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Major Depressive Disorder and Impulsive Reactivity to Emotion: Toward a Dual Process View of Depression

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Abstract

Objective—Dual process theories of behavior have been used to suggest that vulnerability to depression involves elevated reactivity to emotions. This study tests that idea, examining self-reported reactivity.

Design—Comparison between persons with at least one lifetime episode of major depressive disorder (lifetime MDD) and those without this diagnosis, controlling for symptoms of alcohol use (a potential externalizing confound) and current symptoms of depression (a potential state-dependent confound).

Methods—Undergraduates (N = 120) completed a clinical interview to diagnose lifetime MDD and a series of self-reports bearing on diverse aspects of self-control, including reactivity to emotion. Thirty-four were diagnosed with lifetime MDD; 86 did not meet criteria for MDD. The groups were then compared on three factors underlying the scales assessing self-control.

Results—The MDD group had higher scores than controls on the two factors that reflect impulsive reactivity to diverse emotions, including emotions that are positive in valence. These effects were not explained by associations with either externalizing symptoms or current depressive symptoms.

Conclusions—Reflexive reactivity to emotions characterizes depression, in addition to some externalizing problems, and it may deserve study as a potential transdiagnostic feature.

Keywords

depression; emotional reactivity; emotional control; dual process models; urgency

Dual-process views of behavior (of which there are several variants) have attracted a good deal of interest over the past decade and a half (e.g., Barrett, Tugade, & Engle, 2004; Chaiken & Trope, 1999; Epstein, 1994; Evans, 2008, 2010; MacDonald, 2008; Rothbart, Ellis, Rueda, & Posner, 2003; Strack & Deutsch, 2004). Such views posit an evolutionarily old neurobiological system that is associative, highly reactive to emotions, and impulsive; it is often termed a reflexive system (Strack & Deutsch, 2004), though several other labels are also used (see Evans, 2010). These views also posit an evolutionarily more recent system that is linear, deliberative, and planful; it is often termed a reflective or deliberative system, though again other labels are also used. The reflective system is slower to develop than the reflexive system (e.g., Galvan et al., 2006; Steinberg, 2007).

The two systems are posited to function in parallel, once both are fully developed. The two appear to use different aspects of available information (Rudman, Phelan, & Heppen, 2007). There is also evidence that the two systems learn in different ways, and that the two patterns of learning create parallel and potentially competing paths to action, which require continuous arbitration (Daw, Niv, & Dayan, 2005). In many cases the systems specify the same behavior; in these cases, control cannot be unambiguously attributed to either system. In some circumstances, however, the systems conflict with one another, because one specifies one action and the other specifies a different action. An example is the delay of gratification situation, in which the reflexive system wants to take a tempting treat immediately, whereas the reflective system prefers to maximize outcomes by waiting.

When there is conflict, which system dominates (and thus which behavior results) depends on a number of factors. Some of these are situational (e.g., the deliberative system is rendered less effective by sleep deprivation, alcohol, and mental load, among other things). Some of them are dispositional (e.g., individual differences in working memory capacity and individual differences in traits such as conscientiousness and self-control).

As noted earlier, the reflexive mode of functioning is generally characterized as being highly reactive to emotions (for overview, Carver, Johnson, & Joormann, 2008). This property is viewed as being an “operating characteristic” of this system, however. Just how this property is manifested in behavior when the reflexive mode dominates depends on what emotion is being reacted to and thus what action impulse is thereby being evoked.

That is, the topography of behavioral reactions to emotions diverges sharply by emotion. An impulsive reaction to anger may be overt violence. An impulsive reaction to desire may be energetic pursuit. Thus, a relative dominance of the reflexive mode over the deliberative mode can underlie diverse phenomena, including impulsive violence and high sensation seeking (Carver & Miller, 2006). The idea that high reactivity to emotions underlies impulsive violence, sensation seeking, and externalizing problems such as substance abuse is both intuitive and supported by a great deal of data (Cyders, Flory, Rainer, & Smith, 2009; Dick et al., 2010; Whiteside & Lynam, 2003).

Many Manifestations of Reflexive Responding

Less intuitive is the idea that this reactivity to emotions may also underlie internalizing disorders such as depression. This argument has also been proposed, however, based on the dual-process view outlined above (Carver et al., 2008; see also Disner, Beevers, Haigh, & Beck, 2011).¹ The argument is that a relative dominance of the reflexive system (by disposition, in this case) promotes over-reactivity to emotions, just as occurs in the cases of reactive violence and high sensation seeking. However, people who are prone to depression differ in other ways from people who are prone to reactive violence and sensation seeking. Perhaps the most obvious is the frequency with which they experience specific emotions (Carver et al., 2008).

Among persons vulnerable to depression (but not those prone to sensation seeking), sadness and despondency are common. These emotions differ from other emotions in an important way. They are deactivating; they call for passivity, for giving up of effort (Frijda, 1986). A general over-responsiveness to emotions, if applied to sadness, would further promote behaviors that sadness ordinarily triggers. The behavior that sadness triggers is *in* action. Thus, many aspects of depressed behavior reflect passivity and apparent difficulty in

¹There are other ways to apply dual-process thinking to depression, which rely less explicitly on the idea under examination here (for broader discussion of those points see, e.g., Beevers, 2005; Disner et al., 2011; Haefffel et al., 2007).

initiating action. Paradoxically, then, the same functional property (behavioral reactivity to emotion) that can help release bursts of violence or acting out may also help create essentially the opposite profile of behavior in response to a different emotion.

Present Study

The study reported here was prompted by the idea that depression vulnerability follows in part from impulsive reactivity to emotion, reflecting relative dominance of the reflexive system. The study does not directly address depression vulnerability *per se* (i.e., prospectively). Rather, it compared a sample of persons whom clinical interview determined had had at least one major depressive episode during their lifetime (lifetime MDD) with a group of persons who had not had such an episode.

Several self-report scales were also administered to the sample, some of which were chosen specifically to pertain to reflexive reactivity to emotions. Some focus on reactivity to negative emotions. Associations of these measures with lifetime MDD would be consistent with the widely held view that depression vulnerability is related to an enhanced experience of negativity (Bylsma, Taylor-Clift, & Rottenberg, 2011; Kendler, Neale et al., 1993). However, the measures used here focus not on the frequency of occurrence of negative emotions but on the tendency to respond relatively reflexively and automatically to them, either cognitively (e.g., drawing further conclusions) or behaviorally.

It is important to be clear, though, that the dual-process view underlying the study suggests that what is involved here is not just a propensity toward negativity. In holding that the reflexive system is highly reactive to emotions, the dual-process viewpoint does not distinguish among emotions. The reflexive system is simply held to be highly reactive to emotions. In applying this idea to depression vulnerability, the implication would seem to be that people who are vulnerable to depression should have a general reactivity to emotion of diverse sorts, not just negative emotions. To test this reasoning, the measures used here included one scale that addresses impulsive behavioral reactions to emotions “in general,” and another scale that assesses impulsive reactions to *positive* emotions in particular.

Our focus, then, is on aspects of impulsivity that imply a reflexive response to emotions. We also included measures to test the specificity of this reasoning. As a contrast, measures were included that pertain to better versus worse self-control without involvement of emotions. We had no hypothesis with respect to this aspect of self-control. A measure of comorbid alcohol problems was also included, to test whether any associations of lifetime MDD with reactivity to emotions would actually be attributable to this commonly comorbid externalizing syndrome.

Method

All procedures were approved by the University of xxxxxxxx IRB. The flow of data collection was as follows: Some self-report measures (including some not relevant to this article) were collected from a large number of potential participants in introductory psychology classes at the start of the semester. A general description of the project was then posted on a departmental website. Interested persons signed up for group sessions (approximately 20 per session), in which 303 completed informed consent documents and additional self-reports. At the end of the sessions, individual appointments (for a week later) were made for a subset of those who completed these sessions. The appointments were for diagnostic interviews (we were able to interview only less than half of those who completed the earlier sessions, due to limitations on resources). An effort was made to oversample for

the interviews persons whose self-reports in the earlier session (on the BDI) suggested possible depression vulnerability.

Those who completed the diagnostic interview and who had also completed all relevant self-report scales constitute the sample reported on here. This sample comprised 120 University of xxxxxxxx undergraduates (87 female).² Mean age of the sample analyzed here was 18.63 years ($SD = 1.98$); the sample self-identified as follows: 72 Caucasian (60%), 24 Hispanic (20%), 10 Asian (8.3%), 5 African American (4.2%), 3 Caribbean (2.5%), and 6 “other” (5%).

Depression, Depressive Symptoms, and Externalizing

Structured Clinical Interview for DSM-IV (SCID)—The SCID (First, Spitzer, Gibbon, & Williams, 1997) module for MDD was administered in the interview sessions to determine whether participants met criteria for lifetime diagnosis of MDD (American Psychiatric Association, 2000). SCIDs were conducted by clinical psychology graduate students extensively trained in diagnostic interviewing. The SCID has good retest reliability among trained interviewers (Williams et al., 1992). Interviews were audiotaped, and a random sample reviewed for reliability. Inter-rater reliability, using intra-class correlation to assess absolute agreement on dichotomous variables, was high for lifetime diagnosis of MDD, $r_i = .87$. MDD cases were persons who met criteria for a major depressive episode at some point in their lifetime ($n = 34$). Controls were defined as those who had never met those criteria ($n = 86$).

Beck Depression Inventory (BDI)—The BDI, a 21-item self-report scale, is a standard measure of depression symptom severity (see Beck, Steer, Ball, & Ranieri, 1996). Each item addresses a symptom, and respondents choose one option describing its severity. Items are scored on a scale of 0 to 3, and summed to yield a total score. Scores of 10 and over are interpreted as indicating mild to moderate depression; scores of 19 and over are interpreted as indicating moderate to severe depression. The BDI has good reliability and validity (Ambrosini, Metz, Bianchi, Rabinovich, & Undie, 1991); alpha in this sample was .88, $M = 7.48$, $SD = 6.47$.

The Alcohol Use Disorder Identification Test (AUDIT)—It was desirable to reduce the likelihood that any effects obtained would be attributable to externalizing problems, which are known to relate to emotional reactivity. Although we were unable to administer SCID modules for other categories of disorder, we were able to include a self-report measure of symptoms of one externalizing problem: alcohol use. Alcohol problems are some of the most frequently observed problems in undergraduate populations, and are often comorbid with depression. The AUDIT (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) is a 10-item self-report designed to screen for excessive alcohol consumption and for drinking problems (e.g., “Have you or someone else been injured as a result of your drinking?”). The AUDIT is widely used and is correlated with diagnoses of alcohol abuse and dependence (Allen, Reinert, & Volk, 2001). Internal consistency in this study was high ($\alpha = .84$). The AUDIT was used in the analyses reported here to control for the possibility that externalizing problems (in the form of alcohol use), which might be comorbid with depression, could represent an alternative account of any relationship found between lifetime MDD and the measures of reflexive reactivity to emotions.

²The sample analyzed here is the sample in which Carver et al. (2011b) examined associations of two genetic polymorphisms with lifetime MDD, plus 2 additional persons who completed the self-reports and clinical interview but lacked the genetic data, minus 15 persons who were missing data on one or more self-report scale. None of the analyses reported here were part of any earlier report, however.

Reactivity Versus Control

Several measures bearing on various aspects of self-control were administered. Some of these concern reflexive reactivity to feelings, others concern other aspects of self-control. Some measures were preexisting, others were developed for the project from which these analyses were drawn. Given response burden (sessions included many other measures), some scales were slightly abbreviated by selecting highest-loading items from the originals. The scales were reduced to three latent dimensions by factor analysis (see below).

Negative Generalization—Negative Generalization is a 4-item subscale from a measure of potentially depressogenic cognitive tendencies called Attitudes Toward Self (Carver et al., 1988). Items reflect generalizing from a single negative event to the broader sense of self-worth. This scale was created without reference to the dual process viewpoint. However, the fact that its items refer to jumping to a general conclusion from a single negative experience suggests that it does reflect, at least in part, a reactive response to the negative emotion associated with the experience in question. Items were rated from 1 (“I agree a lot”) to 5 (“I disagree a lot”), and responses were averaged (these response options were used for all measures of impulsiveness except for one that is noted below). Mean, SD, sample items, and alpha for this and other measures of reactivity versus control are in Table 1.

Urgency and Lack of Perseverance—The UPPS Impulsive Behavior scale (Whiteside & Lynam, 2001) assesses impulsive tendencies as conceptualized within the 5-factor personality model. Its four subscales reflect distinct processes that might lead people to act without regard for potential adverse consequences. Two subscales from the UPPS were administered here. Urgency is the tendency to experience strong impulses. About half the items of this scale indicate that the impulses follow from negative affect, the rest do not. This scale thus appears to pertain to reactivity to emotion (see Table 1 for items), although it may not do so exclusively. In contrast, Lack of Perseverance assesses an inability to stay focused on difficult or tedious tasks. It clearly pertains to effective self-control, but it does not incorporate any sense of reactivity to emotion. We used 12 items from the Urgency scale and 10 items from Lack of Perseverance.

Positive Urgency—The Positive Urgency Measure (Cyders et al., 2007) assesses the tendency to act recklessly or inappropriately when experiencing positive emotions (Cyders & Smith, 2008). This measure is organized around the theme of reacting strongly to emotions, but it is specific to emotions of a positive valence. This measure has been shown to predict a variety of specific risky behaviors such as vandalism (Cyders et al., 2007) and high alcohol consumption per sitting (Cyders et al., 2009). Positive Urgency is moderately related to Urgency from the UPPS ($r = .37$), but it has been shown in two studies to predict outcomes through different pathways than UPPS Urgency (Cyders et al., 2007). We used 7 items from this scale.

Self-Control—The Self-Control scale (Tangney et al., 2004) is a measure of general self-control tendencies (we used the 13-item Brief version). Self-control measured by this instrument predicts higher grade point average, better adjustment, less alcohol abuse, and better interpersonal skills (Tangney et al., 2004). Items tend to focus on persistence in completing activities. To orient all impulse-related scales in the same direction, scores on this measure were computed as *lack* of self-control. The items of this scale do not particularly reflect any sense of heightened responsiveness to emotions.

Laziness—The Behavioral Indicators of Conscientiousness (Jackson, Wood, Bogg, Walton, Harms, & Roberts, 2010) is an inventory of behaviors related to conscientiousness.

It asks how often respondents engage in specific behaviors, 1 (“never”) to 5 (“very often”). We administered the Laziness scale, which reflects low conscientiousness (low self-control). The items of this scale reflect primarily a lack of carry-through. Again, there is no particular implication of reactivity to emotion.

Project-specific scales—A number of items that were intended to target very specific reflections of reactivity versus control were written for the larger project from which this study is drawn (Carver, Johnson, Joormann, Kim, & Nam, 2011). The formation of coherent scales was verified by factor analysis. Sadness Paralysis (2 items) is the tendency to react reflexively to sad feelings with inaction (Table 1). The items thus express the behavioral response that is most directly specified by sadness. Inability to Overcome Lethargy (7 items) is a more general inability to get moving despite having things to do (again, reflexive inaction, but in this case in response to feelings of fatigue). Emotions Color Worldview (3 items) reflects the experience of having an emotional state lead reflexively to biased perceptions of the world. Reflexive Reaction to Feelings (7 items) assesses tendencies to act reflexively and quickly when experiencing emotions. Distractibility (9 items) is the tendency for attention to be drawn off-task readily. Distractibility is the only project-specific scale that does not have any implication of reactivity to emotion.

Data Reduction

The measures of impulsive reactivity described above had been factor analyzed in a sample of 303 (reported in Carver et al., 2011a), of which the present 120 are a subset. In those analyses each scale score was treated as a data point. Exploratory factor analysis with oblimin rotation was used to extract 3 factors; structural equation modeling then was used to verify that the 3-factor solution was significantly better than a 2-factor solution.

Those procedures reduced the scales to three factors. The pattern matrix from the exploratory analysis is reproduced in Table 2. Factor 1 (Pervasive Influence of Feelings) reflects a broad tendency for emotions to reflexively shape the person’s orientation to the world: having one’s worldview affected by temporary feelings, generalizing from negative events to the overall sense of self-worth, and reacting to sadness and fatigue with inaction. Factor 2 (Follow- Through) centers on the tendency to complete tasks versus letting things go. This factor has no obvious implication of reacting to emotion. The cross-loading of Lethargy on Factors 1 and 2 reflects the fact that items in the Lethargy scale reflect both a strong influence of feelings of fatigue and a resulting failure to follow through. Factor 3 (Feelings Trigger Action) centers explicitly on impulsive behavioral reactivity to emotions, including positive emotions (the Positive Urgency Measure). The cross-loading of the Urgency scale on Factors 1 and 3 reflects the fact that some Urgency items specify responses to negative affect and others more neutrally specify responses to “feelings.”

Factor scores for each participant were created from that factor analysis by the regression method, yielding standardized values across the sample for each of the factors ($M = 0.0$, $SD = 1.0$). The factor scores were positively correlated with each other (fitting the view that all reflect impulsive reactions of one sort or another) but not strongly so (consistent with their differences in content). In the sample of 303 (Carver et al., 2011a), factor 1 correlated .36 with 2 and .34 with 3; factor 2 correlated .16 with 3. The factor scores were used as the dependent measures in the analyses reported here.

Results

Each factor score was analyzed by a separate regression analysis, in which MDD diagnostic group was one predictor and AUDIT scores were a second simultaneous predictor (though the AUDIT scores tended to be higher in the MDD group, $M = 6.35$, $SD = 4.97$, than in the

comparison group, $M = 5.08$, $SD = 4.70$, this difference was not significant, $p > .2$). Means of the factor scores for each diagnostic group are shown in Table 3.³

Analysis of Pervasive Influence of Feelings yielded a significant effect of diagnostic group, $\beta = .42$, $t(117) = 5.09$, $p < .001$, with the effect of AUDIT scores not significant ($p = .16$). Analysis of Follow-Through yielded a marginal effect of diagnostic group, $\beta = .17$, $t(117) = 1.93$, $p = .056$, along with a significant effect of AUDIT scores, $\beta = .23$, $t(117) = 2.60$, $p = .01$. Finally, analysis of Feelings Trigger Action yielded a significant effect of diagnostic group, $\beta = .25$, $t(117) = 5.09$, $p = .006$, with the effect of AUDIT scores not significant ($p = .12$). To confirm that this latter effect held for even positive emotion, this analysis was repeated using the Positive Urgency Measure by itself as the outcome. This analysis also yielded a significant effect of diagnostic group, $\beta = .28$, $t(117) = 3.20$, $p = .003$, with the effect of AUDIT scores not significant ($p = .22$).

Further Analyses

Two further analyses tested whether these results might be state-dependent. First, we reanalyzed data after removing those persons whose major depressive episode as diagnosed on the SCID had occurred within the past year ($N = 7$). The results remained the same.

Second, we used concurrent BDI scores as an additional predictor. In bivariate correlations, BDI correlated .54 with Pervasive Influence of Feelings ($p < .001$), .44 with Follow-through ($p < .001$), and .20 with Feelings Trigger Action ($p < .04$). BDI also correlated .38 with diagnostic group. The regression analyses for the three factors were repeated, entering BDI scores as an additional (simultaneous) predictor. Pervasive Influence of Feelings was still associated with diagnostic category, $\beta = .22$, $t(116) = 2.61$, $p = .01$, and also with BDI scores, $\beta = .43$, $t(116) = 5.04$, $p < .001$, total $r^2 = .35$. Follow-through was associated with BDI scores, $\beta = .44$, $t(116) = 4.84$, $p < .001$, and AUDIT, $\beta = .24$, $t(116) = 2.91$, $p = .004$, but not diagnostic category, $\beta = .04$, total $r^2 = .25$. Feelings Trigger Action was still associated with diagnostic category, $\beta = .21$, $t(116) = 2.04$, $p = .04$, but not BDI scores, $\beta = .09$, $p = .35$, or AUDIT, $\beta = .14$, $p = .12$, total $r^2 = .10$. In sum, both effects of MDD diagnosis observed in the initial analyses continued to be significant after controlling for BDI scores.

Discussion

Results support the idea that lifetime MDD is related to elevated reactivity to emotions. This result is unsurprising with respect to Factor 1, because Factor 1 reflects in part reactions to negative emotions and to fatigue, along with overtones of passivity and automatic coloring of one's view of the world from (mostly negative) events. It is true that the item content of the measures loading on this factor emphasizes reactions to states or outcomes rather than the frequency of the states. Nonetheless, it might be argued that this factor reflects a general negativity or neuroticism. Thus, the meaning of an association with this factor is at least somewhat ambiguous regarding the dual-process model.

Less intuitive, but far less ambiguous in supporting the dual-process viewpoint, is the finding that the lifetime MDD group also endorsed a more general impulsive reactivity to emotions—including positive emotions—to a greater degree than did the control group. This suggests that a contribution to depression vulnerability is made by an over-responsiveness to emotions in general, rather than only by a specific responsiveness to sadness or negativity. A link between history of MDD and reactivity to positive emotion

³Preliminary analyses revealed no main effect or interaction involving gender, which is not considered further here.

would be very hard to predict from a viewpoint other than the dual-process viewpoint with which we entered the study.

It is also noteworthy that both of the associations between MDD and reactivity to emotions held when controlling for a measure of externalizing symptoms (alcohol use) as well as a measure of current symptoms of depression. Thus, the links between MDD and reactivity to emotion do not appear to be dependent on comorbidity with alcohol use, nor do they appear to be a state-dependent feature of depression.

With respect to another aspect of self-control in which no role was indicated for emotions, the findings were quite different. Current symptoms of depression and AUDIT scores both related uniquely to Lack of Follow-through. After controlling for those measures, however, the diagnosis of MDD did not relate to Lack of Follow-through. The item content of that factor is weighted toward giving up easily when engaged in goal-directed behavior. The pattern of results suggests that this form of impulsivity is not related to predispositions to depression, but rather is state-dependent. This in turn suggests that the self-control deficit associated with lifetime episodes of depression may be specific to control over emotion.

Limitations

We should note several limitations of this study. First, although participants were diagnosed by SCID, this was a convenience sample. Potential differences between it and a community sample limit generalizability. Second, participants were relatively young; it is likely that some who did not meet criteria for MDD will develop depressive episodes later on. Third, the reactivity measures examined here were all self-reports. It will be important to examine behavioral responsiveness to emotion in future work. Fourth, there remain questions about whether this profile of associations would generalize across various subtypes of clinical depression. Further, we can not be sure that differences between MDD cases and controls represent vulnerabilities predating the first episode versus scars from an episode. Still, given the abundant evidence that adolescent onset of MDD yields a high risk for subsequent episodes (Boland & Keller, 2002; Pine, Cohen, Brook, Gurley, & Ma, 1998; Pine, Cohen, Cohen, & Brook, 1999; Solomon et al., 2000), the findings remain quite relevant to future vulnerability. Despite this, many individuals with only a single major depressive episode do not experience another episode; it will be important to examine other parameters of vulnerability, such as recurrence.

Finally, the study addressed only the reflexive side of the dual-process account. Measures were not included to separately assess the sensitivity of the deliberative system. By implication, the measures used here reflect a balance between the two systems (high reflexiveness implying a correspondingly lower deliberativeness), but it would have been better to have had separate measures of each.

Links to Other Findings

The association between MDD and reactivity to emotion found here has some parallels in the existing literature. There is a variety of indirect evidence suggesting a link between depression and reflexive responses to emotion (reviewed by Carver et al., 2008). More recent findings from experience sampling studies make a similar case. As one might expect, people with MDD report greater negative emotion in response to stressors than controls, but there is also evidence that people with MDD report greater mood brightening after experiencing positive events than controls (Bylsma et al., 2011). This pattern is not quite the same as that identified in the study reported here, but it seems related to it.

Several recent studies have also linked aspects of impulsiveness to current levels of depressive symptoms (Clarke, 2012; d'Acremont, & Van der Linden, 2007; Karyadi &

King, 2011). Two of these studies (d'Acremont, & Van der Linden, 2007; Karyadi & King, 2011) found associations for the measure of urgency used here; one of them (Karyadi & King, 2011) found an association for the measure of positive urgency used here. Again, the studies differ (those studies looked only at current symptoms), but the patterns obtained for symptoms are similar.

Two previous studies (Ekinci, Albayrak, & Caykoğlu, 2011; Peluso et al., 2007) have also linked measures of impulsiveness to diagnosis of MDD. In both of these, persons diagnosed with depression reported greater motor impulsivity on the Barratt Impulsiveness Scale (Barratt, 1965) than controls; in one (Ekinci et al., 2011), a similar difference emerged for attentional impulsivity. The Barratt measure is more general than those used in our study, and it is difficult to attribute the impulsiveness reported in its items to emotional versus non-emotional sources. Nonetheless, the results appear to share some common ground.

Broader Implications

Our interest in the hypothesis tested here derived from a broader interest in dual-process models, in particular the idea that relative dominance of the more basic, reflexive system promotes impulsive reactions to emotions. However, our empirical focus on depression in this study should by no means be taken to mean we think the reasoning applies exclusively to depression vulnerability. This reasoning obviously applies to impulsive violence and many other externalizing problems (Carver & Miller, 2006; Cyders et al., 2009; Dick et al., 2010; Whiteside & Lynam, 2003). We focused on depression here because of the highly counterintuitive nature of the prediction regarding an association between depression and impulsive reactions to emotions other than negative ones.

Across how broad a spectrum of disorder is reactivity to emotion a contributor? Previous findings indicate that positive urgency is related to a range of externalizing problems, including vandalism, risky sexual behavior, and gambling, and drug use (Cyders et al., 2007; Zapolski, Cyders, & Smith, 2009), but there is less evidence regarding its role in internalizing problems. The three factors examined here have also been studied in one other psychopathology-related context (Johnson, Carver, Mulé, & Joormann, in press), in which manic temperament was found to be related to Feelings Trigger Action, but not to the other factors. Thus, reports of an over-responsiveness to emotions in general appears to relate to mania vulnerability as well as to depression. The possibility is worth at least suggesting that an impulsive reactivity to emotion may be a trans-diagnostic feature (see an argument made by Johnson-Laird et al., 2006, about the role of emotional over-responsiveness in psychopathology). This possibility seems worthy of further examination.

Despite our focus here on impulsive reactivity to emotion, we want to be clear that impulsive reactivity to emotion is not in itself the only determinant of any specific problem. We would argue instead that impulsive reactivity to emotion interacts with other traits which themselves yield the frequent presence of particular emotions. In effect, the reactivity to emotions amplifies the manifestations of those emotions (Carver et al., 2008; Depue & Lenzenweger, 2005), potentially leading to problems. This mechanism would account for the fact that reactivity to emotion is associated with a diverse array of problems, which follow from different emotions and their associated action impulses.

One further link across literatures that seems useful to make is with the concept of rumination. Rumination, in the form of brooding, is known to be associated with development and maintenance of depression; in contrast, rumination involving reflective problem solving is not (Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Watkins, 2008; Watkins & Teasdale, 2004). Clearly these forms of thought differ in important ways. We would argue that the deliberative problem-solving form is a manifestation of the reflective

system, as that phrase has been used throughout this article. Brooding, on the other hand, appears to reflect the more passive and more limited focus on and reaction to negative emotion that is captured in the Feelings Color Worldview factor from the study reported here. Unfortunately, our study did not include a measure of rumination per se. Thus, this link remains speculation at this point.

In closing, putting aside these broader considerations, we believe the findings reported here have some implications for depression per se. The results indicate that a reactive response to emotions may be a common trait-like feature of persons with depression. Clinical strategies for managing emotion might then profitably have two targets. First, emotion regulation strategies might help diminish the problematic emotions themselves, thus reducing risk of over-reaction to them. Second, strategies could be implemented to bolster control over thought and behavior during states of intense emotions. These might include enhancing patients' awareness of this possible risk following from emotion states, and also helping patients plan strategies to implement during such states (Linehan, 1993; Webb, Sheeran, Totterdell, Miles, Mansell, & Baker, 2012).

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Practitioner Points

- Reflexive reactivity to emotions characterizes persons diagnosed with major depressive disorder
- Findings suggest desirability of focusing treatment partly on management of reflexive reactions to emotions
- Limitation: Measures were self-reports, rather than behavioral responses to emotions

Table 1**Representative Items and Descriptive Statistics for Measures of Reactivity**

<u>Negative Generalization, $\alpha = .78$, $M = 2.99$, $SD = .95$</u>
When even one thing goes wrong I begin to wonder if I can do well at anything at all.
A single failure can change me from feeling OK to seeing only the bad in myself.
<u>I hardly ever let unhappiness over one bad time influence my feelings about other parts of my life. [R]</u>
<u>Urgency, $\alpha = .88$, $M = 2.78$, $SD = 0.88$</u>
It is hard for me to resist acting on my feelings.
When I am upset I often act without thinking.
<u>I often make matters worse because I act without thinking when I am upset.</u>
<u>Lack of Perseverance, $\alpha = .87$, $M = 1.98$, $SD = 0.69$</u>
I am a productive person who always gets the job done. [R]
I tend to give up easily.
<u>I concentrate easily. [R]</u>
<u>Positive Urgency, $\alpha = .81$, $M = 2.29$, $SD = 0.81$</u>
When I am really excited, I tend not to think of the consequences of my actions.
When I am very happy, I feel like it is OK to give in to cravings or overindulge.
<u>I tend to act without thinking when I am really excited.</u>
<u>[Lack of] Self-Control, $\alpha = .83$, $M = 2.63$, $SD = 0.70$</u>
I am able to work effectively toward long-term goals. [R]
I wish I had more self-discipline.
<u>Sometimes I can't stop myself from doing something, even if I know it is wrong.</u>
<u>Laziness, $\alpha = .80$, $M = 2.71$, $SD = 0.58$</u>
Miss appointments or classes
Give up on a problem
Watch TV instead of taking care of responsibilities
<u>Sadness paralysis, $\alpha = .77$, $M = 2.30$, $SD = 0.96$</u>
When I feel sad, it paralyzes me.
<u>I respond to feeling sad by just stopping moving</u>
<u>Inability to Overcome Lethargy, $\alpha = .87$, $M = 2.44$, $SD = 0.89$</u>
It's hard to get myself moving, even when I know what I want to do
When I feel tired, it's very hard for me to overcome it and do things
<u>If I feel unmotivated, I just do nothing at all</u>
<u>Emotions color worldview, $\alpha = .77$, $M = 3.60$, $SD = 0.94$</u>
When I have emotional experiences, they strongly influence how I look at life
My feelings greatly affect how I see the world
I am easily overwhelmed by feelings I have
<u>Distractibility, $\alpha = .90$, $M = 3.08$, $SD = 0.95$</u>
<u>I am easily distracted by stray thoughts</u>
My mind wanders when I'm working on something that's tedious or difficult
<u>It can be hard for me to carry out my intentions because I get sidetracked by my thoughts</u>

Reflexive reaction to feelings, $\alpha = .86$, $M = 2.89$, $SD = 0.83$

When I have an emotional reaction to something, I often act without thinking

When I feel a desire, I act on it immediately

I react impulsively to my feelings

When I feel filled with enthusiasm about something, I charge into motion

Table 2

Factor Loadings of Impulsiveness-related Measures After Oblimin Rotation

	Factor 1: Pervasive Influence of Feelings	Factor 2: Follow- Through	Factor 3: Feelings Trigger Action
Negative Generalization	.85		
Sadness Paralysis	.80		
Emotions Color Worldview	.71		
Lethargy	.54	.39	
Lack of Perseverance		.88	
[Lack of] Self-Control		.79	
Laziness	.38	.61	
Distractibility		.56	
Reflexive Reaction to Feelings			.83
Positive Urgency		.30	.69
Urgency	.42		.44

Note. Loadings below .3 are omitted. From Carver, Johnson, Joormann, Kim, & Nam, 2011.

Table 3

Comparisons Between Persons with Lifetime Major Depressive Disorder (MDD) and Healthy Controls on Three Factors Pertaining to Control vs Reactivity (Controlling for Alcohol Symptoms)

Self-control factor	Diagnostic sample		p
	MDD M (SD)	Control M (SD)	
1. Pervasive Influence of Feelings	.67 (.68)	-.23 (.90)	.001
2. [Lack of] Follow-Through	.22 (1.00)	-.23 (1.01)	.06
3. Feelings Trigger Action	.49 (1.00)	-.13 (1.03)	.006

Note: Data are factor scores, expressed as z scores.