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Selective Attention to Emotional Faces Following Recovery From Depression

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This study was designed to examine attentional biases in the processing of emotional faces in currently and formerly depressed participants and healthy controls. Using a dot-probe task, the authors presented faces expressing happy or sad emotions paired with emotionally neutral faces. Whereas both currently and formerly depressed participants selectively attended to the sad faces, the control participants selectively avoided the sad faces and oriented toward the happy faces, a positive bias that was not observed for either of the depressed groups. These results indicate that attentional biases in the processing of emotional faces are evident even after individuals have recovered from a depressive episode. Implications of these findings for understanding the roles of cognitive and interpersonal functioning in depression are discussed.

Keywords: depression, attention, emotion, faces, bias

Depression is a highly recurrent disorder. Kessler (2002), for example, has estimated that between one half and two thirds of people who have ever been clinically depressed will experience an episode in any given year over the remainder of their lives. Approximately 80% of depressed individuals will experience more than one major depressive episode over the course of their illness (e.g., Boland & Keller, 2002). Keller and Shapiro (1981) reported that 50% of depressed patients relapse within 2 years of recovery; in fact, individuals with three or more previous episodes of depression may have a relapse rate as high as 40% within only 12 to 15 weeks after recovery (Keller et al., 1992). This high rate of recurrence of depressive episodes almost certainly reflects the presence of stable vulnerability factors, which place certain individuals at increased risk for experiencing depression repeatedly over the course of their lives.

Cognitive theories of depression have provided the impetus for investigations examining the etiology of depression, the functioning of depressed individuals, and vulnerability to this disorder. In particular, Beck (1967, 1976) has formulated a theory that ascribes the onset, maintenance, and recurrence of depressive episodes in large part to biases in the processing of information and stimuli from the environment. Beck contends that these biases not only are state markers of depressive episodes but, further, represent an important vulnerability factor for the development and recurrence of depression. Indeed, Beck and other cognitive theorists (e.g., Teasdale, 1988) posit that vulnerable and depressed individuals are characterized by biases in virtually all aspects of information processing, including perception, attention, and memory. Thus, depressed individuals, as well as persons who are vulnerable to experience depressive episodes, are hypothesized to selectively attend to and remember negative stimuli, to filter out positive stimuli, and to perceive negative or neutral information as being more negative than is actually the case.

Numerous studies have now provided empirical support for the basic tenets of cognitive formulations of depression (see J. M. Williams, Watts, MacLeod, & Mathews, 1997, for a review). Although studies examining biased memory processes have generally led to consistent findings, there is controversy concerning the operation and role in depression of attentional biases in the processing of negative information. Whereas some investigators have documented the presence of attentional biases to negative stimuli in depressed individuals (e.g., Mathews, Ridgeway, & Williamson, 1996; Rinck & Becker, 2005), other researchers either have failed to replicate this pattern of results (e.g., MacLeod, Mathews, & Tata, 1986; Mogg, Millar, & Bradley, 2000) or have found that depressed participants appear to have lost the positive attentional biases that characterize nondepressed persons (e.g., Gotlib, McLachlan, & Katz, 1988). Most of these studies have used the dot-probe task (MacLeod et al., 1986). In this task, participants are presented with pairs of stimuli (typically words or faces) consisting of one neutral stimulus and one emotional stimulus. After the offset of each pair, a dot probe appears in the location of either the neutral or the emotional stimulus. Allocation of attention is measured by the participant's latency to detect the probe. If participants orient selectively toward the emotional stimulus, they will be faster to detect dot probes that replace that stimulus (where they are already attending) and slower to detect probes that replace the neutral stimulus.

Although investigators using this task have generally failed to find evidence for attentional biases in depression under short stimulus exposure durations, there is a growing literature documenting depression-associated attentional biases to sad words that are presented for longer durations (Bradley, Mogg, & Lee, 1997; Mogg, Bradley, & Williams, 1995). In addition, researchers have

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suggested that the use of more salient pictorial stimuli and, in particular, the use of emotional faces rather than words might yield more consistent results in studies of attentional biases in depression (e.g., Gotlib, Krasnoperova, Yue, & Joormann, 2004; Mogg & Bradley, 2005). Indeed, given the profound difficulties experienced by clinically depressed persons in their social interactions (e.g., Gotlib & Hammen, 2002; Segrin, 2000), faces expressing different emotions are likely to be particularly powerful stimuli for depressed individuals. Importantly, the use of faces permits an integration of basic research on information-processing biases in depression with research examining the processing of interpersonal stimuli in this disorder.

In one of the first studies to use the dot-probe task with emotional faces in a sample of clinically depressed participants, Mogg et al. (2000) did not find evidence for an attentional bias to sad faces at a 1-s exposure duration. It is important to note, however, that 13 of the 15 depressed participants had a comorbid diagnosis of generalized anxiety disorder (GAD), making it impossible to determine whether the absence of an attentional bias for sad faces was due to depression or to the co-occurring GAD. In contrast, in two recent studies, Gotlib, Kasch, et al. (2004) and Gotlib, Krasnoperova, et al. (2004) found that carefully selected and diagnosed clinically depressed participants oriented toward sad faces that were presented for 1 s; psychiatric control participants diagnosed with GAD or social phobia did not demonstrate this bias. Moreover, the attentional bias in the depressed participants in these studies was specific to sad faces and was not observed in response to the presentation of angry or happy faces.

The results of these studies suggest both that clinical depression is characterized by selective attention to sad faces presented for a 1-s duration and that attentional biases are more likely to characterize clinically depressed participants without a comorbid anxiety disorder than comorbid or dysphoric participants. Despite the promise of these findings, however, we do not know whether attentional biases are state markers of a depressive episode, or whether they are, as postulated by cognitive theories, a traitlike characteristic of individuals who are vulnerable to experiencing depressive episodes. This question is critical to our understanding of the role of these biases in the development, maintenance, and recurrence of this debilitating disorder. Unfortunately, few studies have assessed the operation of attentional biases in individuals at risk for the onset or recurrence of depression, and those that have been conducted have yielded inconsistent findings (e.g., Gilboa & Gotlib, 1997; Hedlund & Rude, 1995). It is important to note that no studies have been conducted using the dot-probe task to examine attentional biases of individuals who are vulnerable to experiencing recurrent depressive episodes. The present study was designed to address this issue by using the dot-probe task to examine whether formerly depressed individuals, as well as currently depressed persons, are characterized by selective attention to sad faces. If negative cognitive biases are not merely symptoms of depression, we expected that both currently and formerly depressed individuals, compared to never-disordered controls, would demonstrate an attentional bias for sad faces on the dot-probe task.

Method

Participants

Three groups of participants took part in the study: participants diagnosed with a current major depressive disorder (MDD); participants who had experienced at least one diagnosable depressive episode in their lives but were currently remitted (RMD); and never-disordered controls (NC). Participants were solicited from two outpatient psychiatry clinics in a university teaching hospital, as well as through advertisements posted in numerous locations within the local community (e.g., Internet bulletin boards, university kiosks, supermarkets). Participants' responses to a telephone interview provided initial selection information. This phone screen established that participants were fluent in English and were between 18 and 60 years of age. Participants were excluded for severe head trauma and learning disabilities, as well as for current and lifetime anxiety disorders, psychotic symptoms, bipolar disorder, and alcohol or substance abuse within the past 6 months. This telephone interview was also used to identify individuals who were likely to meet criteria for inclusion in one of the three groups. Those individuals were invited to come to the laboratory for a more extensive interview.

Trained interviewers administered the Structured Clinical Interview for the *DSM–IV* (SCID; First, Spitzer, Gibbon, & Williams, 1995) to these individuals during their first session in the study. This interview schedule assesses *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994) current and lifetime diagnoses for anxiety, mood, psychotic, alcohol and substance use, and somatoform and eating disorders. The SCID has demonstrated good reliability for the majority of the disorders covered in the interview (e.g., J. B. Williams et al., 1992). SCID–I interviewers had previous experience administering structured clinical interviews and were trained specifically to administer the SCID–I. Our team of interviewers achieved excellent interrater reliability for MDD ($\kappa = 1.00$) and nonpsychiatric controls ($\kappa = 0.92$), although we should note that the interviewers used the "skip out" strategy of the SCID, which may have reduced the opportunity for the independent raters to disagree with the diagnoses (Gotlib, Krasnoperova, et al., 2004).

Participants were included in the depressed group if they met *DSM–IV* criteria for MDD. Participants were included in the RMD group if they met *DSM–IV* criteria for a past major depressive episode. In addition, a slightly modified version of this interview was used to determine whether each participant in the RMD group had fully recovered from depression, using guidelines recommended by the National Institute of Mental Health Collaborative Program on the Psychobiology of Depression (e.g., Keller et al., 1992): 8 consecutive weeks with no more than 2 symptoms of no more than a mild degree (i.e., ratings of 1 [*no symptoms*] or 2 [*minimal symptoms, no impairment*]). The NC group consisted of individuals with no current diagnosis and no history of any Axis I disorder. Participants also completed the Beck Depression Inventory (Beck, Steer, & Brown, 1996), a 21-item, self-report measure of the severity of depressive symptoms. The acceptable reliability and validity of the BDI has been well documented (Beck et al., 1996). Participants were scheduled for a second session of "computer tasks," usually within 2 weeks after the interview. Sixty-eight individuals (26 MDD, 23 RMD, and 19 NC) participated in this study.

Materials

A set of 20 faces, each expressing happy, sad, and neutral emotions, was selected from the MacArthur Network Face Stimuli Set[1] (http://www.macbrain.org/faces/index.htm), developed by The Research Network on Early Experience and Brain Development. The entire MacArthur Network Face Stimuli Set consists of color photographs of 646 different facial expression stimuli displayed by a variety of models across different genders and ethnicities. For the current study, we selected from this validated set of face stimuli an equal number of male and female faces that each had

[1] Development of the MacBrain Face Stimulus Set was overseen by Nim Tottenham and supported by the John D. and Catherine T. MacArthur Foundation Research Network on Early Experience and Brain Development. Please contact Nim Tottenham at tott0006@tc.umn.edu for more information concerning the stimulus set.

a neutral, happy, and sad expression, as well as an equal number of faces of different ethnicities.

Design

Each of the 40 picture pairs (20 happy and 20 sad expressions paired with the neutral expression of the same actor) was presented twice, for a total of 80 trials, which were presented in a new, fully randomized order for each subject.[2] Each trial started with a display of a white fixation cross in the middle of the screen for 1,000 ms, followed by a pair of pictures displaying the same actor with a neutral and an emotional expression presented for 1,000 ms. Following the offset of the pictures, a small gray dot appeared in the center of the screen location where one of the pictures had been, and it remained on the screen until the participant pressed one of two response keys on the keyboard to indicate the position of the dot—on the left or the right side of the screen. The computer recorded the accuracy and latency of each response. The emotional stimulus faces (sad or happy) appeared in the right and the left positions with equal probability, with the matched neutral face of each pair appearing in the other position. The dot probe was also presented in both positions with equal probability.

Procedure

The task was presented on an IBM-compatible computer and a Dell 17-in. color monitor. E-Prime software was used to control stimulus presentation and record response accuracy and latency. When projected on the screen, the size of each picture was approximately 9 × 10 cm. The pictures in each pair were approximately 13 cm apart (measured from their centers). Participants sat 50 cm from the screen, giving a visual angle of approximately 4.6° between the inner edges of the pictures. Participants were told that their goal was to detect a small dot as quickly as possible. They were told that the dot could appear in the left or right position on the screen, and that their job was to respond as quickly as possible when they saw the dot by pressing the button labeled “left” on the keyboard in front of them if the dot appeared on the left side of the screen and the button labeled “right” if the dot appeared on the right side. Participants completed 12 practice trials of the face–dot-probe task (with neutral–neutral face pairs) with the experimenter present in the room.

Results

Participant Characteristics

Demographic and clinical characteristics of the three participant groups are presented in Table 1. The proportion of women was similar across groups. There were no significant group differences in ethnicity, education, or the percentage of participants who were married, all $\chi^2(2, N = 68) < 1, p > .05$; the NC participants were slightly but significantly older than were the participants in the MDD, $t(43) = 3.78, p < .01$, and RMD groups, $t(40) = 3.51, p < .01$, who did not differ from each other, $t(47) < 1, p > .05$. As expected, the MDD participants had higher BDI scores than did both the RMD, $t(47) = 11.19, p < .01$, and NC participants, $t(43) = 12.58, p < .01$, who did not differ significantly from each other, $t(40) = 1.14, p > .05$. Whereas the RMD participants had no comorbid current or lifetime diagnoses, two participants in the MDD group were diagnosed with a comorbid current eating disorder. Five of the MDD participants and three of the RMD participants reported having had too many previous depressive episodes to count; the remaining MDD and RMD participants did not differ significantly in the mean number of previous depressive episodes reported, $t(38) < 1, p > .05$.

Dot-Probe Task

Data reduction procedures. Only response latencies from correct responses were analyzed. Error rates were extremely low (less than 1% for all groups) and did not differ among the groups, $F(2, 65) = 1.63, p > .05$. Average overall reaction times also did not differ among the groups, $F(2, 65) < 1, p > .05$. To minimize the influence of outliers, reaction times that were less than 100 ms were considered anticipation errors and were excluded from the analyses. Similarly, reaction times that were greater than 1,000 ms were excluded because they were extremely infrequent and likely reflected lapses of concentration. Overall, the exclusion of these extreme reaction times also resulted in the deletion of less than 1% of the data for participants in the three groups, $F(2, 65) < 1, p > .05$. Average reaction times were computed for each group separately for each emotion type in the different conditions (same [probe is in the same location as the emotional face] vs. different [probe is in the other location from the emotional face]). To test specific hypotheses, attentional bias scores were computed separately for each facial expression (happy, sad), using the following equation (cf. Mogg et al., 1995):

$$\text{Attentional bias score} = 1/2[(\text{RpLe} - \text{RpRe}) + (\text{LpRe} - \text{LpLe})],$$

where R = right position, L = left position, p = probe, and e = emotional face. In this equation, RpLe corresponds to the mean latency when the probe is in the right position and the emotional face is in the left position, and so on. This equation calculates the “attention-capturing” quality of emotional faces by subtracting the mean probe detection times for probes appearing in the same position as the emotional face from the mean probe detection times for probes appearing in a different position from the emotional face. Positive values of this bias score indicate a shift of attention toward the spatial location of emotional faces relative to matched neutral faces, and negative values indicate a shift of attention away from the spatial location of emotional faces relative to matched neutral faces.

Bias scores. We hypothesized that MDD and RMD participants, compared with NC participants, would demonstrate an attentional bias for sad faces. To test this hypothesis, we compared the attentional bias scores for sad and happy faces in the three groups of participants by conducting a two-way (Group × Face Emotion) mixed design analysis of variance (ANOVA) on reaction times. The ANOVA yielded the predicted significant two-way

[2] In the full design, we presented 240 trials across three conditions, which differed in the duration for which the face pairs were presented: 16 ms followed by a mask (same actor’s face with a neutral expression) for 984 ms, 1,000 ms, and 3,000 ms. Both because of concerns about the interpretation of results from the shortest and longest presentation conditions, and because of space limitations, we are restricting our analyses and discussion in this article to the 1,000-ms condition. Neither exposure condition revealed an attentional bias in currently depressed participants and, therefore, could not be used to determine whether the pattern of biased attention that characterizes currently depressed individuals is also evident in recovered depressives. Therefore, we excluded the detailed consideration of these exposure conditions from the present short report. A longer report that includes findings from all three conditions is available from the authors.

Table 1
Characteristics of Participants

Variable	Group		
	Depressed	Remitted	Control
N	26	23	19
Female	18	16	13
% Caucasian	71	85	67
Age (years)			
M	35.00_a	36.11_a	46.42_b
SD	7.98	8.45	9.62
College education (%)	75	73	67
Married (%)	13	23	28
Number of depressive episodes			
M	3.18_a	3.78_a	0_b
SD	2.27	5.23	0
Number of participants with a comorbid diagnosis	2	0	0
Currently taking psychotropic medication (%)	63	23	0
Currently in psychotherapy (%)	63	15	0
Currently in cognitive–behavioral therapy (%)	13	0	0
History of psychotropic medication (%)	33	69	5
History of psychotherapy (%)	92	73	17
History of cognitive–behavioral therapy (%)	38	19	0
Beck Depression Inventory			
M	30.55_a	5.21_b	2.93_b
SD	8.09	7.25	3.91

Note. Means having the same subscript are not significantly different at $p < .05$.

interaction of group and face emotion, $F(2, 65) = 10.17$, $p < .01$.[3] This interaction is presented in Figure 1. As hypothesized, both the MDD and RMD participants demonstrated significantly greater vigilance to the sad faces than did the NC participants: MDD, $t(43) = 3.74$; RMD, $t(40) = 3.99$, both *p*s $< .01$; RMD and MDD participants did not differ significantly in their bias scores, $t(47) < 1$, $p > .05$. With respect to the happy faces, the NC participants demonstrated significantly greater vigilance than did the MDD participants, $t(43) = 2.07$, $p < .05$, and marginally greater vigilance than did the RMD participants, $t(40) = 1.80$, $p < .08$; the MDD and RMD participants did not differ significantly in their response latencies to the happy faces, $t(47) < 1$, $p > .05$. Thus, whereas MDD and RMD participants exhibited vigilance for sad faces presented for an exposure duration of 1 s, control participants demonstrated vigilance for happy faces.

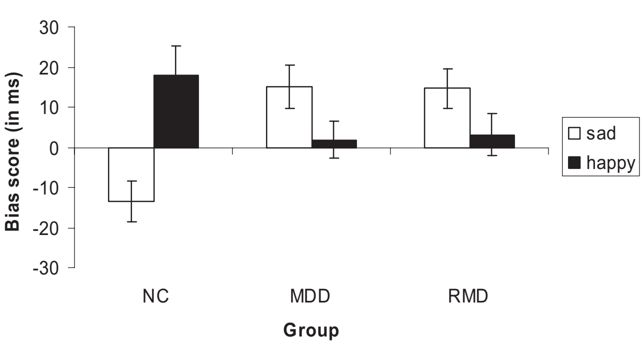

Figure 1. Attentional biases for sad and happy faces presented for 1 s for currently depressed (MDD), remitted depressed (RMD), and never-disordered control (NC) participants. Error bars represent one standard error.

Group differences on attentional bias measures do not indicate which, if any, of the groups is exhibiting a bias (see Gotlib et al., 1988). That is, differences among the MDD, RMD, and NC participants could be due to one or two of the groups showing a bias, or to all groups showing a bias, but to different degrees. To distinguish among these possibilities, one-sample *t* tests were conducted comparing attentional bias scores to zero within each group. A positive bias score that is significantly different from zero indicates a bias toward sad faces; a negative bias score that is different from zero indicates a bias away from sad faces. A bias score that is not significantly different from zero indicates no bias for sad faces. These analyses revealed that the attentional bias scores for MDD and RMD participants toward sad faces at the 1-s exposure duration were positive and significantly different from zero: MDD, $t(25) = 2.79$; RMD, $t(22) = 3.01$, both *p*s $< .01$. In contrast, NC participants showed a significant attentional bias away from sad faces, $t(18) = 2.68$, $p < .01$. With respect to happy faces, whereas MDD and RMD participants exhibited no bias, both *t*s < 1, $p > .05$, NC participants showed an attentional bias toward happy faces, $t(18) = 3.24$, $p < .01$. Thus, as predicted, MDD and RMD participants exhibited an attentional bias toward the sad

[3] Because the MDD and RMD participants differed significantly from the NC participants in mean age, we also conducted all analyses with age as a covariate. Including age as a covariate did not change the reported results. In addition, because the groups differed in the number of participants who were currently taking psychotropic medication, we also conducted the ANOVA with the control participants and the 11 MDD and 16 RMD participants who were not currently taking psychotropic medication. Despite the reduced sample size, this analysis also yielded a highly significant two-way interaction, $F(2, 44) = 13.97$, $p < .01$, and the obtained pattern of results was not different from that obtained for the full sample.

faces; in addition, NC participants showed an attentional bias away from sad faces and an attentional bias toward happy faces.

Discussion

The present study was designed to examine attentional biases to sad faces in currently and formerly depressed participants, addressing the critical question of whether attentional biases are merely a correlate of depressive episodes or are also evident in participants who have recovered from depression. We replicated the finding in clinically depressed participants of an attentional bias for sad faces that are presented for 1 s. Importantly, we also extended this finding to formerly depressed participants: Both currently and formerly depressed participants selectively attended to a face expressing sadness presented for a 1-s exposure duration. Moreover, neither group exhibited an attentional bias in response to the happy faces. In contrast, never-disordered control participants exhibited biased processing for both happy and sad faces, orienting toward the happy faces and avoiding attending to the sad faces.

The present results replicate findings of other studies that have reported an attentional bias in depression for stimuli presented at specific exposure durations. For example, Bradley et al. (1997) found attentional biases to negative verbal stimuli in dysphoric participants with a 1-s stimulus exposure duration. More recently, also using a 1-s exposure duration, Gotlib, Kasch, et al. (2004) and Gotlib, Krasnoperova, et al. (2004) found clinically depressed participants to exhibit an attentional bias toward sad faces. Importantly, not only was this attentional bias specific to sad faces, and not observed for angry or happy faces, but participants diagnosed with GAD or social phobia did not show this attentional bias. These results suggest that negative stimuli that remain in the environment for at least 1 s capture depressed individuals' attention. It is interesting that studies using other measures of attentional processing also support the formulation that depression is associated with attentional biases. For example, Matthews and Antes (1992) examined the eye movements of dysphoric and nondysphoric participants in response to complex pictures with happy and sad regions. Although both groups of participants fixated on the happy regions sooner, longer, and more often than they did on the sad regions, the dysphoric participants fixated on the sad regions more often than did their nondysphoric counterparts. More recently, Rinck and Becker (2005) used a visual search task to examine depression-related biases in selective attention. Although these investigators found no evidence for enhanced detection of depression-related words in clinically depressed participants, they did find that depression-related words were more distracting for the depressed than for the nondepressed participants.

The finding in this investigation of an attentional bias for sad faces in formerly depressed participants is particularly noteworthy given that a number of investigators have not been able to identify cognitive biases that are stable beyond the depressive episode. For example, studies that used words as stimuli on the Stroop task have yielded little evidence for the persistence of attentional biases in remitted depressives (e.g., Gilboa & Gotlib, 1997; Hedlund & Rude, 1995). In response to these negative results, some researchers have contended that biased processing in formerly depressed participants is dependent on priming, that is, on the prior activation of depression-related schemata through a mood induction or a self-focus manipulation (e.g., Scher, Ingram, & Segal, 2005). Indeed, studies that have included a priming strategy, such as a negative mood induction, have provided more consistent evidence of cognitive biases following recovery than have investigations without a priming manipulation (see Scher et al., 2005, for a review of this literature). The present results indicate that, even without a priming manipulation, biased attentional processing can be elicited in formerly depressed individuals using the dot-probe task.

We should note, however, that our design differs in a number of ways from those used in previous studies of information processing in remitted depressed participants. It is possible, for example, that the previous negative findings are due to the use of either shorter stimulus exposure durations or words instead of more interpersonally relevant faces (e.g., Gilboa & Gotlib, 1997; Hedlund & Rude, 1995). Indeed, interpersonal stimuli might be of special importance in investigating vulnerability markers of depression. It is noteworthy that interpersonal functioning has been found to remain impaired following recovery from depression (see Joiner, 2002, for a review of this literature). In this context, therefore, biased processing of interpersonal stimuli might be elicited more readily in formerly depressed participants than is biased processing of verbal material.

We must be cautious in interpreting the present finding of biased processing in remitted depressed individuals as evidence of a vulnerability for the onset of depression. A strict test of this interpretation would require the assessment of attentional biases in individuals before the onset of a first episode of depression. Assessing remitted participants confounds factors related to depression onset with factors that are a consequence, or a "scar," of having experienced a depressive episode (Just, Abramson, & Alloy, 2001; Lewinsohn, Steinmetz, Larson, & Franklin, 1981). It is possible, for example, that sad expressions capture attention in individuals who are concerned about becoming depressed again in the future simply because these stimuli are related to their own concerns. Although this explanation does not imply that attentional biases play a causal role in the onset or maintenance of depression, it is possible nevertheless that changes in information processing that occur as a consequence of having been depressed play an important role in the recurrence of depression. Investigators have demonstrated, for example, that the risk of recurrence increases with each depressive episode that is experienced (Solomon et al., 2000). Thus, assessing cognitive processing in remitted depressed participants may be useful in identifying factors that increase the risk for experiencing recurrent depressive episodes. Future studies are needed that investigate more closely the relation between biased processing of emotional information and the onset, recurrence, and maintenance of depression.

In conclusion, the present results are important not only in elucidating the relation between depression and attentional biases but also in increasing our understanding of the nature of the problematic interpersonal functioning of depressed persons. Gotlib and Hammen (2002) suggested that depressed individuals' readiness to perceive and attend to negative aspects of their social surroundings contributes to the decreased levels of social support they experience. Only recently, however, have investigators begun to integrate examinations of cognitive biases in depressed individuals with assessments of the processing of interpersonally relevant stimuli and cues (e.g., Gotlib, Krasnoperova, et al., 2004; Joiner, 2000). Our findings suggest that depressed participants selectively attend to negative responses emitted by others around them but not to positive responses. These findings might help to elucidate the manner in which depressed individuals process the negative and positive cues emitted by their interaction partners. Clearly, an important task for future research is to examine the associations among biases in the processing of facial expressions and social skills, interpersonal difficulties, and social support in both currently and formerly depressed participants.

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects.* New York: Harper & Row.

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders.* New York: New American Library.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory—II.* San Antonio, TX: Psychological Corporation.

Boland, R. J., & Keller, M. B. (2002). Course and outcome of depression. In I. H. Gotlib & C. L. Hammen (Eds.), *Handbook of depression* (pp. 43–60). New York: Guilford Press.

Bradley, B. P., Mogg, K., & Lee, S. C. (1997). Attentional biases for negative information in induced and naturally occurring dysphoria. *Behaviour Research and Therapy, 35,* 911–927.

First, M. B., Spitzer, M. B., Gibbon, M., & Williams, J. B. W. (1995). *Structured Clinical Interview for DSM–IV Axis I Disorders—patient edition (SCID-I/P, Version 2.0).* New York: Biometrics Research Department, New York State Psychiatric Institute.

Gilboa, E., & Gotlib, I. H. (1997). Cognitive biases and affect persistence in previously dysphoric and never-dysphoric individuals. *Cognition & Emotion, 11,* 517–538.

Gotlib, I. H., & Hammen, C. L. (Eds.). (2002). *Handbook of depression.* New York: Guilford Press.

Gotlib, I. H., Kasch, K. L., Traill, S. K., Joormann, J., Arnow, B. A., & Johnson, S. L. (2004). Coherence and specificity of information-processing biases in depression and social phobia. *Journal of Abnormal Psychology, 113,* 386–398.

Gotlib, I. H., Krasnoperova, E., Yue, D. N., & Joormann, J. (2004). Attentional biases for negative interpersonal stimuli in clinical depression. *Journal of Abnormal Psychology, 113,* 127–135.

Gotlib, I. H., McLachlan, A. L., & Katz, A. N. (1988). Biases in visual attention in depressed and nondepressed individuals. *Cognition & Emotion, 2,* 185–200.

Hedlund, S., & Rude, S. S. (1995). Evidence of latent depressive schemas in formerly depressed individuals. *Journal of Abnormal Psychology, 104,* 517–525.

Joiner, T. E. J. (2000). Depression's vicious scree: Self-propagating and erosive processes in depression chronicity. *Clinical Psychology: Science and Practice, 7,* 203–218.

Joiner, T. E. J. (2002). Depression in its interpersonal context. In I. H. Gotlib & C. L. Hammen (Eds.), *Handbook of depression* (pp. 295–313). New York: Guilford Press.

Just, N., Abramson, L. Y., & Alloy, L. B. (2001). Remitted depression studies as tests of the cognitive vulnerability hypotheses of depression onset: A critique and conceptual analysis. *Clinical Psychology Review, 21,* 63–83.

Keller, M. B., Lavori, P. W., Mueller, T. I., Endicott, J., Coryell, W., Hirschfeld, R. M., & Shea, T. (1992). Time to recovery, chronicity, and levels of psychopathology in major depression: A 5-year prospective follow-up of 431 subjects. *Archives of General Psychiatry, 49,* 809–816.

Keller, M. B., & Shapiro, R. W. (1981). Major depressive disorder: Initial results from a one-year prospective naturalistic follow-up study. *Journal of Nervous and Mental Disorders, 169,* 761–768.

Kessler, R. C. (2002). Epidemiology of depression. In I. H. Gotlib & C. L. Hammen (Eds.), *Handbook of depression* (pp. 23–42). New York: Guilford Press.

Lewinsohn, P. M., Steinmetz, J. L., Larson, D. W., & Franklin, J. (1981). Depression-related cognitions: Antecedent or consequence? *Journal of Abnormal Psychology, 90,* 213–219.

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology, 95,* 15–20.

Mathews, A., Ridgeway, V., & Williamson, D. A. (1996). Evidence for attention to threatening stimuli in depression. *Behaviour Research and Therapy, 34,* 695–705.

Matthews, G. R., & Antes, J. R. (1992). Visual attention and depression: Cognitive biases in the eye fixations of the dysphoric and the nondepressed. *Cognitive Therapy and Research, 16,* 359–371.

Mogg, K., & Bradley, B. P. (2005). Attentional bias in generalized anxiety disorder versus depressive disorder. *Cognitive Therapy and Research, 29,* 29–45.

Mogg, K., Bradley, B. P., & Williams, R. (1995). Attentional bias in anxiety and depression: The role of awareness. *British Journal of Clinical Psychology, 34,* 17–36.

Mogg, K., Millar, N., & Bradley, B. P. (2000). Biases in eye movements to threatening facial expressions in generalized anxiety disorder and depressive disorder. *Journal of Abnormal Psychology, 109,* 695–704.

Rinck, M., & Becker, E. S. (2005). A comparison of attentional biases and memory biases in women with social phobia and major depression. *Journal of Abnormal Psychology, 114,* 62–74.

Scher, C. D., Ingram, R. E., & Segal, Z. V. (2005). Cognitive reactivity and vulnerability: Empirical evaluation of construct activation and cognitive diatheses in unipolar depression. *Clinical Psychology Review, 25,* 487–510.

Segrin, C. (2000). Social skills deficits associated with depression. *Clinical Psychology Review, 20,* 379–403.

Solomon, D. A., Keller, M. B., Leon, A. C., Mueller, T. I., Lavori, P. W., Shea, M. T., et al. (2000). Multiple recurrences of major depressive disorder. *American Journal of Psychiatry, 157,* 229–233.

Teasdale, J. D. (1988). Cognitive vulnerability to persistent depression. *Cognition & Emotion, 2,* 247–274.

Williams, J. B., Gibbon, M., First, M. B., Spitzer, R. L., Davis, M., Borus, J., et al. (1992). The Structured Clinical Interview for *DSM–III–R* (SCID): Multisite test–retest reliability. *Archives of General Psychiatry, 49,* 630–636.

Williams, J. M., Watts, F. N., MacLeod, C., & Mathews, A. (1997). *Cognitive psychology and emotional disorder.* Chichester, England: Wiley.

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