

Interactions between emotion regulation strategies and affective style: Implications for trait anxiety versus depressed mood

Tracy A. Dennis

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Abstract Affective style reflecting approach and inhibition is thought to be associated in distinct ways with anxious versus depressed mood; relatively few studies, however, consider how the interaction between affective style and the strategies individuals use to regulate mood and emotion might influence these associations. Sixty-seven non-disordered adults self-reported on their use of two emotion regulation strategies (cognitive reappraisal and expressive suppression), behavioral approach (BAS) and behavioral inhibition sensitivity (BIS) dimensions of affective style, and anxious and depressed mood (trait anxiety and symptoms of depression). Trait anxiety versus depressed mood was associated with unique interactive patterns of emotion regulation and affective style: enhanced use of reappraisal was linked to less depressed mood in those reporting low BAS, whereas high suppression was linked to greater trait anxiety in those reporting low BIS. The implications of findings for typical emotional processes and for clinical disorders and interventions are discussed.

Keywords Emotion regulation · Affective style · Trait anxiety · Depressed mood

Introduction

Emotion regulation has been defined in numerous and sometimes conflicting ways; most if not all definitions, however, include the use of strategies that individuals

employ to modify the course and expression of emotional experiences (Cole et al. 2004; Davidson et al. 2000; Garber and Dodge 1991; Gross 1998; Schore 1994; Thompson 1994). There is also general agreement that understanding the nature of conscious and unconscious emotion regulation strategies is crucial for advancing knowledge of positive emotional adjustment as well as emotional dysregulation (Bradley 2000; Cole et al. 2004; Kring and Werner 2004; Ochsner et al. 2002).

Cognitive reappraisal and expressive suppression are two emotion regulation strategies that have received considerable empirical attention (Gross and John 2002, 2003; Jackson et al. 2003; Ochsner et al. 2002). Cognitive reappraisal is defined as cognitive change that serves to neutralize the negative emotional impact or amplify the positive emotional aspects of a future event or outcome. It is an antecedent-focused strategy because it occurs before distress is fully experienced. For example, before a job interview, an applicant might focus on the personal skills and qualities about which he or she feels confident rather than the potential to be negatively evaluated during the interview. In contrast, expressive suppression is a form of response modulation: inhibiting ongoing emotion expressive behavior. It is a response-focused strategy because an emotional response has already occurred, although it does not generally result in reduced subjective emotional distress. Examples of expressive suppression include not laughing in a serious situation although something funny just happened or not crying at a funeral although one feels sad. Cognitive reappraisal and expressive suppression may differ in their consequences: those who tend to use reappraisal more often than suppression express more positive and fewer negative emotions, have better interpersonal functioning, and show greater subjective and objective well-being (Gross and John 2002, 2003).

T. A. Dennis (✉)
Hunter College, The City University of New York,
695 Park Avenue, New York, NY 10065, USA
e-mail: tracy.dennis@hunter.cuny.edu

There is, however, a small but growing body of evidence showing that specific emotion regulation strategies are not just “good” or “bad in terms of their emotional consequences, but instead are associated with distinct social-emotional problems. For example, one study showed that expressive suppression compared to cognitive strategies was positively associated with social anxiety and panic disorder (Kashdan and Steger 2006; Levitt et al. 2004). Other research, however, has failed to find associations between suppression and mood problems such as high trait anxiety, even accounting for emotional vulnerability factors such as behavioral inhibition sensitivity (Leen-Feldner et al. 2004). The goal of the present study is to build upon and clarify previous research by examining whether depressed and anxious mood are both staved off by use of cognitive reappraisal and exacerbated by suppression, or whether each strategy is differentially linked to these distinct problems.

One approach to this question is to place emotion regulation in the context of individual differences that create specific emotional vulnerabilities. This is similar to an endophenotype approach, which identifies causal mechanisms in observable behavior (Cannon and Keller 2006; Goldsmith and Davidson 2004; Gottesman and Gould 2003). Behavioral and neurological research provides converging evidence that affective style, or trait-like differences in the speed and intensity of emotional and behavioral responses to rewards or threats, may be one such individual difference. In particular the behavioral approach and behavioral inhibition systems are thought to be related to vulnerabilities for depressed and anxious mood (Davidson et al. 2002; Dennis 2006; Derryberry and Rothbart 1997; Gray and McNaughton 2000).

Behavioral approach sensitivity (BAS) reflects motivation to emotionally respond to and approach potentially rewarding situations; behavioral inhibition sensitivity (BIS), on the other hand, reflects motivation to emotionally respond to but avoid or withdraw from potentially threatening situations (Breiter and Rosen 1999; Carver and Scheier 1998; Davidson 1998a; Gray and McNaughton 2000; Higgins et al. 1994). These sensitivities are present in all individuals, but vary in intensity (Higgins 2006). Those showing relatively high BAS are more likely to react rapidly and intensely with frustration when rewards are blocked and with sadness or despair when rewards are lost; they are also likely to expend greater effort overcoming obstacles to potential reward. Those showing relatively high BIS, in contrast, are more likely to respond with anxiety and behavioral withdrawal in novel or threatening situations.

Characteristic patterns of affective style and emotion regulation may be linked to specific mood problems; in particular, BAS and reappraisal have been associated with depressed mood and BIS and expressive suppression with

anxious mood (Carver 2004; Carver and Scheier 1998; Derryberry and Rothbart 1997; Higgins 1997; Higgins et al. 1994; Shankman and Klein 2003). Depression and depressed mood are characterized by low BAS, including fewer experiences of reward-related emotional experiences like interest and anticipatory pleasure and reduced motivation to obtain rewards (Campbell-Sills et al. 2004; Derryberry and Rothbart 1997; Kasch et al. 2002). Indeed, low positive emotion and reduced reward responsiveness rather than the presence of negative emotionality might be a specific risk factor for clinical depression (Henriques and Davidson 2000; Shankman et al. 2005). Finding the “silver lining” via cognitive reappraisal may bolster reward-focused goals and desires and reduce the negative impact of low BAS. For example, thinking of an exam as an opportunity to challenge oneself rather than an opportunity to fail increases interest and excitement and decreases the potential for feelings of failure or despair (Gross 1998). In addition, increased negative appraisal biases, or focusing on negative characteristics of the self and situation, are thought to exacerbate or create risk for depressed mood (Alloy et al. 2006; Cicchetti and Toth 1998; Elliott et al. 2002); positively-oriented cognitive reappraisal might counteract these cognitive characteristics of depression. Therefore, those who show relatively low BAS but frequently use reappraisal as a regulatory strategy may show reduced problems with depressed mood compared to low-BAS individuals who use reappraisal rarely.

In contrast, BIS is thought to be a specific diathesis for problems with anxiety because both involve a greater likelihood of experiencing threat-related emotions such as fear and involve increased motivation to avoid threatening or novel situations (Campbell-Sills et al. 2004; Carver and Scheier 1998; Gray and McNaughton 2000; Matthews and Mackintosh 1998). Aspects of BIS such as behavioral avoidance, however, often succeed in preventing or reducing anxious arousal (and thus are negatively reinforced) because the anxious person disengages from the threatening situation. Therefore, high trait anxious individuals who show high BIS may have less need to use expressive suppression (inhibiting ongoing emotion-expressive behavior): for example, if an anxious person avoids giving public speeches because they are anxiety-provoking, he or she will have less need for expressive suppression compared to the person who goes ahead and gives the speech, feels nervous, and attempts to suppress that emotion in order to appear calm (Gray and McNaughton 2000; Gross 2001). On the other hand, suppression is generally not effective in reducing subjective arousal and actually increases sympathetic activation linked to anxiety, such as greater cardiovascular and electrodermal responding (Gross and Levenson 1997; Hagemann et al. 2006). Therefore, expressive suppression

could potentiate problems with anxiety (Gross and John 2002, 2003; Kashdan and Steger 2006; Levitt et al. 2004), particularly among those not already showing the anxiety-avoidance cycle (low BIS).

The associations between affective style and emotion regulation strategies raise the question of their independence (Davidson 1998a). Affective style is often treated as an overarching concept encompassing both emotional mood and regulatory behavior (Davidson 1998b). Moreover, it is difficult to distinguish where emotion leaves off and emotion regulation begins because regulatory processes are intrinsic to emotion and partially share behavioral and neurological underpinnings (Cole et al. 2004; Cole et al. 1994; Davidson 2004; Gross 2002). Although these issues are far from resolved, several distinctions are often made in the literature: emotion regulation refers to steps taken to change (enhance or suppress) the intensity, timing, and duration of emotional experiences and expressions (Cole et al. 2004; Thompson 1994); affective style reflects initial speed and intensity of emotional and behavioral responsiveness; and mood is a long term style of emotional responsiveness. Affective style may increase the likelihood of certain aspects of mood and of behaviors that serve a regulatory function, but the link between dispositional affective tendencies and actual mood and regulatory behavior is not one-to-one (Davidson et al. 2002).

In summary, the associations between emotion regulation and specific mood problems may depend in part on whether long-term use of strategies such as reappraisal and suppression ameliorates or bolsters affective processes associated with BAS and BIS. Despite suggestive evidence, only a few studies document such patterns (Kashdan and Steger 2006; Kring and Werner 2004; Levitt et al. 2004). To build on this research and explore normative emotional processes, the present study examined this question in relation to depressed mood and trait anxiety in a group of non-disordered adults. Depressed mood was compared to trait anxiety because both are considered to reflect relatively consistent mood experiences rather than temporary emotional states. It was predicted that (a) increased use of cognitive reappraisal will be associated with reduced depressed mood in those showing high affective vulnerability (low BAS); and (b) increased use of expressive suppression will be associated with increased trait anxiety, particularly in those showing low affective vulnerability (low BIS).

Method

Participants

Participants were 67 adults between the ages of 24 and 45 (42 females; M age = 21.64, SD = 5.63) recruited through

the psychology participant research pool at an urban college in New York City. Participants did not have a history of psychopathology or neurological impairments according to their self report on a demographic questionnaire, which asked them in an open-ended format to report on such history. Self-reported race/ethnicity was: 27 Caucasian, 7 African American, 15 Hispanic, 15 Asian, 3 “Other”.

Procedures and measures

Participants spent approximately 2 hours in the laboratory. They completed a series of questionnaires immediately after consent procedures. The following were used in the present report:

Participants completed the 10-item *Emotion Regulation Questionnaire* (ERQ; Gross and John 2003), which requires respondents to indicate the degree to which they use cognitive reappraisal (6 items, α = .68) and expressive suppression (4 items, α = .79) emotion regulation strategies. Reappraisal items include “I control my emotions by changing the way I think about the situation I am in” and suppression items include “I control my emotions by not expressing them.” Questions are rated on a 1 to 7 scale, with 1 being strongly disagree and 7 being strongly agree.

The 24-item *BIS/BAS Questionnaire* (Carver and White 1994) yields a BIS score and three BAS subscales, BAS-drive (“I go out of my way to get things I want”), BAS-fun seeking (“I’m always willing to try something new if I think it will be fun”), and BAS-reward responsiveness (“When I get something I want, I feel excited and energized”). BIS questions included “Criticism or scolding hurts me quite a bit.” Questions are rated on a 1 to 4 scale, with 1 being very true for me and 4 being very false for me; because most items are reverse scored, high scores indicate greater BIS or BAS. The BIS scale (α = .62) and a single BAS scale calculated as the average of the three BAS subscales (α = .78) were used in analyses reported below.

The *State Trait Anxiety Inventory* (STAI; Spielberger 1983) and the *Beck Depression Inventory* (BDI; Beck et al. 1961) were administered in order to assess trait anxiety and depressed mood, respectively. Internal consistency for the trait anxiety scale was α = .87 and for the depressed mood scale was α = .90. Average scores and ranges for the sample (see Table 1) were consistent with those reported for a normative sample of adults and college students (Beck et al. 1961; Spielberger 1983).

Results

Descriptive statistics

Table 1 presents means, standard deviations, 50%tiles, and ranges for all variables of interest: BIS, BAS, reappraisal,

Table 1 Descriptive statistics for affective style, emotion regulation, and trait mood scores

Variables	<i>M</i>	<i>SD</i>	50th percentile	Range
BIS	3.08	0.46	3.00	2.14–4.00
BAS	3.18	0.36	3.12	2.27–3.85
Cognitive reappraisal	4.91	0.77	4.83	3.33–6.83
Expressive suppression	3.30	1.26	3.25	1.00–6.25
Trait anxiety	42.09	10.69	41.00	22–71
Depressed mood	8.89	7.45	7.00	0–32

suppression, trait anxiety, and depressed mood. No gender differences in study variables emerged, although the relatively low proportion of men may not have allowed adequate testing. Table 2 shows zero-order correlations among these variables. Several notable patterns emerged. BIS and BAS were positively correlated with reappraisal, whereas BIS was negatively correlated with expressive suppression and positively with trait anxiety. Reappraisal was negatively correlated with trait anxiety. Emotion regulation strategies were not significantly correlated with each other, whereas trait anxiety and depressed mood were highly positively correlated. These patterns of correlations show that BAS and BIS were not redundant with emotion regulation strategies, and that emotion regulation strategies alone showed only one significant correlation with mood symptoms. As expected, trait anxiety and depressed mood were strongly positively correlated (Kennedy et al. 2001) and thus in analyses reported below, the effects of depressed mood on trait anxiety were controlled for before examining links with emotion regulation, and vice versa.

Predicting trait anxiety and depressed mood

Using hierarchical multiple regressions with either trait anxiety or depressed mood as the dependent variable (DV), it was tested whether (a) increased use of cognitive reappraisal will be associated with reduced depressed mood in those showing low BAS; and (b) increased use of expressive suppression will be associated with increased trait

Table 2 Zero-order correlations among variables

Variable	1	2	3	4	5	6
1. BIS	–	–.07	.26*	–.26*	.52***	.02
2. BAS		–	.34**	.01	.01	–.09
3. Reappraisal			–	.20	–.31*	.05
4. Suppression				–	.21	.18
5. Trait anxiety					–	.55***
6. Depressed mood						–

p* < .05. *p* < .01. ****p* < .001

anxiety in those showing low BIS. Given highly significant positive correlations between trait anxiety and depressed mood, each was entered in the first step as a covariate for the other; BIS or BAS scores were entered in the second step (because they reflect dispositional tendencies); emotion regulation scores were entered in the third step (reappraisal or suppression); and interaction terms were entered in the fourth step. If the interaction term’s contribution to *R*² was significant (*p* < .05), the interactions were plotted using simple regression equations (Aiken and West 1991). These recast the significant interactions as the regression of one criterion on one predictor. The criterion on the y-axis was plotted against two levels of the predictors (suppression or reappraisal), 1 SD below the mean (low) and 1 SD above the mean (high). Plotted regression lines represent low or high levels of the moderator variables (BIS or BAS), also based on 1 SD below or above the mean. For all steps of the analyses, predictor variables were centered to reduce problems of lack of invariance of regression coefficients and multicollinearity. Table 3 presents regression coefficients for each step when all variables were entered and includes only significant regression equations.

Trait anxiety

Both depressed mood and BIS accounted for significant variance in trait anxiety: greater depressed mood and BIS were linked to greater trait anxiety. Above and beyond these effects, the interaction between suppression and BIS just missed significance (*p* < .06): as predicted, greater suppression was associated with greater trait anxiety among those showing low BIS. The high BIS group showed stably high levels of trait anxiety regardless of suppression (Fig. 1).

Depressed mood

In addition to the variance accounted for by trait anxiety, there was a significant effect of reappraisal on depressed mood due to its interaction with BAS. As predicted, greater reappraisal was associated with reduced depressed mood among those reporting low BAS. The high BAS group showed stably low levels of depressed mood regardless of reappraisal (Fig. 2).

Discussion

The future of emotion regulation as a useful scientific construct is actively under debate (Cole et al. 2004).

Table 3 Regression analyses: predicting trait anxiety and depressed mood

Steps and predictors	F	B	β	R ²	ΔF
<i>DV: trait anxiety</i>					
Step 1. Depressed mood	5.37***	0.70	0.49	0.49	61.34***
Step 2. BIS	4.47***	8.90	0.38	0.60	17.59***
Step 3. Suppress	1.75	1.27	0.15	0.61	1.60
Step 4. BIS \times suppress	-1.93 [†]	-3.14	-0.16	0.63	3.72 [†]
<i>DV: depressed mood</i>					
Step 1. Depressed mood	7.17***	1.00	0.70	0.49	61.34***
Step 2. BAS	<1	-0.47	-0.02	0.49	<1
Step 3. Reappraisal	-1.21	-1.73	-0.12	0.51	2.60
Step 4. BAS. \times reappraisal	<1	-2.62	-0.08	0.52	<1
<i>DV: depressed mood</i>					
Step 1. Trait anxiety	5.37***	0.45	0.65	0.49	61.34***
Step 2. BIS	<1	0.37	0.02	0.49	<1
Step 3. Suppress	1.40	0.82	0.14	0.50	2.37
Step 4. BIS \times suppress	<1	0.26	0.02	0.51	<1
Step 1. Trait anxiety	7.17***	0.45	0.65	0.49	61.34***
Step 2. BAS	<1	-1.72	-0.08	0.49	<1
Step 3. Reappraisal	<1	-0.38	-0.04	0.49	<1
Step 4. BAS \times reappraisal	2.89**	6.36	0.27	0.55	8.24**

[†] $p < .06$. * $p < .05$. ** $p < .01$. *** $p < .001$

Coefficients are those generated when all steps are entered

Current models of emotion regulation do not yet provide clear predictions about associations between distinct emotion regulation strategies and specific psychological strengths and vulnerabilities. The focus of the present study was on examining this question in a non-clinical sample. Results are consistent with previous characterizations of reappraisal as relatively adaptive and expressive suppression as relatively maladaptive (Gross 1998), but further suggest that cognitive reappraisal might be a key factor in reducing risk for depressed mood and that expressive suppression might potentiate anxious mood, particularly in those showing relatively low affective risk (BIS) for

anxiety. Although these data are limited by being correlational and cross-sectional, they provide potentially important insights into normal emotional processes and could eventually inform etiological models of mood and anxiety disorders and the development of prevention and intervention efforts (Fox et al. 2005; Izard 2002; Izard and Ackerman 2000; Kring and Werner 2004).

Correlations suggested distinct associations between emotion regulation strategies and BIS versus BAS. As BIS increased, suppression was reported as being used less often. Although BIS was positively correlated with trait anxiety, BIS might lead to reductions in the number of

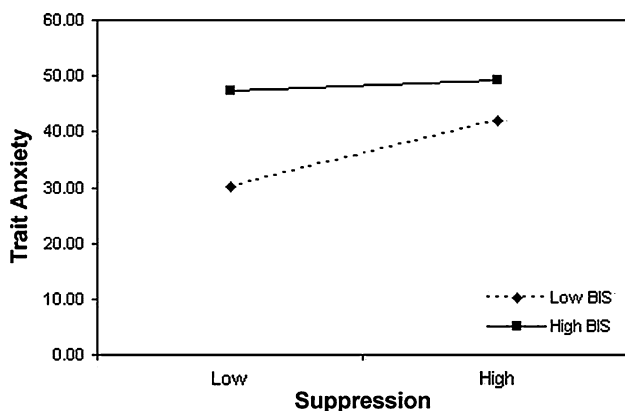


Fig. 1 The association between suppression and trait anxiety was moderated by BIS

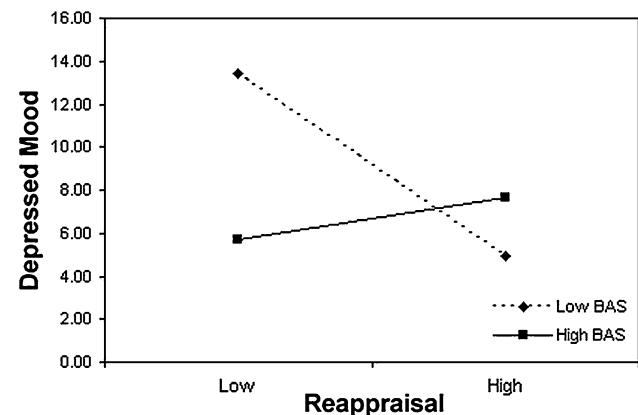


Fig. 2 The association between reappraisal and depressed mood was moderated by BAS

anxious experiences through avoidance of threatening situations (Gray and McNaughton 2000; Matthews and Mackintosh 1998); such reduced anxiety and worry would in turn reduce the need for expressive suppression (Mennin et al. 2004). On the other hand, increased affective sensitivities of any sort (BIS and BAS) were correlated with greater use of reappraisal, which in turn was negatively correlated with trait anxiety. Although correlational, this implies that enhanced overall emotional reactivity is associated with increased recruitment of cognitive control mechanisms that may support antecedent-focused emotion regulation like cognitive reappraisal (Gray et al. 2002; Gray et al. 2005; Jackson et al. 2003).

Once emotion regulation was examined in the context of individual differences in affective style, however, different patterns emerged. Reappraisal was associated with reduced depressed mood, but only among those showing low BAS, whereas the high BAS group showed stably lower levels of depressive symptoms. Consistent with previous research, this finding suggests that reduced BAS may create risk for depression (Davidson 1998a, 1998b; Shankman and Klein 2003), but further implies that the link between BAS and depressed mood may in part depend on the use of cognitive strategies such as reappraisal. This interpretation is supported by the present finding that neither BAS nor reappraisal alone was related to depressed mood. These effects must be interpreted with caution, however, since there may not have been adequate variability in depressed mood in this non-clinical sample to detect effects. A direction for future research is to test whether similar patterns emerge in clinically depressed participants, or whether bolstering reappraisal serves a protective function in those at risk for but not yet evidencing depression. In addition, future research should combine self-report and observation of emotion regulation strategies to tease apart whether affective individual differences promote the use of some strategies above others, and to take into account affective properties of emotional contexts.

In contrast to reappraisal, increased use of suppression was associated with greater trait anxiety in the low BIS group. The high BIS group showed consistently higher trait anxiety regardless of suppression. Therefore, when affective risk was low (low BIS), the use of expressive suppression appeared to represent a unique and specific vulnerability for trait anxiety. This may explain in part why some in the low BIS group still reported elevated trait anxiety. Given the negative correlation between BIS and expressive suppression, it may be that high-BIS individuals experience relatively higher trait anxiety but use suppression less often because they have effectively learned to avoid situations that increase anxious arousal (Derryberry and Reed 2002; Gray and McNaughton 2000; Matthews and Mackintosh 1998). These findings highlight the

interplay between BIS and emotion regulation and suggests targets for intervention, such as helping individuals detect signs of suppression and use alternative strategies (Gross 2001).

Because the present study included a non-clinical sample, findings may not map onto processes associated with clinical anxiety and depression and may not be valid indicators of risk. In addition, depression and anxiety (as trait-like phenomena) could contribute causally to the use of emotion regulation strategies. Thus, the direction of effects in the present study is not clear. Another limitation of this study is reliance on self-report measures. The ERQ (Gross and John 2003), for example, reflects general strategies used to regulate a range of emotions, not those used to specifically regulate anxious and depressed mood, the focus of the present study. Future research could benefit from an expansion of measurement techniques to include methodologies capturing more long-term dynamics of specific emotional responses such emotion experience sampling (Kashdan and Steger 2006) or that involve biological challenges with emotional consequences like carbon dioxide challenges (Feldner et al. 2006). In addition, it is important to consider other endophenotypes for emotion regulation, such as cognitive control capacities like conflict monitoring and response inhibition that may bolster emotion regulation by increasing behavioral flexibility and by guiding goal-directed actions (Davidson et al. 2000; Desimone and Duncan 1995; Drevets and Raichle 1998; Hariri et al. 2000; Miller and Cohen 2001). Finally, future research should examine potential gender differences since mood and anxiety disorders are more common in women than men (Kennedy et al., 2001).

Although the effects of depressed mood on trait anxiety were controlled for before examining links with emotion regulation, and vice versa, the present study does not address the well-documented comorbidity between depressed and anxious mood (Bakish 1999; Bruder et al. 1999) and the difficulty in using self-report measures which likely capture variability in both aspects of mood (Kennedy et al. 2001). For example, the mood questionnaires used in the present study (STAI and BDI) were highly inter-correlated and likely tap a blend of sad and anxious emotions, thus reducing the specificity of these self-report measures. Future research should examine co-morbid mood symptoms in relation to emotion regulation and affective style. For example, comorbid anxiety and depression may be characterized by tendencies for low BAS and high BIS (Kasch et al. 2002), whereas high levels of each may predispose individuals towards approach/avoidance conflicts and disorders such as generalized anxiety disorder in which worry and negative anticipation predominate (Derryberry and Rothbart 1997; Mennin et al. 2004).

The present study, by taking individual differences in affective style into account, documented specific associations between emotion regulation and depressed mood versus trait anxiety. Prevention and intervention implications of the present study require additional research, but suggest that reappraisal may be particularly important for reducing vulnerability for depressed mood and expressive suppression may be associated with vulnerability for anxious mood. These preliminary findings could contribute to our understanding of emotion regulation in relation to negative mood and perhaps even psychopathology, and set the stage for interdisciplinary research that uses both behavioral and neuroscientific tools. Such an approach has the potential to generate testable developmental and clinical hypotheses concerning the etiology, prevention, and treatment of multiple psychological disorders.

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