Impulsivity and risk for mania: Towards greater specificity

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**Background.** Impulsivity is elevated among people diagnosed with bipolar disorder, and recent evidence suggests that impulsivity can predict onset among those at risk for the disorder. Impulsivity, though, is a broad construct.

**Objective.** The goal of this study was to examine whether some aspects of impulsivity are more correlated with risk for mania than others. We hypothesized that risk for mania would be related specifically to difficulties controlling impulsive responses to emotions.

**Design and Methods.** Undergraduates (N = 257) completed a large battery of measures of emotion-relevant and non-emotional forms of impulsivity, along with a well-validated measure of risk for mania, the Hypomanic Personality Scale (HPS).

**Results.** Analyses examined correlations of impulsivity scales with the HPS, and partial correlations controlling for lifetime tendencies towards depressive symptoms and current symptoms of alcohol abuse, both of which relate to impulsivity and often co-occur with mania. After controlling for these measures, risk for mania remained related with measures of impulsive responses to positive emotions, but not with difficulties in following through or with impulsivity in the context of general distress emotions.

**Conclusions.** Although impulsivity is a major concern among those at risk for mania and those diagnosed with mania, difficulties may be especially evident during positive affective states, and other forms of impulsivity may be less related to mania risk. Discussion focuses on limitations and future directions.

**Practitioner Points**

- Impulsivity is correlated with risk for mania.
- Mania risk appears tied to tendencies towards impulsive action, particularly during positive affective states.
- Mania risk was not significantly correlated with other non-emotional forms of impulsivity.

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DOI:10.1111/j.2044-8341.2012.02078.x
A better understanding of what aspects of impulsivity are problematic in bipolar disorder could guide more refined interventions.

Bipolar disorder has been estimated to be the sixth leading cause of medical disability worldwide (Murray & Lopez, 1996). The disorder is related to high rates of all-cause mortality (Angst, Stassen, Clayton, & Angst, 2002), with rates of completed suicide that are 15 times those of persons in the general population (Harris & Barraclough, 1997). Although pharmacological interventions and adjunctive psychotherapies are clearly helpful (Glick, Suppes, DeBattista, Hu, & Marder, 2001; Sachs, Printz, Kahn, Carpenter, & Docherty, 2000), most people diagnosed with bipolar disorder experience relapse even with best available treatments (Archer & Webb, 2006). To refine intervention approaches, it is crucial to identify mechanisms involved in the onset, maintenance, and severity of bipolar disorder.

Impulsivity is present during manic episodes (Strakowski et al., 2010), but also during remission among those with bipolar disorder (Peluso et al., 2007; Strakowski et al., 2009; Swann, Pazzaglia, Nicholls, Dougherty, & Moeller, 2003). Impulsivity has also been found to predict the onset of bipolar disorder, suggesting that it may be a core vulnerability of the disorder (Alloy et al., 2009; Kwapił, Miller, Zinser, Chapman, Chapman, & Eckblad, 2000). In addition to diagnoses of bipolar disorder, impulsivity has been found to be correlated with measures of risk for the disorder, such as the Hypomanic Personality Scale (HPS; Alloy et al., 2009; Alloy et al., 2012; Kwapił et al., 2000).

Although impulsivity is well established as an important feature of bipolar disorder, it has been noted frequently that impulsivity is a broad construct that encompasses many different facets of cognition and behaviour, which are not necessarily strongly intercorrelated (Whiteside & Lynam, 2001). Elevations in impulsivity in bipolar disorder have been found on performance measures including the Immediate Memory Task-Delayed Memory Task, the Stop Signal Task, the Delayed Reward Task, and the Continuous Performance Task, and on self-reports including the Barratt impulsiveness scale (Najt, Perez, Sanches, Peluso, Glahn, & Soares, 2007; Strakowski et al., 2010; Swann, Anderson, Dougherty, & Moeller, 2001; Swann, Moeller, Steinberg, Schneider, Barratt, & Dougherty, 2007). Less attention, however, has been given to the possibility that some aspects of impulsivity relate to mania risk more than others. Our goal here was to consider this possibility further.

In this study, we examined how mania risk relates to several forms of impulsivity. Manic episodes often involve euphoria, and one of the defining symptoms of mania is the tendency to engage in pleasurable activities without regard to potentially dangerous consequences (American Psychiatric Association, 2000). Given that people with bipolar disorder also report trait-like tendencies towards mood lability and periods of intense happiness even during remission (Myin-Germeys, van Os, Schwartz, Stone, & Delespaul, 2001), we hypothesized that mania risk would correlate with reports of impulsive actions triggered by emotions, especially positive emotions.

In this study, we focus on a definition of impulsivity that is broader and somewhat different conceptually than other definitions. Although it is most common to think of impulsiveness in terms of the abrupt taking of action, an alternative view focuses instead on the reflexive versus deliberative nature of behaviour. If one were to adopt the idea that impulsivity at its core implies reflexivity in contrast to deliberation, then even reflexive inaction can be impulsive. That is, reflexively reacting to sadness by not moving (for
example) can be viewed as an impulsive response because of its reflexiveness. We are also interested in the reflexive influence of emotions on cognitions (Carver, Johnson, & Joormann, 2009). For that reason, the project also incorporated measures of cognitive reactions that sometimes occur reflexively in response to emotions and thus could be seen as impulsive.

In a previous study from this project, factor analysis was used to distil a set of self-report measures bearing on diverse aspects of impulsivity into three factors (Carver, Johnson, Joormann, Kim, & Nam, 2011). One factor concerns impulsive responses to mostly negative emotions (sadness, fatigue, and general distress), such that the emotions reflexively colour the person's immediate subjective experiences. The second factor concerns responses that interfere with follow through, including distractibility and tendencies to let things go. The third factor concerns a tendency towards impulsive actions in response to emotions, including positive emotions. The scales have been validated against biological and environmental indices related to impulsivity, in that both emotion-related factors were linked with a polymorphism of the serotonin transporter gene in the context of early adversity (Carver, Johnson, Joormann, Kim et al., 2011). The study reported here examined how the three factors relate to a measure of mania proneness.

In considering links between mania proneness and impulsivity, it is important to consider one potential confound. Mania vulnerability often co-occurs with several other problems, including depression and alcohol concerns. There is evidence that depression is tied to elevations in emotion-related impulsivity (Peluso et al., 2007). Alcohol abuse has also been tied to impulsive responses to negative emotions (Fischer, Settles, Collins, Gunn, & Smith, 2012), to non-emotion-related forms of impulsivity (von Diemen, Bassani, Fuchs, Szobot, & Pechansky, 2008), and to heightened impulsivity within bipolar disorder (Holmes et al., 2009). It would seem important, than, to consider whether different aspects of impulsivity relate to mania vulnerability after considering vulnerability to alcohol and depressive symptoms.

As noted above, we hypothesized that mania risk would be related to impulsive actions triggered by emotions, particularly positive emotions. We expected this association with mania risk to be independent of tendencies towards either depression symptoms or alcohol-abuse symptoms. In contrast, we hypothesized that any association of mania risk with responses to negative emotion would be accounted for by the tendency towards depression symptoms.

**Method**

Participants were 257 undergraduates at the University of Miami (31.2% male), who participated in partial fulfilment of a course requirement. Mean age of the final sample was 18.64 years ($SD = 1.67$); the sample self-identified as follows: 136 Caucasian (52.9%), 48 Hispanic (18.7%), 14 Asian (5.4%), 11 African American (4.3%), 19 Caribbean (7.4%), and 29 ‘other or unspecified’ (11.3%).

All procedures for the study were approved by the University of Miami Institutional Review Board. Some of the self-report measures were completed during early class sessions. A general description of the project then was posted on a departmental website, and interested persons made appointments for group sessions that included up to 20 persons per group. Participants in these sessions completed written informed consent procedures, other self-report measures, and other tasks not relevant to this article.
Mania risk

Hypomanic Personality Scale
The HPS (Eckblad & Chapman, 1986) was designed to assess risk for bipolar disorders (defined by manic symptoms of varying degree and duration). The measure includes 48 true–false items related to changes in energy, emotions, and behaviours, as well as trait-like tendencies towards extraversion and high energy. Sample items include the following: ‘I am frequently so hyper that my friends kiddingly ask me what drug I’m taking’ and ‘Sometimes ideas and insights come to me so fast that I cannot express them all’. In the initial validation study, 78% of persons scoring more than two standard deviations above the mean met diagnostic criteria for a bipolar spectrum disorder, whereas none of the participants with a score at or below one half of a standard deviation above the mean met diagnostic criteria for bipolar spectrum disorders (Eckblad & Chapman, 1986). In longitudinal analyses of a 10–13-year follow-up study, elevated scores on the HPS predicted increased risk for diagnosed bipolar disorders (Kwapil et al., 2000). The HPS has been shown to correspond with psychosocial risk variables relevant to bipolar disorder across a range of studies (Eisner, Johnson, & Carver, 2008; Gruber, Johnson, Oveis, & Keltner, 2008; Johnson & Carver, 2006). The measure has displayed adequate internal consistency \( \alpha = .87 \) and 15-week test–retest reliability \( r = .81 \); Eckblad & Chapman, 1986). Internal consistency in this study was good \( \alpha = .86 \). In this sample, scores ranged from 0 to 42, with a \( M \) of 18.94 (\( SD = 8.02 \)).

Measures bearing on impulsiveness
As noted earlier, participants also completed several self-report measures bearing on impulsive reactions. Some were pre-existing scales, and others were developed for use in this project, to provide broader coverage of behavioural and cognitive responses to emotions. A previous report detailed findings of a factor analysis of these measures (Carver, Johnson, Joormann, Kim et al., 2011). In the analyses now being reported, we began by using the factor scores from that analysis as outcome variables. In the sections that follow, we briefly describe the scales that contributed to the scores, and then describe the composition of the three factors.

Positive urgency measure
The positive urgency measure (PUM; Cyders & Smith, 2008) was designed to assess the tendency to respond to positive moods with impulsive thought and behaviour (e.g., ‘When I am very happy, I can’t seem to stop myself from doing things that can have bad consequences,’ ‘I tend to lose control when I am in a great mood’). This measure has been found to correlate with specific risky behaviours such as vandalism and alcohol problems (Cyders, Smith, Spillane, Fischer, Annus, & Peterson, 2007; Smith, Fischer, Cyders, Annus, Spillane, & McCarthy, 2007). In this study, we used seven items which we extracted in a previous sample based on their high factor loading during the scale’s development and their clear item content. Responses were made on a scale of 1 (‘I agree a lot’) to 5 (‘I disagree a lot’). All impulse-related scales, including this one, were scored by averaging items (after reverse scoring relevant items such that high scores reflect impulsive tendencies), with one exception noted below. Internal consistency for this scale was high, \( \alpha = .81 \).
Negative generalization

Negative generalization (Carver, 1998) is a four-item scale designed to assess tendencies to reflexively generalize from a single negative event to the broader sense of self-worth (e.g., ‘A single failure can change me from feeling OK to seeing only the bad in myself’). The scale has been found to correlate with tendencies towards depression, in both cross-sectional and prospective research (Carver, la Voie, Kuhl, & Ganellen, 1988). Previous research has shown that negative generalization is elevated among persons with bipolar spectrum disorder, but that the elevations are actually related to depressive tendencies within that group (Eisner et al., 2008). Items were rated from 1 (‘I agree a lot’) to 5 (‘I disagree a lot’). Internal consistency was high, $\alpha = .81$.

UPPS urgency and lack of perseverance

The UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001) is based on a conceptual model of impulsive behaviour deriving from the five-factor approach to personality. The UPPS has four-factor analytically supported subscales, two of which were administered here. Urgency refers to the tendency to experience strong impulses; about half the items imply that the impulses occur under conditions of negative affect (e.g., ‘When I am upset I often act without thinking’); others are not specific about any precipitating affective state (e.g., ‘It is hard for me to resist acting on my feelings’). Lack of Perseverance, in contrast, assesses the inability to stay focused on tasks that are difficult or tedious (e.g., ‘I am a productive person who always gets the job done’ [reverse scored]). In this study, we used 10 items from the Lack of Perseverance scale, $\alpha = .86$, and 12 items from the Urgency scale, $\alpha = .90$.

Self-control brief version

The Brief Self-Control scale (Tangney, Baumeister, & Boone, 2004) is a 13-item measure of individual differences in the ability to control one’s behaviour, the conceptual opposite of impulsivity. Its items tend to focus on persistence in completing activities (e.g., ‘I am able to work effectively towards long-term goals’). Greater self-control correlates with higher grade point average, better adjustment, less binge eating, and alcohol abuse, and better relationships, and interpersonal skills (Tangney et al., 2004). To orient all scales so that impulsivity was reflected in higher scores, items were reverse scored, so that the scores reflect lack of self-control. Internal consistency for this scale was high, $\alpha = .83$. Consistent with the idea that self-control is related to impulsivity, self-control (reverse-scored) was highly related to the Lack of Perseverance scale, $r = .56$, $N = 366$, $p < .0005$.

Laziness

The behavioural indicators of conscientiousness (Jackson, Wood, Bogg, Walton, Harms, & Roberts, 2010) are self-report inventory designed to assess aspects of conscientious behaviour (the opposite of reactive impulsiveness). Respondents are asked to rate how often they engage in specific behaviours, from 1 (‘never’) to 5 (‘very often’). We administered the Laziness scale, reflecting low conscientiousness (e.g., ‘Miss appointments or classes’, and ‘Put off work until the last minute’), $\alpha = .83$. 
Project-specific scales
A number of items were written for this project to target very specific aspects of impulsiveness. Their separation into specific scales was verified by principal components analysis within the overall dataset (Carver, Johnson, Joormann, Kim et al., 2011). Sadness Paralysis (two items; \( \alpha = .76; \) ‘When I feel sad, it paralyses me’, and ‘I respond to feeling sad by just stopping moving’) is endorsement of the tendency to respond reflexively to sad feelings with inaction. Inability to Overcome Lethargy (seven items; \( \alpha = .87; \) e.g., ‘It’s hard to get myself moving, even when I know what I want to do’) is a more general inability to get moving despite having things to do (reflexive inaction). Colouring of Worldview items assess whether being in an emotional state (of unspecified valence) biases one’s perceptions of the surrounding world (three items; \( \alpha = .76; \) e.g., ‘My feelings greatly affect how I see the world’, and ‘When I have emotional experiences, they strongly influence how I look at life’). Reflexive Reaction to Feelings (seven items; \( \alpha = .87; \) e.g., ‘When I have an emotional reaction to something, I often act without thinking’, and ‘I react impulsively to my feelings’) is reacting reflexively and quickly when experiencing emotions (three of these seven items explicitly mention desires and enthusiasm, four do not refer to valence). Distractibility (nine items; \( \alpha = .90)\) concerns the tendency for one’s attention to be drawn towards daydreams or other thoughts (e.g., ‘I am easily distracted by stray thoughts’, and ‘My mind wanders when I’m working on something that’s tedious or difficult’).

Factor scores
In a previous analysis of a partially overlapping sample (\( N = 303 \)) that was being examined for other purposes (Carver, Johnson, Joormann, Kim et al., 2011), the impulsiveness-related measures described above were reduced to three factors, using a combination of exploratory and confirmatory techniques. The first factor (labelled Pervasive Influence of Feelings) centres on the extent to which (mostly negative) emotions influence the person’s orientation to the world. Scales loading primarily on this factor were negative generalization, sadness paralysis, emotions colour worldview, inability to overcome lethargy, and urgency. The negative emotions reflected in items of the scales loading on this factor were (either explicitly or by implication) primarily sadness, weariness, and general distress. Factor 2 (lack of follow-through) centres on the tendency to carry tasks to their conclusion versus letting things go, with no involvement of emotions in the items’ content. Scales loading primarily on this factor were lack of perseverance, (lack of) self-control, laziness, and distractibility. Factor 3 (labelled feelings trigger action) centres on impulsive reactivity to emotions in general, including positive emotions. Scales loading primarily on this factor were positive urgency, urgency, and reflexive reaction to feelings.

Factor scores were computed for each participant by the regression method, yielding a distribution for each factor with \( M = 0 \) and \( SD = 1 \). As expected, the factors were moderately, but not strongly intercorrelated, \( r_{\text{factor 1 - factor 2}} = .37, r_{\text{factor 1 - factor 3}} = .33, \) and \( r_{\text{factor 2 - factor 3}} = .14. \)

Symptom control variables
Inventory to Diagnose Depression-Lifetime
The Inventory to Diagnose Depression-Lifetime (IDD-L; Zimmerman & Coryell, 1987) was used as an index of the person’s vulnerability to depression in terms of severity of depressive symptoms experienced during the person’s lifetime. The IDD-L is a 45-item scale which captures the symptoms required for DSM-IV diagnoses of major depression.
Participants are asked to identify whether they have experienced a given symptom during their lifetime. For each symptom endorsed, participants are asked whether the symptom lasted for at least 2 weeks. Symptom scores provide a count of the number of DSM-IV-TR symptoms that are endorsed, and so range from 0 to 9. The IDD-L correlates strongly with other measures of depression. It also demonstrates high sensitivity and specificity for diagnoses made using structured research interviews and internal consistency ($\alpha = .92$; Zimmerman & Coryell, 1987). Internal consistency in this study was high, $\alpha = .90$. The mean score in this sample was 2.76 ($SD = 3$). The data were collected in two successive semesters, and a clerical error prevented this measure from being administered in the second semester. Thus, the IDD-L was completed by only 153 participants.

The alcohol use disorder identification test

The alcohol use disorder identification test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993) is a 10-item self-report scale designed to screen for excessive alcohol consumption and for other drinking-related 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 (Saunders et al., 1993). Internal consistency in this study was adequate, $\alpha = .84$. In this sample, the $M$ was 5.26 ($SD = 5.09$).

Results

All analyses were completed using Predictive Analytics SoftWare Statistics, version 18 (IBM, New York, NY, USA). Alpha was set to .05, and all analyses were two-tailed. Bivariate correlations of the impulsivity factors with HPS and symptom measures are in Table 1. As can be seen, the HPS was related to pervasive influence of feelings and feelings trigger action, but not to lack of follow through. Also shown in Table 1 are partial correlations of the HPS with the three factors after controlling for the IDD-L alone, the AUDIT alone, and the IDD-L and AUDIT together. It will be apparent from these partial correlations that the association with pervasive influence of feelings (which includes many items referring to sadness, fatigue, or general distress) was accounted for mostly by history of depression symptoms. After controlling for tendencies towards depression history and comorbid alcohol abuse, however, HPS scores remained significantly correlated with the feelings

<table>
<thead>
<tr>
<th>Impulsivity factor</th>
<th>HPS</th>
<th>AUDIT</th>
<th>IDD-L</th>
<th>HPS controlling for IDD-L</th>
<th>HPS controlling for AUDIT</th>
<th>HPS controlling for AUDIT and IDD-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pervasive influence of feelings</td>
<td>.22***</td>
<td>.16**</td>
<td>.47***</td>
<td>.07</td>
<td>.20***</td>
<td>.07</td>
</tr>
<tr>
<td>Lack of follow-through</td>
<td>.12</td>
<td>.24***</td>
<td>.16</td>
<td>.08</td>
<td>.08</td>
<td>.10</td>
</tr>
<tr>
<td>Feelings trigger action</td>
<td>.49***</td>
<td>.21**</td>
<td>.27**</td>
<td>.43***</td>
<td>.47***</td>
<td>.43***</td>
</tr>
</tbody>
</table>

Note. AUDIT, alcohol use disorder identification test; HPS, hypomanic personality scale; IDD-L, inventory to diagnose depression-lifetime.
*p < .05; **p < .01; ***p < .001.
trigger action factor (which includes many items referring to positive emotions along with items referring to feelings in general).

To obtain as much clarity as possible concerning the association of HPS with this third factor, we conducted further exploratory analyses in which the HPS was related separately to each of the three scales loading on that factor. In bivariate correlations and after controlling for the AUDIT and IDD-L, HPS was significantly associated with the PUM (r(272) = .31, p < .001; partial r controlling for both AUDIT and IDD-L = .25, p < .005) and with reflexive reaction to feelings (r(286) = .49, p < .001; partial r controlling for both AUDIT and IDD-L = .43, p < .001). HPS correlated significantly with Urgency in bivariate analyses (r(301) = .21, p < .001), but this relationship was no longer significant after controlling for the AUDIT and the IDD-L (partial r = -.02, ns).1

**Discussion**

The study reported here was the first analysis of a broad array of impulsivity-related measures in relation to risk for mania, while also considering the role of alcohol-abuse tendencies and lifetime tendencies towards depressive symptoms. The HPS was significantly correlated with emotion-relevant forms of impulsivity, but not with lack of follow through. After controlling for depression severity and comorbid alcohol use, risk for mania was no longer related to the factor pervasive influence of feelings. That is, impulsive reactions in the context of primarily negative emotions appear to be specific to the depressive symptoms that often co-occur with mania risk. In contrast, after controlling for both comorbid conditions, mania risk remained related to a factor reflecting the tendency for feelings to guide impulsive actions. Analyses of specific scales suggested that this form of impulsivity is particularly likely during positive affective states. These findings extend previous work suggesting that impulsivity during positive affective states is problematic among those with bipolar disorder, even after controlling for other forms of impulsivity (Victor, Johnson, & Gotlib, 2011).

The relative lack of correlation between mania risk and lack of follow through is intriguing, because it fits with other evidence that bipolar disorder is related to an extremely high investment in goals (Johnson, Edge, Holmes, & Carver, 2012) and a willingness to persist in pursuing rewards even when tasks become difficult (Harmon-Jones et al., 2007). The subjective importance of goals may motivate those at risk for mania to persevere in goal pursuit, thus preventing this form of impulsivity.

Before considering the implications of these findings, it is important to note several limitations. This study relied on self-report measures, some of which were abbreviated from their original versions. Self-reports may be biased by recall problems and a desire to endorse socially desirable responses (Paulhus, 1991), although the size and frequency of the latter have been called into question (Fiske, 1971; Rorer & Goldberg, 1965). Further research is desirable using behavioural measures of impulsivity. Findings of this study suggest that it will be particularly important to consider behavioural measures that integrate emotion-relevant probes, such as the emotion faces Go–No Go task (Reynolds &

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1 To address the possibility that the results reflect impulse-related item content in the HPS, we removed four HPS items that three expert raters nominated as being impulsivity relevant, and repeated the analyses. Findings with this abbreviated HPS were fully consistent with those reported above.
Jeeves, 1978), or to conduct these assessments after mood inductions or naturalistically occurring mood states.

This study was also limited by the reliance on analogue rather than a clinically diagnosed sample of persons with bipolar disorder. Furthermore, only one index of risk was used; future studies would do well to include measures of family history of bipolar disorder (Nurnberger et al., 2011). In this regard, it is notable that even risk for mania appears correlated with impulsivity. Previous research has suggested that diagnoses of bipolar disorder may relate to specific elevations in impulsivity during positive mood states as compared to non-emotion-relevant forms of impulsivity (Victor et al., 2011).

Current research suggests other forms of emotion-relevant impulsivity that may be important to examine in diagnosed samples.

Finally, the study is limited by the reliance on a cross-sectional design, precluding ability to comment on causal patterns. It remains unknown if any of the identified forms of impulsivity have particular meaning for onset. Previous research has found that measures of impulsivity can predict onset (Alloy et al., 2009; Kwapil et al., 2000), but no studies have yet examined which facets of impulsivity predict onset best.

Despite these limitations and cautions, the profile of findings here has implications for understanding bipolar disorder, in that those prone to mania have difficulty in controlling their responses to emotion, particularly positive emotion. The pattern provides some prediction as to when losses of control might occur: During high-arousal positive emotion states. Future research should more directly examine the role of physiological arousal as a trigger for impulsive actions. It also appears that difficulties might be more related to engaging in action without forethought than to lack of perseverance or inattention. Intervention strategies designed to foster better behavioural control may be an important facet of comprehensive care in bipolar disorder.

References


Received 8 December 2011; revised version received 6 June 2012