



Does mood really influence comparative optimism? Tracking an elusive effect

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Methodological limitations call into question prior evidence that positive moods are associated with greater comparative optimism. Experiments 1–4 tested if mood affects comparative optimism using a mood manipulation that minimized experimenter demand. While the procedure was successful in inducing mood, we found no evidence for a mood effect on comparative optimism. The absence of a mood effect was not due to participants correcting their judgments in response to a presumed mood bias (Experiments 2, 3 and 4) or to participants proactively regulating their mood (Experiments 3 and 4). Experiment 5 compared the mood manipulation of Experiments 1–4 with an autobiographical recall procedure. Although the two methods were equally effective in inducing mood, only autobiographical recall influenced participants' comparative optimism. Study 6 provides preliminary evidence that experimenter demand may be responsible for the effects of autobiographical recall on comparative judgments.

Three decades of research reveals that people believe that positive events are more likely and negative events are less likely to happen to them than to others. This *comparative optimism* is documented in hundreds of studies and occurs for events ranging from the likelihood of having a pleasant vacation or intelligent children (Weinstein, 1980) to the likelihood of experiencing heart disease or divorce (see Chambers & Windschitl, 2004; Shepperd, Carroll, Grace, & Terry, 2002, for reviews).

Various researchers have proposed that people should show a mood congruence effect in their expressions of comparative optimism (for a review see Helweg-Larsen & Shepperd, 2001). A person induced to experience a negative mood should show weaker comparative optimism and a person induced to experience a positive mood should show stronger comparative optimism than should a person in a neutral mood.

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Nine published studies document mood as a moderator of comparative judgments (see Table 1 for a summary). To date, these studies have been cited more than 360 times. In addition, mood as a moderator of comparative judgments has received considerable attention in several review papers (Armor & Taylor, 1998; Helweg-Larsen & Shepperd, 2001; Shepperd *et al.*, 2002). Researchers have also advanced several explanations for the mood effect in comparative judgments. However, a careful review of the empirical findings and the theoretical rationales suggest that it may be premature to conclude that mood affects comparative optimism.

Prior empirical demonstrations

Three published studies explored the relationship between dysphoria, which can be thought of as an enduring negative mood, and comparative optimism and found that greater dysphoria was associated with less comparative optimism (Alloy & Ahrens, 1987; Pietromonaco & Markus, 1985; Pyszczynski, Holt, & Greenberg, 1987). Importantly, these three studies measured dysphoria and comparative optimism simultaneously (Alloy & Ahrens, 1987; Pietromonaco & Markus, 1985; Pyszczynski *et al.*, 1987). Their cross-sectional, correlational design makes it impossible to determine whether the dysphoria prompted weak comparative optimism, weak comparative optimism prompted dysphoria, or a third factor prompted both dysphoria and weak comparative optimism.

Three other studies manipulated mood in a rather unconventional way that involved having participants turn their heads in one direction while gazing in the other direction (e.g. Drake, 1984; 1987; Drake & Ulrich, 1992). The rationale was that turning one's head to the left while gazing to the right activates the left hemisphere and initiates a positive mood, whereas turning one's head to the right while gazing to the left activates the right hemisphere and initiates a negative mood. Although, these studies found stronger comparative optimism when participants turned their heads to the left than to the right, the studies lacked a no-activation control condition as well as a manipulation check to confirm that the manipulations created the intended mood states. Thus, it is unclear whether the obtained effects were truly mood effects.

The remaining three studies provided the most direct test yet yielded mixed results. In the first study participants were students who were currently experiencing colds or influenza and who were recruited for a study of health beliefs (Salovey & Birnbaum, 1989, experiment 2). Participants underwent a five-minute audio mood induction that directed them to vividly imagine a situation that would make them feel happy, sad, or neutral (neither happy nor sad). The instructions encouraged them to focus on details and to feel and react as if they were in the situation. Although the manipulation was successful, induced mood did not affect subsequent comparative judgments for either positive or negative events. The second study (Salovey & Birnbaum, 1989, experiment 3) replicated the first study in a sample of healthy participants. Participants in a positive mood displayed the strongest comparative optimism whereas participants in a negative mood displayed the weakest comparative optimism. However, mood influenced comparative judgments for negative but not for positive events.

The strongest support for a mood effect in comparative optimism appeared in a study by Abele and Hermer (1993). They induced mood by having participants provide a detailed autobiographical memory of a very happy or a very sad event. Participants then completed an ostensibly unrelated health cognition survey in which they estimated the likelihood that they and the average person their age would experience eleven

Table 1. Summary of prior studies of a mood congruence effect in comparative judgments

Study	Summary	Limitation
Alloy & Ahrens, 1987; Pietromonaco & Markus, 1985; Pyszczynski, Holt, & Greenberg, 1987	Examined dysphoria and comparative optimism simultaneously and found that greater dysphoria were associated with weaker comparative optimism.	These studies measured rather than manipulated affective qualities. It thus is unclear whether the dysphoria prompted weak comparative optimism, weak comparative optimism prompted dysphoria, or a third factor prompted both.
Drake, 1984; Drake, 1987; Drake & Ulrich, 1992	Working from the assumption that different combinations of head position and gaze direction influence mood, these studies found that different head/gaze manipulations were associated with different levels of comparative optimism.	The studies lacked a no-activation control condition as well as a manipulation check to confirm that the manipulations created the intended moods. Thus, it is unclear whether the obtained effects were mood effects.
Salovey & Birnbaum, 1989, experiment 2	Used autobiographical recall to manipulate mood among students in an infirmary but found that mood did not affect comparative judgments for either positive or negative events.	No mood effect.
Salovey & Birnbaum, 1989, experiment 3	Used autobiographical recall to manipulate mood in healthy students and found a mood effect for negative events only.	Open to a demand interpretation.
Abele & Hermer, 1993	Used autobiographical recall to manipulate mood. Participants showed a mood effect on a health cognition survey in which they provided risk estimates.	Open to a demand interpretation.

undesirable events. Positive mood participants displayed stronger comparative optimism than did control participants who underwent no mood induction. Negative mood participants displayed weaker comparative optimism than did control participants. Indeed, they displayed comparative pessimism.

Limitations in the evidence

A limitation in the studies by Abele and Hermer (1993) and Salovey and Birbaum (1989) raise additional problems. Specifically, the procedures of these studies may have inadvertently created experimenter demand. Participants may have surmised that the researchers were examining the relationship between mood and comparative judgments and consequently adjusted their estimates to comply with the assumed research hypothesis, reporting greater comparative optimism in the positive mood condition and less comparative optimism in the negative mood condition. Although Salovey and Birbaum (1989) found only partial support for a mood effect, a demand interpretation of their findings is plausible because they did not disguise their interest in the relationship between mood and cognitions. Abele and Hermer (1993) presented the mood manipulation and the measure of comparative optimism as separate studies. However, they assessed mood immediately before and immediately after the mood induction. The repeated measurement may have made it clear to participants that the researchers were manipulating mood. In both the Abele and Hermer (1993) and Salovey and Birbaum (1989) studies, the demand explanation is especially difficult to dismiss because mood was assessed through self-reports only, a procedure that seems to be particularly sensitive to compliance bias (Clark, 1983).

Why should a mood affect comparative judgments?

Researchers have advanced three explanations for why mood states should influence comparative judgments. Although all three seem reasonable on the surface, closer examination reveals problems in their logic. The first explanation draws from the work of Pyszczynski and Greenberg (1987) on depression and accounts for lower comparative optimism among people who experience sad moods. It says that a sad mood enhances self-focused attention, which in turn increases access to negative self-schemas. The negative self-schemas affect personal risk judgments, leading people to overestimate the likelihood they will experience unpleasant events and underestimate the likelihood that they will experience pleasant events. The weakness of the explanation is that it does not explain why positive mood increases comparative optimism. Because both Salovey and Birbaum (1989) and Abele and Hermer (1993) found that both positive and negative mood affect comparative optimism, any explanation for the mood effect should incorporate the effects of a positive mood as well as the effects of a negative mood.

The second explanation hinges on the finding that moods enhance the availability of mood-congruent information (see Gilligan & Bower, 1984). Evidence suggests that mood can strongly affect how people think and typically prompts thoughts that are congruent with current mood states. Positive moods tend to elicit positive thinking, perceptions, and judgments, whereas negative moods tend to elicit negative thinking, perceptions, and judgments (see Forgas & Bower, 2000; Sedikides, 1992 for reviews). By extension, moods should also influence comparative judgments of future outcomes. We label this explanation the *Mood Priming* explanation.

The third explanation draws from the *Affect as Information* model (Schwarz, 1990; Schwarz & Clore, 1996), which proposes that people use their momentary feelings as cues to the global status of their environment. Accordingly, the experience of positive moods such as euphoria or happiness prompts the perception that the environment is safe, whereas the experience of negative moods such as sadness prompts the perception that the environment is unsafe. These general appraisals influence risk perception in a congruent manner (DeSteno, Petty, Wegener, & Rucker, 2000). We label this explanation the *Mood as Information* explanation.

The primary limitation of the Mood Priming explanation and the Mood as Information explanation is that they explain why self-judgments and judgments for others should be responsive to mood, but do not explain why *comparative* judgments (i.e., the difference between self and other judgments) should be responsive to mood. For example, a negative mood might facilitate access to negative events. When asked to judge their risk of a car accident, people in a negative mood may think about how dangerous driving is and how many car accidents occur. They would thus estimate a higher likelihood than would someone in a neutral or positive mood who presumably had less access to negative cognitions about driving. However, presumably these mood-induced cognitions would also influence judgments about the average person's risk. Thus, people induced to experience a negative mood would not only estimate a higher personal risk of a car accident, but would also estimate a higher risk for the average person. The net result would be a change in risk judgments for the self and risk judgments for the average person, but no change in comparative judgments (the difference between self and other judgments).

One might argue that all models can explain mood effects on comparative risk judgments when the judgments are measured directly (i.e. via a single item anchored by endpoints such as *much less than average* and *much greater than average*). However, they do not explain the effect of mood on comparative risk judgments when the judgments are measured indirectly (i.e. via separate items for self and other that are then subtracted to produce a comparative judgment), and prior studies demonstrated mood effects on comparative judgments using the indirect method (Abele & Hermer, 1993; Salovey & Birbaum, 1989).

The present research

Clearly, the jury is still out on whether mood affects comparative likelihood judgments. We thus sought to experimentally re-examine the effect of mood on comparative judgments using a less conspicuous mood manipulation than the autobiographical procedure that was used in previous studies. Specifically, we used a procedure that minimized experimenter demand. We told participants that they were taking part in a study on eyewitness identification then induced mood states by manipulating the pictures participants viewed and the music they heard in the background. We present a pilot experiment that establishes the effectiveness of this procedure as a manipulation of participants' mood. We then present four experiments that tested whether induced mood influences comparative judgments such that people in a positive mood display stronger comparative optimism and people in a negative mood display weaker comparative optimism than people in a neutral mood. Finally, we present a fifth experiment that directly compared the effects of our manipulation with the effects of the autobiographical procedure, and a sixth experiment that provides a preliminary test of a demand interpretation of prior studies of mood effects on comparative judgments.

Overview of methods

Mood induction procedure

We developed a mood induction procedure that combined two nonverbal methods to induce strong negative and positive moods while minimizing demand characteristics. We tested this mood induction procedure in a pilot experiment and used it in Experiments 1 through 5 (see Table 2 for a summary of all studies).

Participants viewed pictures from the *International Affective Picture System* (IAPS; Lang, Bradley, & Cuthbert, 1995). In a pretest, participants rated 102 pictures from the inventory on 9-point scales (1 = *negative*; 9 = *positive*). For the negative mood condition we selected pictures with mean scores below 3.5; for the positive mood condition we selected pictures with mean scores above 6.5; and for the neutral mood condition we selected pictures with mean scores that varied from 4.5 to 5.5. The negative mood condition pictures depicted, among other scenes, traffic accidents, cemeteries, drug addicts and crying children. The positive mood condition pictures depicted, among other scenes, babies, landscapes, family idylls and athletes involved in sports. The neutral mood condition pictures depicted, among other scenes, affectively neutral human faces, furniture, utensils and abstract art. We were thus able to select 26 pictures for the negative mood condition ($M = 2.3$, $SD = 0.37$, *Range* 1.8 to 3.2), 26 pictures for the neutral mood condition ($M = 5.0$, $SD = 0.26$, *Range* 4.6 to 5.3), and 26 pictures for the positive mood condition ($M = 7.3$, $SD = 0.32$, *Range* 6.7 to 8.1).¹

Because recent work demonstrates that music can enhance emotional experience evoked by of IAPS slides (Baumgartner, Esslen, & Jancke, 2005), we paired the slides with music selections. While performing the picture viewing task, participants heard music selections used in prior mood research (Niedenthal, Halberstadt, & Setterlund, 1997; Niedenthal & Setterlund, 1994). Participants in the positive mood condition heard selections from Mozart's *Eine Kleine Nachtmusik* and *Divertimento #136* and Vivaldi's *Mandolin Concertos*. Participants in the neutral mood condition heard selections from Brahms's *Symphonie No. 1 en do Mineur*. Participants in the negative mood condition heard selections from Mahler's *Adagietto*. The mood induction procedure lasted for 10 min.

Apparatus

The mood manipulation procedures were designed to completely engross participants' attention. To this end, we presented the music and pictures to participants via a virtual reality helmet (VFX 3D) connected to a computer fitted with high quality stereo headphones and two mini-screens (0.7") with liquid crystal display. In the pilot experiment, participants viewed the pictures via a computer and listened to the music via ordinary headphones because the virtual reality helmet interfered with the placement of EMG-electrodes on participants' brows and cheeks (see below). Ancillary tests revealed that participants were highly attentive to the stimulus material. At the end of each session, participants viewed pictures that were and were not presented during the mood induction phase. All participants in all studies correctly identified

¹ The specific pictures we used are as follows. Positive mood: 1460, 1463, 1610, 1710, 1721, 1750, 2057, 2070, 2080, 2091, 2165, 2304, 2311, 2340, 2341, 2345, 2360, 2530, 2550, 2660, 5779, 5780, 5982, 7580, 8370, 8420. Negative mood: 2205, 2710, 2750, 2900, 3180, 3220, 6212, 6213, 6530, 6550, 6570, 9000, 9041, 9050, 9220, 9280, 9415, 9421, 9520, 9560, 9611, 9630, 9830, 9910, 9911, 9920. Neutral mood: 2190, 2385, 2514, 2516, 2749, 2840, 2890, 5510, 5531, 5534, 7004, 7006, 7009, 7010, 7020, 7050, 7160, 7170, 7175, 7185, 7187, 7207, 7211, 7217, 7233, 7235.

Table 2. Summary of all studies

Study	N	Procedures	Findings
Pilot experiment	40	Assessed self-reported mood, <i>M. corrugator supercilii</i> versus <i>M. zygomaticus major</i> EMG activity, and valence of autobiographical memories.	Mood manipulation successful. Negative mood participants reported fewer positive memories than did neutral mood participants, who in turn reported fewer positive memories than did positive mood participants.
Experiment 1	94	Manipulated mood and assessed comparative judgments.	Mood manipulation successful. No mood effect.
Experiment 2	64	Same mood induction procedure as in Experiment 1, plus manipulated mood salience to explore the Correction Hypothesis.	Mood manipulation successful. No mood effect.
Experiment 3	93	Same mood induction procedure as in Experiment 2, plus manipulated time pressure and the strength of the mood manipulation to explore the Correction Hypothesis.	Mood manipulation successful. No mood effect.
Experiment 4	71	Same mood induction procedure as in Experiment 2, plus assessed individual differences in mood and in the tendency to regulate mood.	Mood manipulation successful. No mood effect. However, negative affect correlated negatively and positive affect correlated positively with comparative optimism.
Experiment 5	120	Manipulated the mood induction method (pictures + music versus autobiographical recall).	Mood manipulations successful. Mood effect for the autobiographical recall procedure only.
Experiment 6	74	Directed participants to respond as though in they were in different mood states to explore an Experimenter Demand explanation.	Greater comparative optimism when participants responded as though they were in a negative mood than in a neutral mood or positive mood.

which pictures they had seen and which pictures they had not seen during the mood induction.

Procedures common to experiments 1–5

Participants took part individually and were randomly assigned to a mood induction condition. We crafted the instructions to avoid any suggestion that we were interested in the relationship between mood and comparative likelihood judgments. Specifically, the experimenter described the research as examining eyewitness testimony (cf. Bradley, Cuthbert, & Lang, 1996) and explained that the experiment consisted of three stages. First, participants would view a series of pictures (viewing stage). The experimenter advised participants to attend carefully to the pictures because their memory would be tested at the end of the session. Second, participants would complete a series of allegedly unrelated questionnaires (distraction stage). The ostensible purpose was to simulate real-world eyewitness identification situations in which time passes and thought is diverted from the stimulus. The experimenter emphasized that, because the materials were not related to the present study, they would provide a good distraction from the photos displayed during the viewing stage. To induce participants to take their judgments seriously, the experimenter explained that the distraction task involved validation of materials for future research. Presenting the likelihood questionnaires as a validation test of materials for future research also served to disguise the fact that our real interest was in participants' comparative ratings. Third, the experimenter would test participants' memory for the pictures (identification stage). The experimenter added that participants would hear music throughout the session to isolate them from environmental noises and facilitate concentration on the pictures.

After participants indicated that they understood the procedures, they donned the virtual reality helmet and the mood induction procedure began. Each picture lasted for 15 s and was followed by a black screen for 5 s. The end of the viewing stage was indicated by a white screen. After the viewing stage, participants completed several questionnaires. When they had finished doing so, they were thanked and debriefed.

Pilot experiment

We tested the success of the mood induction in a pilot experiment. Participants ($N = 40$) underwent the mood induction procedure then indicated how they felt 'at this moment' on a four-point scale to 16 adjectives (e.g. *sad, happy, lively, gloomy*) from the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988). The sum of the negative items was subtracted from the sum of the positive items to yield a single score with a higher score reflecting a more positive mood. In addition, we included measures of electromyographic activity (EMG) in the *M. corrugator supercilii*, a muscle used in frowning but not smiling, and in the *M. zygomaticus major*, a muscle used in smiling but not frowning. Previous research reveals enhanced activity in these muscles when people are exposed to stimuli that provoke negative or positive affective responses, respectively, even when participants do not visibly frown or smile (Cacioppo, Petty, Losch, & Kim, 1986; Sirota & Schwartz, 1982).

Responses to the BMIS revealed less positive mood in the negative mood condition ($M = 0.9$, $SD = 6.8$) than in the neutral ($M = 9.2$, $SD = 6.0$) and positive ($M = 10.8$, $SD = 5.8$) mood conditions, both $ps < .001$, both $\eta^2 > .30$ and no difference in mood

between the latter two conditions². Analysis of physiological responses revealed greater *M. corrugator supercilii* EMG activity in the negative mood condition ($M = 1.1$, $SD = 0.3$) than in the neutral ($M = 0.7$, $SD = 0.2$) and positive ($M = 0.6$, $SD = 0.1$) mood conditions, $F(1, 37) = 33.8$, $p < .0001$, $\eta^2 = .47$. The neutral and positive mood conditions did not differ, $F < 1$. Analysis also revealed greater *M. zygomaticus major* EMG activity in the positive mood condition ($M = 1.2$, $SD = 0.5$) than in the neutral ($M = 0.7$, $SD = 0.2$) and negative ($M = 0.7$, $SD = 0.1$) mood conditions, $F(1, 37) = 24.3$, $p < .0001$, $\eta^2 = .39$. The neutral and negative mood conditions did not differ, $F < 1$. The significant differences between conditions in EMG activity persisted in the intervals between the pictures (i.e. when participants viewed a black screen) and for one minute after the final picture, at which point we terminated the measurement of EMG activity.

Finally, we asked participants to report three autobiographical memories from the past year. Replicating prior research (Snyder & White, 1982), participants reported fewer positive memories in the negative mood condition ($M = 3.5$, $SD = 1.2$) than in the neutral mood condition ($M = 4.4$, $SD = 1.1$). The latter participants reported fewer positive memories than participants in the positive mood condition ($M = 4.7$, $SD = 0.9$), $F(1, 37) = 8.36$, $p < .006$, $\eta^2 = .18$.

In sum, the pilot experiment showed that our music + picture procedure was successful in inducing moods. The finding that participants in the neutral condition did not differ from participants in the positive mood condition replicates prior studies using self-reports (Schwarz & Clore, 1983; Westermann, Spies, Stahl, & Hesse, 1996) and may indicate that the ambient mood for most people is positive. Alternatively, the BMIS may be insensitive to differences between neutral and positive mood. After all, the second pilot experiment revealed mood differences in EMG activity. We now turn to examining whether induced mood influences comparative optimism.

EXPERIMENT I

Method

Psychology undergraduates (84 female, 10 male; M age = 19.4, $SD = 1.41$) from the Savoie University were randomly assigned to conditions. Participants in the Negative and Positive mood conditions experienced the mood induction procedures described in Pilot Experiment 1. Following the mood induction, participants completed the BMIS and a measure of comparative optimism, after which they completed the BMIS a second time. Neutral mood participants completed the questionnaires but did not view slides or hear music. Our measure of comparative optimism consisted of six positive events (e.g. *own your own house*) and six negative events (e.g. *have a car accident as a driver*) presented in one of four random orders. The events were adapted from previous studies (e.g. Dewberry, Ing, James, Nixon, & Richardson, 1990; Weinstein, 1980) and were typical of the type of events examined in research on comparative optimism. Participants rated the

² For all studies involving three moods conditions (Pilot experiment, and Experiments 1 and 3), differences between mood conditions were analyzed with two contrasts: one planned comparison testing the hypothesis and one orthogonal contrast testing remaining variance. We used the Sheffes's method for all post hoc tests.

likelihood that each event would happen to them and to the average student at their university (1 = *not likely*, 7 = *very likely*) in a counterbalanced order. We calculated differences between self and other likelihood judgments separately for the six positive events ($\alpha = .47$) and the six negative events ($\alpha = .70$) such that higher scores reflected stronger comparative optimism (average minus self for negative events and self minus average for positive events).

Results

Participants reported less positive mood in the negative mood condition ($M = -2.6$, $SD = 5.3$) than in the neutral ($M = 10.0$, $SD = 5.7$) and positive ($M = 9.0$, $SD = 5.5$) mood conditions, $p < .001$, both $\eta^2 > .42$, with the neutral and positive mood conditions not differing from each other. Our mood induction continued to produce significant differences in mood even after we assessed participants risk judgments. We found comparative optimism for positive, $t(93) = 3.14$, $p < .01$, $\eta^2 = .09$, and negative events, $t(93) = 8.10$, $p < .001$, $\eta^2 = .41$. Consistent with prior observations (Hoorens, 1995), we found stronger comparative optimism for negative events ($M = 5.2$, $SD = 6.3$) than for positive events ($M = 1.5$, $SD = 4.7$), $F(1, 91) = 16.42$, $p < .0001$, $\eta^2 = .15$. However, analysis revealed no effect of mood on comparative likelihood judgments, all $F_s < 1$.

EXPERIMENT 2

It is possible that Experiment 1 yielded no effect of mood on comparative likelihood judgments because participants ‘corrected’ for their mood by adjusting their judgments in the opposite direction of the assumed mood influence (Wegner & Petty, 1997). Experiment 2 tested this *Correction Hypothesis* by manipulating mood saliency. The rationale of this manipulation is that people are more likely to correct for mood bias when they are aware of their mood (e.g. Berkowitz, Jaffee, Eunkyung, & Troccoli, 2000; McFarland, White, & Newth, 2003), which can arise simply from asking people to report their mood.

Method

Psychology undergraduates (56 female, 8 male; M age = 19.5, $SD = 1.6$) from the Savoie University were randomly assigned to conditions in a 2 (Mood Salient versus Mood Not Salient) \times 2 (Negative versus Positive mood) design. Experiment 2 differed in three ways from Experiment 1: (a) we omitted the neutral condition because of the similarity in results between the neutral and positive mood conditions, (b) we manipulated mood salience by having participants complete (*mood salient*) or not complete (*mood not salient*) the mood measure prior to giving likelihood judgments (see Siemer & Reisenzein, 1998), and (c) we expanded the comparative optimism measure by including eight positive events ($\alpha = .53$) and eight negative events ($\alpha = .65$) typical of those seen in prior research on comparative optimism. Participants provided likelihood estimates on a scale ranging from 0% to 100%.

Results

Experiment 2 once again showed that the mood manipulation was successful. Participants reported less positive mood in the Negative mood condition ($M = 4.5$, $SD = 5.3$) than in the Positive mood condition ($M = 10.7$, $SD = 5.5$), $F(1, 30) = 7.15$, $p < .01$, $\eta^2 = .19$. They displayed comparative optimism for positive events, $t(63) = 4.34$, $p < .0001$, $\eta^2 = .23$, and negative events, $t(63) = 7.43$, $p < .0001$, $\eta^2 = .46$, with stronger comparative optimism for negative events ($M = 10.2$, $SD = 10.3$) than for positive events ($M = 5.6$, $SD = 10.1$), $F(1, 91) = 16.42$, $p < .0001$, $\eta^2 = .07$. However, we found no effect of induced mood on comparative optimism and no support for the Correction Hypothesis, all F s involving Mood Salience < 1 .

EXPERIMENT 3

Experiment 3 examined two explanations for our null effects. First, our negative mood induction may have been so strong that even participants in the Mood Not Salient condition were aware of their altered mood, promoting them to correct for it. Alternatively, our strong mood induction may have prompted retrieval of mood *incongruent* cognitions to dampen or neutralize the negative mood. To address this *Self-Regulation Hypothesis*, Experiment 3 included an additional, weaker mood induction condition that should be less likely to provoke a self-regulatory response. Second, people may correct their judgments for the potentially biasing effect of their mood only if they have cognitive resources to do so (Martin, Seta, & Crelia, 1990). In Experiment 3, we varied cognitive resources by manipulating time pressure. Presumably participants should show a congruence effect when the negative mood induction is moderate and when mood is not salient (a Mood Induction by Mood Salience interaction). In addition, participants should show a congruence effect when the negative mood induction is moderate and participants make likelihood judgments under time pressure (a Mood Induction by Time Pressure interaction).

Method

Psychology undergraduates (80 female, 13 male; M age = 19.4, $SD = 2.4$) from the Savoie University were randomly assigned to conditions in a 3 (Mood Induction) \times 2 (Mood Salience) \times 2 (Time Pressure) design. Experiment 3 differed from Experiment 2 in that we omitted the positive mood condition and included a neutral mood condition and a moderate negative mood condition in which participants viewed 8 rather than 26 pictures from the *International Affective Picture System* (Lang *et al.*, 1995)³ while listening to the sad music. In addition, we manipulated time pressure by instructing half of the participants prior to making each set (self versus other) of likelihood judgments to answer as quickly as possible. Participants in the No Time Pressure condition were not instructed to work quickly.

Results

The mood and time pressure manipulations were successful. Participants in the Strong Negative mood ($M = -1.6$, $SD = 6.7$), Moderate Negative mood ($M = 3.1$, $SD = 4.9$),

³ The pictures used in the modest negative affect induction condition were 1460, 1463, 1610, 1710, 1721, 1750, 2057, and 2070.

and Neutral mood conditions ($M = 8.8$, $SD = 5.0$) differed in their mood, $F(1, 45) = 27.80$, $p < .0001$, $\eta^2 = .38$. Participants who were instructed to work fast gave estimates more quickly ($M = 92.6$ s, $SD = 19.6$) than did participants not instructed to work fast ($M = 121.7$ s, $SD = 31.8$), $F(1, 91) = 26.52$, $p < .0001$, $\eta^2 = .22$. In addition, participants showed comparative optimism for both positive events ($\alpha = .56$, $M = 4.4$, $SD = 10.7$), $t(92) = 3.93$, $p < .001$, $\eta^2 = .14$, and negative events ($\alpha = .49$, $M = 9.2$, $SD = 10.1$), $t(92) = 8.88$, $p < .001$, $\eta^2 = .46$. A 3 (Mood Induction) \times 2 (Mood Salience) \times 2 (Time Pressure) \times 2 (Event Valence) mixed-model ANOVA of participants' comparative judgments revealed a significant effect of Event Valence. Participants displayed stronger comparative optimism for negative events than for positive events, $F(1, 81) = 8.33$, $p < .005$, $\eta^2 = .09$. The only other significant effect was a unexpected and uninterpretable four-way interaction, $F(2, 81) = 3.95$, $p < .05$, $\eta^2 = .08$, that did not reveal any evidence for a mood effect, the Correction Hypothesis, or the Self-Regulation Hypothesis.

EXPERIMENT 4

People differ in the extent to which they regulate their mood. This difference may have obscured any mood effects. For instance, people with high self-esteem and people who are prone to regulate negative moods may be more inclined to adjust mood states than people who are low in self-esteem and people who are not prone to regulate negative moods (e.g. Rusting & DeHart, 2000; Smith & Petty, 1995). Thus, they may be less likely to show mood effects. Experiment 4 examined the effect of induced mood (positive versus negative) on comparative optimism in a situation in which the induced mood was either salient or not salient and in which individual differences in self-esteem and expectancies regarding their ability to alleviate negative moods were measured.

Experiment 4 also addressed, the possibility that our comparative optimism measure was somehow insensitive to mood effects. Admittedly, this possibility is a stretch. The events we used were highly similar to items used in prior research, including studies showing an association between mood and comparative optimism. Still we wished to exclude this possibility more unequivocally. Experiment 4 therefore included a self-report measure of chronic affect. If our comparative optimism measure is sufficiently sensitive to mood differences, Experiment 4 should replicate the finding that chronic negative moods such as anxiety and depression are negatively correlated with comparative optimism (Alloy & Ahrens, 1987; Pyszczynski et al., 1987).

Method

Participants (68 female, 3 male; M age = 19.7 years, $SD = 3.0$) from the Savoie University completed French versions of the Rosenberg's (1966) *Self-Esteem Scale* (Valliers & Vallerand, 1990), the *Positive Affectivity and Negative Affectivity Scale* (PANAS; Watson, Clark, & Tellegen, 1988), and the *Negative Mood Regulation Scale* (NMRS; Catanzaro & Mearns, 1990), which taps people's expectancies about how well they can regulate a negative mood. Experiment 4 differed from Experiment 3 in that participants signed up for a study that would last 40 min. When they arrived, they learned that the study took 20 min and that they could still earn credit for 40 min if they also participated in an unrelated study that also took 20 min. The 'second study' was conducted in a different location and was described as an investigation of student well-being. Participants completed the personality measures during this 'second study'.

Results

As in the prior studies, the mood manipulation was successful with participants reporting less positive mood in the Negative mood condition ($M = -2.1$, $SD = 5.7$) than in the Positive mood condition ($M = 11.7$, $SD = 4.2$), $F(1, 38) = 76.34$, $p < .0001$, $\eta^2 = .66$. Participants displayed comparative optimism for both positive ($\alpha = .55$, $M = 6.7$, $SD = 16.4$), $t(70) = 4.81$, $p < .0001$, $\eta^2 = .24$, and negative events ($\alpha = .61$, $M = 9.5$, $SD = 11.1$), $t(70) = 7.16$, $p < .0001$, $\eta^2 = .42$. Regression analyses in which Mood Induction, Mood Salience, Self-Esteem, and all interaction terms were entered as predictors of comparative judgments yielded no main effects or interactions on comparative risk judgments for positive or negative events, all t s < 1.77 , all p s $> .09$. The same was true when we repeated these analyses after substituting Negative Mood Regulation for Self-Esteem, all t s < 1.45 , all p s $> .15$. Thus, we found no evidence for a mood congruence effect on comparative judgments and no evidence that individual differences in self-esteem or the tendency to regulate negative moods predicted participants' comparative judgments.

We correlated PANAS scores for positive affect ($\alpha = .83$) and negative affect ($\alpha = .86$) with comparative judgments for positive and negative events. Higher positive affect scores were associated with stronger comparative optimism for both positive events ($r = .37$, $p < .05$) and negative events ($r = .28$, $p < .05$). Higher negative affect scores were associated with weaker comparative optimism for positive events ($r = -.25$, $p < .05$) but not for negative events ($r = -.08$, p ns). These correlations replicate prior findings that chronic individual differences in mood are associated with differences in comparative optimism and rule out the explanation that our comparative optimism measure was insensitive to mood effects.

EXPERIMENT 5

How can we reconcile our findings with prior findings demonstrating that mood does moderate comparative optimism? Perhaps mood congruence in comparative judgments depends on specific features of the mood induction method rather than on mood *per se*. Experiment 5 compared our method for inducing mood (music + pictures) with the mood induction method (autobiographical recollection) used in previous studies (Abele & Hermer, 1993; Salovey & Birnbaum, 1989). If obtaining a mood congruence effect depends on the mood induction method, then the effect should occur when mood is induced via autobiographical recollection but not when it is induced via music and visual images.

Methods

Undergraduate students (103 female, 17 male; M age = 19.9, $SD = 3.8$) from the Savoie University were randomly assigned to conditions in a 2 (Mood: positive versus negative) \times 2 (Induction Method: music + pictures versus autobiographical recall) design. The music + pictures procedure was identical to that used in Experiments 1-4. The autobiographical recall procedure was identical to that used by Abele and Hermer (1993) in which participants were instructed to write about an important happy or sad event that occurred recently in their life. To minimize experimenter demand in the autobiographical memory condition, the experimenter explained that the investigation comprised two independent studies (one examining

recollections and one validating a questionnaire for future research) that were combined to save time. After the mood induction, all participants completed the BMIS and the comparative judgment task.

Results

A 2 (Induction) \times 2 (Mood) ANOVA of response to the BMIS revealed a main effect of Mood, $F(1, 116) = 148.4$, $p < .0001$, $\eta^2 = .56$. Participants reported more positive mood in the positive mood condition ($M = 10.6$, $SD = 5.2$) than in the negative mood condition ($M = 0.2$, $SD = 4.4$). We also found a main effect of Induction, $F(1, 116) = 7.7$, $p < .01$, $\eta^2 = .06$. Participants reported more positive mood ($M = 6.6$, $SD = 7.3$) in the autobiographical recall condition than in the music + pictures condition ($M = 4.2$, $SD = 6.7$). The interaction between Mood and Induction was not significant. Thus, both induction procedures were effective, although participants reported more positive mood in the autobiographical recall condition than in the Music + Pictures condition. Again, participants displayed comparative optimism in both positive events ($\alpha = .51$), $t(119) = 4.5$, $p < .0001$, $\eta^2 = .14$, and negative events ($\alpha = .69$), $t(93) = 9.9$, $p < .0001$, $\eta^2 = .45$.

Because participants reported more positive mood in the autobiographical recall condition, we analyzed participants' comparative judgments using a 2 (Mood) \times 2 (Induction) \times 2 (Event) ANCOVA with the BMIS score as a covariate. As with the other experiments, we found a main effect of Event, $F(1, 116) = 13.4$, $p < .001$, $\eta^2 = .10$. Participants displayed stronger comparative optimism for negative events ($M = 10.1$, $SD = 11.6$) than for positive events ($M = 4.5$, $SD = 11.1$). More importantly, we found a three-way interaction of Mood, Induction, and Event, $F(1, 116) = 5.3$, $p < .03$, $\eta^2 = .04$. We probed the interaction using paired comparisons that compared the level of comparative optimism displayed in the negative versus positive mood conditions as a function of event and induction method. Participants displayed stronger comparative optimism in the positive mood condition ($M = 17.3$, $SD = 10.5$) than in the negative mood condition ($M = 7.6$, $SD = 9.5$), but only for negative events and only in the autobiographical recall condition, $F(1, 116) = 10.7$, $p < .001$, $\eta^2 = .08$. No other comparison was significant. In sum, Study 5 revealed support for the mood congruence effect when mood was induced via autobiographical memories and not when induced via music + pictures (Figure 1).

EXPERIMENT 6

Why does the mood congruence effect occur only when mood is induced via recall of autobiographical memories? We suggested in the introduction that autobiographical recall procedures may include an element of experimenter demand. Participants may have recognized that the researchers were examining the relationship between mood and comparative judgments and consequently adjusted their estimates to comply with the assumed hypothesis, reporting greater comparative optimism in the positive mood condition and less comparative optimism in the negative mood condition. Experiment 6 provided a preliminary test of the demand hypothesis by asking participants to anticipate how positive or negative mood should influence likelihood estimates.

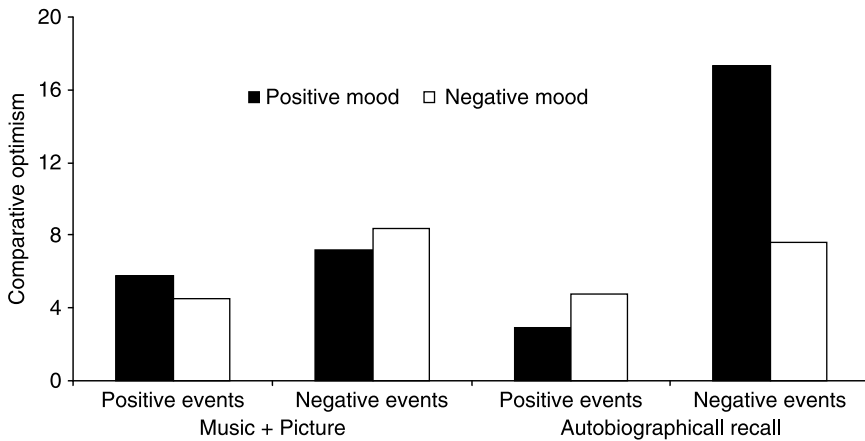


Figure 1. Comparative optimism for positive and negative events with respect to mood valence and mood induction method.

Methods

Undergraduate students (65 female, 9 male; M age = 19.4 years, $SD = 1.4$) from the Savoie University were randomly assigned to conditions in which they were instructed to respond as they thought a person in a happy (versus a sad) mood would. Participants in the control condition received no mood instructions. Participants supplied self and other likelihood ratings to the same positive items ($\alpha = .57$) and negative items ($\alpha = .63$) used in Experiments 2 - 5.

Results

Consistent with the demand explanation, negative mood participants reported weaker comparative optimism than did control participants for both positive events ($M = -10.4$, $SD = 20.0$ versus $M = 6.5$, $SD = 8.8$, $F(1, 71) = 13.26$, $p < .001$, $\eta^2 = .16$, and negative events ($M = -7.3$, $SD = 23.3$ versus $M = 5.2$, $SD = 15.1$, $F(1, 71) = 3.26$, $p < .074$, $\eta^2 = .04$). Positive mood participants did not differ from control participants in their estimates for positive events ($M = 7.6$, $SD = 10.6$) or negative events ($M = 3.6$, $SD = 18.1$), $F_s < 1$ again suggesting that the ambient mood states for most of these participants was positive and asking them to respond as they thought a person in a happy mood would, was tantamount to asking them to respond in their current mood. Regardless, the results suggest that the apparent mood effect on comparative optimism found in prior studies may result from experimenter demand.

GENERAL DISCUSSION

Does mood influence comparative judgments? Although prior studies have explored this question, all suffer from methodological limitations (e.g. correlational data, absence of manipulation checks and control conditions, possible experimenter demand) that preclude drawing conclusions. We used a manipulation of mood (music + pictures) that reduced experimenter demand. The mood induction was successful and comparative

optimism occurred in participants' comparative judgments. However, we did not find a mood effect on comparative judgments. The failure of the procedure to produce mood effect was not due to participants correcting their judgments in response to a presumed mood bias (Experiments 2, 3 and 4) and not to participants regulating their mood (Experiments 3 and 4). Experiment 5 compared the mood induction method of Experiments 1–4 with a method used in previous studies (autobiographical recollection). Although the two methods affected moods, only autobiographical recollection influenced comparative optimism. The latter finding replicates prior research (Abele & Hermer, 1993; Salovey & Birnbaum, 1989). Experiment 6 provided preliminary evidence that it may be due to experimenter demand.

Addressing alternative explanations for our findings

Researchers must exercise caution anytime they fail to replicate an effect because a host of methodological shortcomings may account for the null finding. We can think of four potential methodological shortcomings in our studies. Yet none seems to account for our failure to replicate the mood congruence effect.

First, one might argue that our mood induction was too weak. Indeed, positive mood participants did not differ from neutral mood participants in their self-reported affect. As we noted earlier, however, this finding is common in the mood literature and likely arises from the fact that the ambient state for most people is a positive mood. Moreover, our negative mood induction was successful across every experiment. Self-reports aside, our physiological measure of mood revealed that both our positive and negative mood inductions were successful. In addition, Experiment 5 revealed that the music + pictures manipulation was as effective as the autobiographical recall manipulation. Still, only the autobiographical recall manipulation produced a mood effect.

Second, one might argue that our measure of comparative optimism was flawed or insensitive to mood effects. However, we found mood effects when mood was induced via autobiographical recall. In addition, our measure comprised items typical of those used in prior research. Consistent with prior studies (see Hoorens, 1995), we found weaker (yet significant) comparative optimism for positive events than for negative events.

Third, one might argue that we had insufficient power to detect a mood effect. Effects in psychology are typically small requiring large samples. Whereas our samples may have been large enough to detect comparative optimism and to demonstrate a successful manipulation of mood, they may have been too small to detect a mood effect. Yet past research suggests that the mood congruence effect in comparative judgments is sizable. For example, the partial η^2 in Salovey and Birnbaum's study was .14, and the partial η^2 in Abele and Hermer's study was .35. Moreover, when we use meta-analytic procedures that combine our four experiments, resulting in one large test of the mood effect hypothesis, the results still reveal no mood congruence effect, $F(1, 289) = .14$, $p > .70$, partial $\eta^2 = .0004$. The meta-analytical results suggest that the null effect is likely due to an effect size close to zero rather than to insufficient statistical power.

Finally, the coefficient α s for our measures of comparative optimism were modest, falling as low as .47 in one instance. Because almost no researcher reports coefficient α when combining items to make a single index of comparative judgments, it's hard to know how typical this finding is. Given the similarity of our measure with those used by other researchers, we suspect that modest reliability is common. Moreover, some research suggests that, although the internal consistency of comparative judgments can vary in

response to situational factors, they are generally consistent across time and events (Shepperd, Helweg-Larsen, & Ortega, 2003). Most important, it is unlikely that our consistent null effect was due to our measure being unreliable because we observed mood effects for our measure in Study 5 when we manipulated mood via autobiographical recall. Finally, using traditional techniques to correct for unreliability (adjusting the effect size by the square root of reliability coefficient) had a negligible effect on our results. All effect sizes were close to zero and dramatically below the effect sizes observed by Salovey and Birnbaum (1989), and by Abele and Hermer (1993). In short, even if our measure of comparative optimism was more reliable, it would have made no difference.

One last finding merits repeating because it strongly suggests that poor methodology was not responsible for our inability to replicate the mood effect in comparative judgments. Specifically, our pilot study revealed that participants in the positive mood induction condition recalled more positive memories than did participants in the neutral mood induction condition, who in turn recalled more positive memories than did participants in the negative mood induction condition. In short, we found a mood effect for autobiographical memories (Snyder & White, 1982). However, we failed to find a mood effect for comparative judgments.

Re-thinking the autobiographical recall procedure

Why did the autobiographical recall procedure yield a mood effect whereas the music + pictures procedure did not? Study 6 suggests that the autobiographical recall procedure may have inadvertently included an element of experimenter demand. Participants may have recognized that the researchers were examining the relationship between mood and comparative judgments and adjusted their estimates to comply with the assumed hypothesis, reporting more comparative optimism in the positive mood condition and less comparative optimism in the negative mood condition.

To explore this hypothesis further, we analyzed participants' memories in the autobiographical recall condition of Experiment 5. Two independent judges rated the pleasantness of the recalled memories (from $-3 = \textit{unpleasant}$ to $+3 = \textit{pleasant}$) and showed high agreement in their ratings ($r = .92$). As expected, the memories were rated more pleasant in the positive mood condition ($M = 1.8, SD = 0.7$) than in the negative mood condition ($M = -2.2, SD = 0.7$), $t(54) = 21.52, p < .0001, \eta^2 = .89$. However, pleasantness ratings were uncorrelated with comparative optimism scores in both the positive and negative mood conditions ($r_s < .19$, all $p_s > .35$). One interpretation of this finding is that the mood recall instructions have an asymptotic effect on comparative optimism. For instance, regardless of whether they are mildly or strongly unpleasant, all negative memories diminish comparative optimism to the same degree. An alternative and perhaps more parsimonious interpretation of this finding is that the recalled memories had no effect on comparative optimism and that the comparative optimism instead reflects a response to experimenter demand.

Finally, we can think of one other possibility. The two mood induction procedures may have prompted distinct emotional experiences. The autobiographical recall procedure likely induced specific emotions of happiness versus sadness that were associated with the happy versus sad memories participants recalled. In contrast, the music + pictures procedure likely induced a general and diffuse positive versus negative affective experience. Recent research suggests that the mood congruence effect is emotion-specific in that emotions prime cognitions that are associated with the emotion (Lerner & Keltner, 2001). Risk judgments may be linked closely to happy and sad moods,

perhaps through some common dimension such as perceived control (Lerner & Keltner, 2001; Smith & Ellsworth, 1985), but not to diffuse emotions such as positive and negative affect.

Limitations and directions for further research

Study 6 supports a demand characteristic interpretation of mood effects on comparative optimism. Accordingly, mood states have no effect on comparative judgments. Rather, participants have lay theories regarding how moods influence social judgments (e.g. negative moods produce a reduction in comparative optimism) and their comparative judgments reflect these lay theories. That said, Study 6 provides an indirect rather than a direct test of the demand characteristics interpretation. A more direct test would come from examining whether participants show a mood congruence when they know versus do not know the purpose of the study. This could be accomplished by informing some participants of the hypothesis but not others, or by assessing the extent to which participants are aware of the hypothesis. If the demand characteristics interpretation is valid, then mood should affect comparative optimism among participants who believe that the study is on the mood-optimism relationship but not among other participants. These more direct tests represent important opportunities for future research.

Conclusion

Countless studies have documented the effect of mood on perceptions and judgments (Mayer, Gaschke, Braverman, & Evans, 1992; Sedikides, 1992, for reviews). This mood congruence effect appears across numerous mood states, judgment tasks, and participant characteristics with few boundary conditions (Mayer *et al.*, 1992). However, we were unable to find a mood effect on comparative judgments when we used a mood induction procedure that minimized experimenter demand. We replicated the mood effect only when we induced mood via autobiographical recall. One implication is that the mood congruence effect is method specific. However, we find it troubling that it emerged for an induction method that is particularly vulnerable to experimenter demand. Together these limitations raise questions about the veracity of the mood effect on comparative judgments. More to the point, our findings suggest that, contrary to prior theorizing, the mood congruence effect may not apply to comparative judgments. As such, we appear to have identified a boundary condition on the mood congruence effect. Our observations, however, are more speculative than conclusive. Clearly, a direction for future research is to identify which of the explanations we offer accounts for researchers finding a mood congruence effect only when using the autobiographical recall procedure.

References

- Abele, A., & Hermer, P. (1993). Mood influences on health-related judgments: Appraisal of own health versus appraisal of unhealthy behaviors. *European Journal of Social Psychology*, 23, 613–625.
- Alloy, L. B., & Ahrens, A. H. (1987). Depression and pessimism for the future: Biased use of statistically relevant information in predictions for self versus others. *Journal of Personality and Social Psychology*, 52(2), 366–378.
- Armor, D. A., & Taylor, S. E. (1998). Situated optimism: Specific outcome expectancies and self-regulation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 30, pp. 309–379). New York, NY: Academic Press.

- Baumgartner, T., Esslen, M., & Jancke, L. (2005). From emotion perception to emotion experience: Emotions evoked by pictures and classical music. *International Journal of Psychophysiology*, *60*(1), 34–43.
- Berkowitz, L., Jaffee, S., Eunkyung, J., & Troccoli, B. T. (2000). On the correction of feeling-induced judgmental biases. In J. P. Forgas (Ed.), *Feeling and thinking* (pp. 131–152). Paris: Cambridge University Press & Editions de la Maison des Sciences de l'Homme.
- Bradley, M. M., Cuthbert, B. N., & Lang, P. J. (1996). Picture media and emotion: Effects of a sustained affective context. *Psychophysiology*, *33*(6), 662–670.
- Cacioppo, J. T., Petty, R. E., Losch, M. E., & Kim, H. (1986). Electromyographic activity over facial muscle regions can differentiate the valence and intensity of affective reactions. *Journal of Personality and Social Psychology*, *50*(2), 260–268.
- Catanzaro, S. J., & Mearns, J. (1990). Measuring generalized expectancies for negative mood regulation: Initial scale development and implications. *Journal of Personality Assessment*, *54*(3/4), 546–563.
- Chambers, J. R., & Windschitl, P. D. (2004). Biases in social comparative judgments: The role of nonmotivated factors in above-average and comparative-optimism effects. *Psychological Bulletin*, *130*, 813–838.
- Clark, D. M. (1983). On the induction of depressed mood in the laboratory: Evaluation and comparison of the Velten and musical procedures. *Advances in Behaviour Research and Therapy*, *5*, 27–49.
- DeSteno, D., Petty, R. E., Wegener, D. T., & Rucker, D. D. (2000). Beyond valence in the perception of likelihood: The role of emotion specificity. *Journal of Personality and Social Psychology*, *78*(3), 397–416.
- Dewberry, C., Ing, M., James, S., Nixon, M., & Richardson, S. (1990). Anxiety and unrealistic optimism. *Journal of Social Psychology*, *130*, 151–156.
- Drake, R. A. (1984). Lateral asymmetry of personal optimism. *Journal of Research in Personality*, *18*, 497–507.
- Drake, R. A. (1987). Conception of own versus others' outcomes: Manipulation of monaural attentional orientation. *European Journal of Social Psychology*, *17*, 373–375.
- Drake, R. A., & Ulrich, G. (1992). Line bisecting as a predictor of personal optimism and desirability of risky behavior. *Acta Psychologica*, *79*, 219–226.
- Forgas, J. P., & Bower, G. H. (2000). Affect, memory and social cognition. In E. Eich, J. F. Kihlstrom, G. H. Bower, J. P. Forgas, & P. M. Niedenthal (Eds.), *Cognition and emotion*. New York, NY: Oxford University Press.
- Gilligan, S. G., & Bower, G. H. (1984). Cognitive consequences of emotional arousal. In C. E. Izard, J. Kagan, & R. Zajonc (Eds.), *Emotions, cognition, and behavior* (pp. 547–588). New York, NY: Cambridge University Press.
- Helweg-Larsen, M., & Shepperd, J. A. (2001). Do moderators of the optimistic bias affect personal or target risk estimates? A review of the literature. *Personality and Social Psychology Review*, *5*, 74–95.
- Hoorens, V. (1995). Self-favoring biases, self-presentation, and the self-other asymmetry in social comparison. *Journal of Personality*, *63*(4), 793–817.
- Lang, P. J., Bradley, M., & Cuthbert, B. (1995). International affective picture system. Gainesville: University of Florida, Center for Research in Psychophysiology.
- Lerner, J. S., & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology*, *81*, 146–159.
- Martin, L. L., Seta, J. J., & Crelia, R. A. (1990). Assimilation and contrast as a function of people's willingness and ability to expend effort in forming an impression. *Journal of Personality and Social Psychology*, *59*, 27–37.
- Mayer, J. D., & Gaschke, Y. N. (1988). The experience and meta-experience of mood. *Journal of Personality and Social Psychology*, *55*(1), 102–111.
- Mayer, J. D., Gaschke, Y. N., Braverman, D. L., & Evans, T. W. (1992). Mood-congruent judgment is a general effect. *Journal of Personality and Social Psychology*, *63*, 119–132.

- McFarland, C., White, K., & Newth, S. (2003). Mood acknowledgement and correction for mood-congruency bias in social judgment. *Journal of Experimental Social Psychology, 39*, 483–491.
- Niedenthal, P. M., Halberstadt, J. B., & Setterlund, M. B. (1997). Being happy and seeing 'happy': Emotional state mediates visual word recognition. *Cognition and Emotion, 11*(4), 403–432.
- Niedenthal, P. M., & Setterlund, M. B. (1994). Emotion congruence in perception. *Personality and Social Psychology Bulletin, 20*(4), 401–411.
- Pietromonaco, P. R., & Markus, H. (1985). The nature of negative thoughts in depression. *Journal of Personality and Social Psychology, 48*(3), 799–807.
- Pyszczynski, T., & Greenberg, J. (1987). Self-regulatory perseveration and the depressive self-focusing style: A self-awareness theory of reactive depression. *Psychological Bulletin, 102*, 122–138.
- Pyszczynski, T., Holt, K., & Greenberg, J. (1987). Depression, self-focused attention, and expectancies for positive and negative future life events for self and others. *Journal of Personality and Social Psychology, 52*(5), 994–1001.
- Rusting, C. L., & DeHart, T. (2000). Retrieving positive memories to regulate negative mood: Consequences for mood-congruent memory. *Journal of Personality and Social Psychology, 78*(4), 737–752.
- Salovey, P., & Birnbaum, D. (1989). Influence of mood on health-relevant cognitions. *Journal of Personality and Social Psychology, 57*, 539–551.
- Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 527–561). New York, NY: Guilford.
- Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology, 45*, 513–523.
- Schwarz, N., & Clore, G. L. (1996). Feelings and phenomenal experiences. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 433–465). New York, NY: Guilford Press.
- Sedikides, C. (1992). Changes in the valence of the self as a function of mood. *Review of Personality and Social Psychology, 14*, 271–311.
- Shepperd, J. A., Carroll, P., Grace, J., & Terry, M. (2002). Exploring the causes of comparative optimism. *Psychologica Belgica, 42*, 65–98.
- Shepperd, J. A., Helweg-Larsen, M., & Ortega, L. (2003). Are comparative risk judgments consistent across time and events? *Personality & Social Psychology Bulletin, 29*, 1169–1180.
- Siemer, M., & Reisenzein, R. (1998). Effects of mood on evaluative judgments: Influence of reduced processing capacity and mood salience. *Cognition and Emotion, 12*(6), 783–805.
- Sirota, A. D., & Schwartz, G. E. (1982). Facial muscle patterning and lateralization during elation and depression imagery. *Journal of Abnormal Psychology, 91*(1), 25–34.
- Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology, 48*, 813–838.
- Smith, S. M., & Petty, R. E. (1995). Personality moderators of mood congruency effects on cognition: The role of self-esteem and negative mood regulation. *Journal of Personality and Social Psychology, 68*(6), 1092–1107.
- Snyder, M., & White, P. (1982). Moods and memories: Elation, depression, and remembering of the events of one's life. *Journal of Personality, 50*(2), 149–167.
- Vallieres, E. F., & Vallerand, R. J. (1990). Traduction et validation Canadienne-Francaise de l'Echelle de l'Estime de soi de Rosenberg. *International Journal of Psychology, 25*(3), 305–316.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070.
- Wegener, D. T., & Petty, R. B. (1997). The flexible correction model: The role of naive theories of bias in bias correction. *Advances in Experimental Social Psychology, 29*, 141–201.

- Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, *39*, 806–820.
- Westermann, R., Spies, K., Stahl, G., & Hesse, F. W. (1996). Relative effectiveness and validity of mood induction procedures: A meta-analysis. *European Journal of Social Psychology*, *26*, 557–580.

Received 23 June 2008; revised version received 3 September 2008