone, with those in the happy condition at an intermediate level. On the other hand, when instructed to judge vocal tone and ignore word meaning, sad participants experienced *less* interference than controls. Again, participants in the happy condition scored at an intermediate level. A significant three-way interaction between mood, judgment type, and gender also emerged,  $F(2, 85) = 4.16$ ,  $p < .05$ ,

$\eta^2 = 0.09$ . We decomposed this interaction by examining the interaction between mood state and judgment type separately for male and female participants. The two-way interaction was not significant when we restricted our sample to female participants; it was significant among male participants,  $F(2, 30) = 4.24$ ,  $p < .05$ ,  $\eta^2 = 0.22$ . The pattern of results was identical to that displayed in Figure 1; sad participants attempting to ignore vocal tone ( $M = 285.17$ ,  $SD = 263.55$ ) experienced more interference than their counterparts in the control ( $M = -53.37$ ,  $SD = 226.81$ ) or happy ( $M = 104.71$ ,  $SD = 177.29$ ) condition. We observed the opposite pattern among those asked to ignore word meaning; here, interference scores were lowest in the sad condition ( $M = -55.87$ ,  $SD = 107.76$ ). No other significant main effects or interactions emerged.<sup>1</sup>

To further explore this interaction, we conducted post hoc tests comparing interference scores separately for each judgment-type condition. First, we considered only participants who were asked to ignore vocal tone. A Dunnett test revealed that when ignoring vocal tone, sad participants ( $M = 149.75$ ,  $SD = 267.50$ ) experienced significantly more interference than control participants ( $M = 13.48$ ,  $SD = 131.52$ ),  $t(27) = 1.97$ ,  $p < .05$ , one tailed. By contrast, happy participants ( $M = 84.51$ ,  $SD = 142.35$ ) did not perform differently from control participants. Next, we considered only participants who were asked to ignore word meaning. In this case, those in the sad condition ( $M = -32.98$ ,  $SD = 123.08$ ) experienced marginally less interference than control participants ( $M = 84.91$ ,  $SD = 322.42$ ),  $t(32) = 1.62$ ,  $p = .06$ , one-tailed. Again, however, those in the happy group ( $M = 38.23$ ,  $SD = 102.13$ ) did not differ significantly from those in the control group. This suggests that sadness made it more difficult to ignore vocal tone and (slightly) less difficult to ignore word meaning.

To explore the possibility of a mood congruence effect in responses to vocal stimuli, we conducted an ANOVA on response times for the four types of trials defined by word meaning and vocal tone. In this analysis, mood was the between-subjects factor and valence of meaning and valence of tone were the within-subjects factors. A significant main effect of meaning valence emerged, in that participants responded to positive words more quickly than negative words,  $F(1, 94) = 4.04$ ,  $p < .05$ ,  $\eta^2 = 0.04$ . A main effect of tone valence also emerged, in that participants responded to pleasantly spoken words more quickly than unpleasantly spoken words,  $F(1, 94) = 7.03$ ,  $p < .01$ ,  $\eta^2 = 0.07$ . There were no significant effects involving mood.

**Accuracy.** Overall, responses were accurate, with the average participant responding correctly on 94% of the trials. Accuracy rates were higher for congruous responses ( $M = 96\%$ ) as compared to incongruous responses ( $M = 92\%$ ),  $F(1, 73) = 14.62$ ,  $p < .001$ ,  $\eta^2 = 0.18$ . Accuracy was also higher when participants responded to words spoken in a pleasant voice,  $F(1, 73) = 16.30$ ,  $p < .001$ ,  $\eta^2 = 0.18$ , although word meaning failed to influence the

accuracy of responses,  $F(1, 73) = 1.23$ . The interaction between mood and judgment type did not reach significance.

To summarize, Experiment 1 demonstrated that sad mood influences the manner in which selective attention is oriented toward social cues. Replicating past work, those in the control condition tended to have more difficulty ignoring word meaning, relative to vocal tone (Ishii et al., 2003). A novel finding also emerged: Experiencing a sad mood made it more difficult for participants to ignore vocal tone. This result is consistent with past work demonstrating the power of even mild mood states to alter the manner in which people selectively orient attention in the early stages of cognitive processing (Niedenthal, Halberstadt, & Setterlund, 1997; Niedenthal & Setterlund, 1994). It should be noted that this effect was qualified by an interaction with participant gender and that we did not observe an interaction between mood and judgment type when we considered female participants alone. Because women did not appear to be unaffected by the mood manipulation, we do not have an immediate explanation for this finding.

Pickett et al. (2004) observed a similar effect on attention to vocal tone among those reliving social rejection experiences and among those with chronically high belonging needs. Increased attention to vocal tone, these authors suggest, results from instigation of the SMS in place to deal with rejection experiences and avoid prolonged social exclusion. We suggest that mild, temporary sadness can produce similar effects on social information processing in the absence of social rejection.

Pickett et al. (2004) further note that for the SMS to be an effective guidance tool, it should direct attention toward the most veridical signs of potential acceptance or rejection. The lack of a valence effect in their studies is interpreted as evidence that the SMS, when activated, deploys attention toward the source of both positive and negative information (i.e., signs of both acceptance and rejection). The lack of a mood-congruence effect in responses to vocal tone in the current study suggests that sadness, like chronically high belonging needs or experienced rejection, directs attention toward potential signs of both social outcomes.

In sum, Experiment 1 demonstrated that sadness precipitated by social loss produces an attentional bias toward vocal tone, a reliable source of information about a speaker's true feelings. In Experiment 2 we examined potential changes in motivation. To provide a more comprehensive examination, we added a fearful condition to our basic design.

## Experiment 2

This experiment used emotionally contagious film clips to induce happy, sad, and fearful mood states. After completing the mood induction procedure, participants indicated the 20 activities in which they would most like to engage. We were interested in the extent to which sad mood, relative to happy

and fearful moods and a control condition, would increase the desire to engage in social activities.

## Method

**Participants.** Seventy-six college students (40 women) participated in exchange for partial course credit. Participants were recruited from introductory psychology courses via an online announcement that posted a description of the study and the times that were available for participation.

**Procedure.** Participants assigned to the sadness condition viewed a scene from *Terms of Endearment* (portraying a dying mother) and a scene from *The Champ* (in which a boy reacts to his father's death). In the happy condition, participants viewed a comedic performance by Robin Williams (Gross & Levenson, 1995). Participants in the fear condition viewed short scenes from *Silence of the Lambs* and *The Shining* (Gross & Levenson, 1995). Control-condition participants viewed a nature documentary. After viewing the film clips, participants completed the BMIS as described in Experiment 1 and a measure of behavioral tendencies. Behavioral tendencies were assessed using a modified Twenty Statements Test (TST). Participants were asked to "list all the things you would like to do *right now*." Two trained research assistants, naïve to condition assignments and hypotheses, independently coded each statement using a classification system modified from Fredrickson and Branigan (2005). They classified each statement into one of 10 mutually exclusive thought-behavior categories. We defined social activities as activities that were either social by definition (e.g., a date) or included an explicit mention of another person, and we distinguished them from recreational activities through their mention of another person or people. The coders achieved 86% agreement with their first attempt at classification. For the remaining 14% of statements, they discussed each and attempted to come to agreement. This resulted in 98% total agreement. The first author coded the remaining 2%, blind to condition assignment. We tallied the number of statements in each category for each participant. The central dependent measure was the number of social activities. In addition, because the first five responses generated in the TST tend to be the most salient for respondents (Carpenter & Meade-Pruitt, 2008), we conducted separate analyses on the first five responses to the TST. Past studies have similarly analyzed a subset of TST responses (Cousins, 1989; Jones, Sensenig, & Haley, 1974; Watkins, Yau, Dahlin, & Wondimu, 1997).

## Results and Discussion

**Manipulation check.** A 4 (condition)  $\times$  2 (gender) ANOVA on the BMIS happy composite produced a significant main effect of group,  $F(3, 68) = 22.92$ ,  $p < .001$ ,  $\eta^2 = 0.50$ , with means in the expected direction (happy group  $M = 53.25$ ,  $SD = 12.38$ ; fear group  $M = 22.38$ ,  $SD = 9.75$ ; sad group

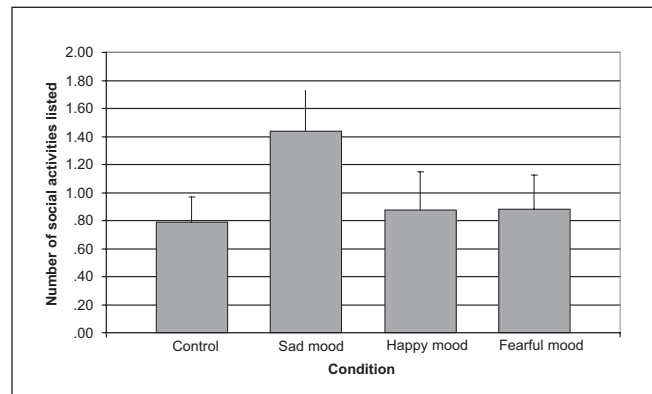
$M = 24.25$ ,  $SD = 17.31$ ; control group  $M = 39.56$ ,  $SD = 11.13$ ). An ANOVA on the BMIS sad composite also produced a significant main effect of group,  $F(3, 68) = 9.91$ ,  $p < .001$ ,  $\eta^2 = 0.30$ , with means in the expected direction (happy group  $M = 27.63$ ,  $SD = 16.00$ ; fear group  $M = 42.31$ ,  $SD = 10.69$ ; sad group  $M = 53.50$ ,  $SD = 16.25$ ; control group  $M = 33.00$ ,  $SD = 17.31$ ). There were no significant effects involving gender. The manipulation also influenced feelings of empathy,  $F(3, 68) = 8.06$ ,  $p < .001$ ,  $\eta^2 = 0.26$ . In light of this significant group difference, we sought to examine whether our sadness induction influenced the intensity of empathetic feelings. We conducted Tukey post hoc comparisons of the four groups on this measure. We found that the fear group reported less intense empathy ( $M = 23.00$ ,  $SD = 15.13$ ) than the three remaining groups (control  $M = 43.94$ ,  $SD = 17.88$ ; happy  $M = 47.63$ ,  $SD = 23.63$ ; sad  $M = 55.06$ ,  $SD = 20.43$ ). Those in the sad group were only different from those in the fear group in terms of their levels of empathy, as a result of reduced empathy among fearful participants. Finally, the manipulation influenced anxious feelings in the expected direction,  $F(3, 68) = 22.97$ ,  $p < .001$ ,  $\eta^2 = 0.50$ . Participants in the fear condition reported the most intense feelings of anxiety ( $M = 62.88$ ,  $SD = 19.88$ ), followed by those in the sad ( $M = 30.31$ ,  $SD = 19.50$ ), happy ( $M = 25.94$ ,  $SD = 19.00$ ), and control ( $M = 13.31$ ,  $SD = 10.19$ ) conditions. In this case, Tukey post hoc comparisons revealed that sad participants were less anxious than those in the fear condition, and yet more anxious than those in the control condition.

**Behavioral tendencies.** We conducted a series of 2 (condition: happy, sad, or fear vs. control)  $\times$  2 (gender) ANOVA on the number of social activities provided in response to the entire TST. There were no significant effects (all  $F$ s  $< 1.00$ ).

**Primary behavioral tendencies.** Next, we conducted a series of 2 (condition: happy, sad, or fear vs. control)  $\times$  2 (gender) ANOVA on the number of social activities provided in the first five responses to the TST. Sadness increased the desire to engage in social behavior,  $F(1, 31) = 4.13$ ,  $p = .05$ ,  $\eta^2 = 0.18$ . Sad participants listed nearly twice as many social activities in their first five responses to the TST ( $M = 1.44$ ,  $SD = 1.15$ ) than did those in the control group ( $M = 0.79$ ,  $SD = 0.79$ ). Happiness and fear had no effect on the desire to engage in social activities (see Figure 2). There were no effects regarding gender.

This experiment revealed a significant and positive effect of induced sad mood on the desire to interact with others. The affiliation motive was particularly urgent for our sad participants; it emerged when we considered the first five responses to the TST but not when we analyzed later responses. The urgency becomes even more apparent when we focus on the first responses to the TST. A full 35% of sad participants listed a social event as their first response, compared to 6% in the fear condition, 5% in the happy condition, and 0 in the control condition.

The increased desire to affiliate with others was specific to sad mood. This is surprising given that there is a solid



**Figure 2.** Number of social activities listed in the first five responses to the Twenty Statements Test as a function of mood condition

Bars represent standard errors of the mean.

foundation of work linking positive affectivity with sociality (Fredrickson & Branigan, 2005; Watson & Clark, 1992). It is surprising, therefore, that happy individuals in the current experiment were not more motivated to engage in social activities. One potential explanation concerns the way in which we measured social tendencies. Within-person correlations between positive affect and social activity level tend to be lower when researchers use a rough measure of the amount, not the quality, of time spent socializing (Watson, 1988). Indeed, positive affect is particularly related to physically active social activity and not to less active events such as sedentary activities, club meetings, and lessons (Clark & Watson, 1988). Perhaps a design that allowed for finer grained analysis assessing both quantity and type of social urges would have clarified the effects of happiness. Like happy mood, fear failed to affect the desire to affiliate. Some specifics of our induction procedures may help explain this divergence from past research. Specifically, our participants viewed scenes depicting other people as the source of threat. In these situations, the primary urge may be to escape the situation rather than turn to others for help. By contrast, studies demonstrating a surge in social tendencies have tended to induce fear with a threat, or simulated threat, of physical danger (e.g., an electric shock; Schachter, 1959). The failure of fear to increase concerns with affiliation in the current experiment adds to a growing body of work demonstrating that similarly valenced states (e.g., sadness and fear) have markedly different effects on thought and behavior (Bodenhausen, Sheppard, & Kramer, 1994; Raghunathan & Pham, 1999).

This far, our work has provided support for the view that sadness elicited by portrayed social loss facilitates attachment. We found in Experiment 1 that this form of sadness produced an attentional shift toward signs of potential acceptance or rejection, and we found in Experiment 2 that this form of sadness increased the desire to engage in social activities. In Experiment 3, we examined whether the attentional and motivational consequences we observed in Experiments 1 and 2 would be specific to sadness that is

elicited by social loss. We randomly assigned participants to one of three conditions: (a) sadness induced by imagining the death of a loved one (i.e., sadness: social loss), (b) sadness induced by imagining failing at a major goal (i.e., sadness: failure), and (c) a control condition. We predicted, based on the SSC, that only participants assigned to the sadness: social loss condition would demonstrate the pattern of results observed in Experiments 1 and 2 regarding attention to vocal tone and the desire to engage in social activities.

## Experiment 3

### Method

**Participants.** A total of 161 students (118 women, 42 men, and 1 who did not provide gender information) participated in exchange for pay or partial course credit. Those participating in exchange for course credit were recruited from introductory psychology courses via an online announcement. Those participating in exchange for pay were recruited from the broader student population via online announcements and flyers.

**Procedure.** Because we expected that participants would have a more intense reaction to the mood induction procedure used in this experiment, we sought to avoid exposing it to participants who showed signs of chronic depressed mood or anhedonia. Therefore, after participants gave their informed consent we asked them to answer the following two screening questions: (a) "During the past month, have you often been bothered by feeling down, depressed, or hopeless?" and (b) "During the past month, have you often been bothered by little interest or pleasure in doing things?" These items comprise the Patient Health Questionnaire-2 (PHQ-2; Kroenke, Spitzer, & Williams, 2003), a very brief depression screener. Participants who answered *yes* to either question were automatically assigned to receive the control condition instructions and were excluded from further analyses. Later they received information about the symptoms of depression and a list of mental health resources. Sixty-eight potential participants (42% of the total sample) were screened out in this way. The remaining 93 participants (50 women) were randomly assigned to the sadness: social loss; sadness: failure; or control conditions. We asked participants in the control condition to describe a fictional trip to the grocery store. We asked participants in the sadness: social loss condition to imagine and describe the loss of a loved one to cancer. We asked participants in the failure condition to imagine and describe their failure to achieve a very important goal. (See Keller & Nesse, 2006, Experiment 3, for more detail on this manipulation.)

Immediately after the mood induction procedure, participants completed the BMIS as described in Experiment 1 (with the exception of the empathy and anxiety subscales) and the TST as described in Experiment 2. Based on the results

of Experiment 1, we decided a priori to restrict our analysis to primary behavioral tendencies. Also, because we had included a condition related to failure at an important task in this experiment, we decided to include in our analyses the extent to which participants indicated a desire to engage in work-related activities, one of the coded TST categories. Finally, participants completed the Stroop task as described in Experiment 1. All participants were required to ignore vocal tone and judge the valence of word meaning. Due to a computer malfunction we lost reaction-time data from 14 participants. In addition, we excluded data from 1 participant in the control condition whose Stroop inference score was greater than 3 *SD* above the mean.

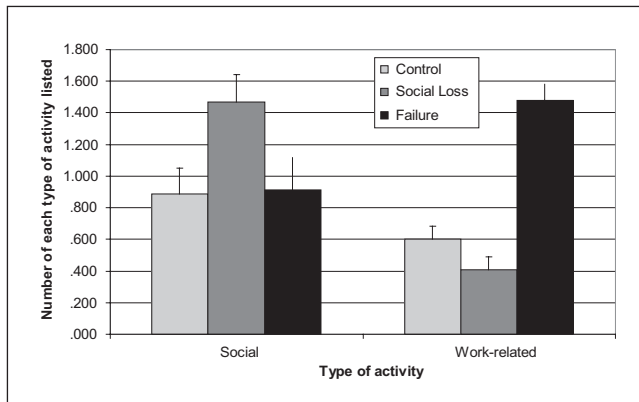
### Results and Discussion

**Manipulation check.** Groups scored differently on the BMIS happy composite,  $F(2, 85) = 5.02, p < .01, \eta^2 = 0.11$ , with means in the expected direction (control  $M = 50.94, SD = 16.75$ ; sadness: social loss  $M = 34.58, SD = 22.39$ ; sadness: failure  $M = 41.97, SD = 19.27$ ). Groups also scored differently on the BMIS sad composite,  $F(2, 85) = 4.78, p < 0.05, \eta^2 = 0.10$ , again with means in the expected direction (control  $M = 35.57, SD = 16.44$ ; sadness: social loss  $M = 46.23, SD = 19.80$ ; sadness: failure  $M = 45.94, SD = 15.33$ ). The sadness: social loss group reported experiencing more sadness than the control group,  $t(64) = 2.39, p < .05$ . The sadness: failure group reported the same effect,  $t(57) = 2.46, p < .05$ . By contrast, the two sadness groups reported experiencing similar levels of sadness,  $t(55) = 0.06, ns$ . There were no significant effects involving gender.

**Behavioral tendencies: Social activities.** A 3 (condition)  $\times$  2 (gender) ANOVA on the number of social activities listed in the first five responses to the TST produced a significant effect of condition,  $F(2, 86) = 4.27, p < .05, \eta^2 = 0.09$ . Participants assigned to the sadness: social loss condition listed more social activities ( $M = 1.47, SD = 1.11$ ) than did those in the control group ( $M = 0.91, SD = 0.83$ ) and the sadness: failure group ( $M = 0.85, SD = 0.68$ ).

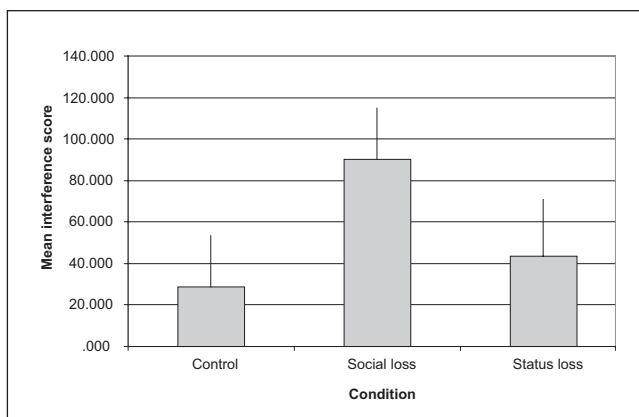
**Behavioral tendencies: Work-related activities.** A 3 (condition)  $\times$  2 (gender) ANOVA on the number of work-related activities listed in the first five responses to the TST produced a significant effect of condition,  $F(2, 86) = 8.60, p < .001, \eta^2 = 0.17$ . Participants assigned to the failure condition listed more work-related activities ( $M = 1.46, SD = 1.53$ ) than did those in the control group ( $M = 0.59, SD = 0.82$ ) and the sadness: social loss group ( $M = 0.41, SD = 0.67$ ; see Figure 3).

**Response times.** Because of lost data files, this analysis was based on fewer participants ( $n = 78$ ). As in Experiment 2, we only included data from correct responses and we statistically controlled for utterance length before computing mean response times for congruous trials and incongruous trials. Response times were longer for incongruous trials ( $M = 1291.90, SD = 218.90$ ) than for congruous trials ( $M = 1354.50, SD = 221.29$ ),  $F(1, 77) = 25.14, p < .01, \eta^2 = 0.25$ . Next, we



**Figure 3.** Number of each type of activity listed in response to the Twenty Statements Test, as a function of activity type and condition

Bars represent standard errors of the mean.



**Figure 4.** Mean interference as a function of condition

Positive scores indicate greater interference. Bars represent standard errors of the mean.

computed an interference score by subtracting the mean response time for congruous utterances from the mean response time for incongruous responses. As in Experiment 2, positive scores indicate greater interference by information in the to-be-ignored channel. A 3 (condition)  $\times$  2 (gender) ANOVA on interference scores did not produce a significant effect of condition,  $F(2, 72) = 1.57$ ,  $\eta^2 = 0.04$ . However, to further explore potential group differences, we compared interference scores of those in the sadness: social loss group against a combined group of those in the control and failure groups. This produced a marginally significant result,  $t(76) = 1.81$ ,  $p < 0.08$ ,  $d = 0.45$ , with those in the sadness: social loss condition producing greater interference scores ( $M = 90.15$ ,  $SD = 100.95$ ) than those in the failure ( $M = 43.31$ ,  $SD = 133.38$ ) or control ( $M = 28.74$ ,  $SD = 150.90$ ) conditions (see Figure 4).

To summarize, this experiment expanded on the results obtained in Experiments 1 and 2 by providing evidence that the effects we observed in those experiments concerning the desire to engage in social activities and attention to vocal tone is specific to sadness that is precipitated by social loss. Note that although the latter effect did not reach conventional levels of significance, the group difference in interference by vocal tone can be described as a medium effect size (Cohen, 1988).

It is noteworthy that we lost 42% of our original sample because their responses to the two-item depression screener suggested a past-month depressed mood. It is possible that our screening process produced a high rate of false positives because we classified participants as having a past-month depressed mood if they responded *yes* to only one of the PHQ-2 items (Teter, Falone, Cranford, Boyd, & McCabe, 2010). And yet, depression genuinely appears to be a growing problem on college campuses, potentially because of a growing number of students who report financial problems (Eisenberg, Gollust, Golberstein, & Hefner, 2007).

It is important to discuss how these results are situated within the mood repair literature. The hedonic contingency hypothesis proposes that sad people will be less selective in their choice of behavior (at least compared to happy people) because, for sad people, engaging in almost *any* type of activity will produce a more pleasant mood state than the one currently being experienced (Wegener & Petty, 1994). Here, sad individuals were selective in their choice of behavior: Only those who imagined a social loss were more interested in engaging in social activities. By contrast, participants assigned to the failure condition felt a great deal of sadness but did not report an increased interest in engaging in social activities. Instead, they were more interested in completing work-related activities. This is consistent with the notion that even dramatic loss at first results in behavior designed to restore the valued object, and that detachment and apathy only arise after attempts to replace the lost object fail (Bowlby, 1960; Darwin, 1872).

## General Discussion

This research focused on the consequences of sadness relative to normal mood. Sadness precipitated by social loss increased the tendency to attend to vocal tone, an important source of nonverbal information (Experiment 1) and increased the desire to engage in social activities (Experiment 2). Experiment 3 revealed that these effects were restricted to sadness precipitated by social loss.

Our proposed explanation for these effects begins with the assumption that sadness can serve important functions. Like other emotions, sadness is presumed to activate coordinated attentional, cognitive, and behavioral tendencies that mobilize action toward an appropriate goal (Levenson, 1994, 1999). Past work indicated that sadness can, under some conditions, change behavior (e.g., Graham, Huang, Clark, & Helgeson,



2008; Hendriks, Croon, & Vingerhoets, 2008) and cognition (e.g., Badcock & Allen, 2003; Forgas, 1998; Forgas et al., 2005; Martin, Ward, Achee, & Wyer, 1993) in ways that promote social connectedness. The current work demonstrates the existence of two related response tendencies: aroused interest in engaging in social activities and an attentional bias conducive to the preservation of social relationships.

A strength of this work is our use of two methods for inducing sadness. In Experiments 1 and 2 participants viewed emotionally contagious film clips, and in Experiment 3 participants imagined what it would be like to experience dramatic events. And yet we found a similar pattern of results with regard to affiliation tendencies in Experiments 1 and 3. However, both types of mood induction—the film clips and the imagined scenarios—likely brought to mind thoughts and feelings about death. This raises the possibility that mortality salience was involved in the findings we observed. Research by terror management theorists indicates that reminders of mortality produce feelings of anxiety and disorientation, and that the cognitive activation of the attachment system is a spontaneous reaction to these unpleasant feelings (Hart, Shaver, & Goldenberg, 2005). Hart et al. (2005) found that both a mortality salience induction and a separation induction enhanced allegiance to one's country. We cannot definitively rule out the possibility that death reminders present in our sadness inductions activated compensatory changes in the attachment system, thus accounting for our effects on attention and motivation. However, two findings suggest that mortality salience might not account for the observed effects on attention and motivation. First, in Experiment 2, we included a fear condition that involved scenes depicting immediate and extreme physical threats (i.e., the climatic scenes from the films *Silence of the Lambs* and *The Shining*). Individuals in this condition no doubt experienced powerful death reminders. And yet, fear had no effect on the desire to engage in social activities. We have no immediate explanation for this null finding, but we note that the effects Hart et al. observed were restricted to a subsample of individuals who were high in trait anxiety. Second, BMIS data reveal that our sadness manipulation in Experiment 1 did not elevate anxious feelings. In Experiment 2, our sadness manipulation did elevate anxious feelings as compared to control-group participants, though to a less extreme extent than the fear induction.

This work is related to and yet distinct from the study of interpersonal rejection. Whereas interpersonal rejection is a specific environmental event, sadness is a ubiquitous and broad state triggered by a number of environmental events (Haidt & Keltner, 1999; Leary et al., 2001). Rejection sometimes increases sad feelings (Baumeister, DeWall, Ciarocco, & Twenge, 2005, Studies 4 and 5; Buckley, Winkel, & Leary, 2004) but sometimes does not (Baumeister et al., 2005, Studies 3 and 6; Twenge, Catanese, & Baumeister, 2002, 2003). Anger is the most common emotional reaction to rejection (Leary et al., 2001; Leary, Twenge, & Quinlivan, 2006). In some

cases, rejection appears to promote the preservation of social bonds in a manner similar to sadness (Gardner, Pickett, & Brewer, 2000; Pickett et al., 2004).

It is important to note that we only have evidence about sadness that has been elicited by portrayed or imagined (but not actually experienced) negative events. Experiencing a genuine social loss, for example, surely produces more intense feelings of sadness and perhaps different effects on attention and motivation. It is also important to note that these results do not necessarily generalize to clinical depression, which differs from normal sadness not only in severity or duration but also in form. In depression, but not in normal sadness, additional debilitating symptoms such as anhedonia, somatic disturbances, cognitive deficits, and hopelessness are present (American Psychiatric Association, 1994). A number of theories have been advanced to deal with the question of whether depression has adaptive aspects. Depression may be “an adaptation, an adaptation gone awry, or a pathological state unrelated to any function” (Nesse, 2000, p. 14). Whatever its evolutionary origin, depression often promotes interpersonal rejection and eventual withdrawal from social situations (Coyne, 1976; Segrin & Abramson, 1994), rather than the affiliative tendencies we have documented in normal sadness.

In speculating as to the evolutionary origin of depression, Nesse (2000) identified several important questions for future research. Chief among them are describing (a) the situations in which normal sadness is useful and (b) how sadness might provide a selective advantage. The work reported here does not provide an ultimate explanation for why sadness evolved in ancestral populations. Instead, it begins to offer a proximal description of how sadness operates today. We have demonstrated that experiencing sadness via fictional or imagined social loss promotes motivational and attentional changes that are adaptive in strengthening social bonds.

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## Note

1. We also examined potential effects on responses to the congruous trials. This analysis revealed no interaction between mood and judgment condition,  $F(2, 91) = 0.60$ , *ns*. These results appear to be circumscribed to the interference scores rather than the baseline used to compute interference scores.

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