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Is impulsivity a common trait in bipolar and unipolar disorders?

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Abstract

Objectives—Impulsivity is increased in bipolar and unipolar disorders during episodes and is associated with substance abuse disorders and suicide risk. Impulsivity between episodes predisposes to relapses and poor therapeutic compliance. However, there is little information about impulsivity during euthymia in mood disorders. We sought to investigate trait impulsivity in euthymic bipolar and unipolar disorder patients, comparing them to healthy individuals and unaffected relatives of bipolar disorder patients.

Methods—Impulsivity was evaluated by the Barratt Impulsiveness Scale (BIS-11A) in 54 bipolar disorder patients, 25 unipolar disorder patients, 136 healthy volunteers, and 14 unaffected relatives. The BIS-11A mean scores for all four groups were compared through the Games–Howell test for all possible pairwise combinations. Additionally, we compared impulsivity in bipolar and unipolar disorder patients with and without history of suicide attempt and substance abuse disorder.

Results—Bipolar and unipolar disorder patients scored significantly higher than the healthy controls and unaffected relatives on all measures of the BIS-11A except for attentional impulsivity. On the attentional impulsivity measures there were no differences among the unaffected relatives and the bipolar and unipolar disorder groups, but all three of these groups scored higher than the healthy participant group. There was no difference in impulsivity between bipolar and unipolar disorder subjects with and without suicide attempt. However, impulsivity was higher among bipolar and unipolar disorder subjects with past substance use disorder compared to patients without such a history.

Conclusions—Questionnaire-measured impulsivity appears to be relatively independent of mood state in bipolar and unipolar disorder patients; it remains elevated in euthymia and is higher in individuals with past substance abuse. Elevated attentional and lower non-planning impulsivity in unaffected relatives of bipolar disorder patients distinguished them from healthy participants suggesting that increased attentional impulsivity may predispose to development of affective disorders, while reduced attentional impulsivity may be protective.

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Disclosures

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Keywords

Barratt Impulsiveness Scale; bipolar disorder; depression; euthymic; impulsivity; mood; unipolar disorder

Bipolar disorder (BD) is commonly associated with increased impulsivity, particularly during manic and depressed episodes (1, 2), and unipolar depressive disorder (UP) is also associated with increased impulsivity during depressive episodes (3). In BD, impulsivity also remains elevated during euthymic phases, suggesting that it is a trait-like personality characteristic (4).

Increased impulsivity adversely affects the illness course of BD and UP by increasing suicide risk (1, 3, 5, 6) and mood instability (7). In BD, elevated impulsivity during euthymic periods contributes to disruptive behaviors such as reckless driving (8), substance abuse disorder (9), and poor adherence to treatment (10). However, there is a lack of studies assessing impulsivity in euthymic UP patients, so it is not known whether impulsivity is related to poor illness course and risk of substance abuse as with BD.

Increased impulsivity in BD and UP during illness episodes as well as in euthymic states supports the suggestion that impulsivity is related to mood disorders in general (4, 7). If this is confirmed, then therapies targeting impulsivity could represent novel interventions for mental disorders with impulsivity at their core, as suggested by Pattij and Vanderschuren (11).

In this study, we compared questionnaire-measured impulsivity in euthymic BD and UP patients, healthy controls (HC), and a group of unaffected relatives (NAR) of BD patients. The NAR were included because impulsivity may be an inherited trait that could predispose vulnerable individuals to affective disorders in general (12). We also compared impulsivity in patients with and without history of suicide attempts and substance abuse to determine whether impulsivity during the euthymic interval predicts these outcomes. We hypothesized that: (i) euthymic BD and UP subjects have higher impulsivity than NAR and HC; (ii) NAR have higher impulsivity than HC; and (iii) euthymic BD and UP patients with past suicide attempts and substance abuse history have higher impulsivity than BD and UP subjects without such histories.

Methods

Participants

Fifty-four euthymic BD patients, 25 euthymic UP patients, 136 HC, and 14 NAR were recruited from advertisements as part of a program of mood disorders imaging studies at The University of Texas Health Science Center at San Antonio (UTHSCSA) and the University of North Carolina at Chapel Hill (UNC). Inclusion criteria were: (i) 18 years of age or older; (ii) diagnosis of euthymic BD or UP for patients; and (iii) no history of Axis I disorders for HC and NAR. Exclusion criteria for all groups were: (i) presence of chronic illness (e.g., hypertension, diabetes, liver disease, kidney diseases, current thyroid dysfunction, neurological disease); (ii) current comorbid Axis I disorders, except anxiety and substance abuse within six months of study participation (urine analysis was performed to exclude current drug use); and (iii) use of any psychotropic medication (except benzodiazepines) less than two weeks prior to the screening interview. The Institutional Review Board of UTHSCSA and the Ethics Committee of the School of Medicine of UNC approved the study. All procedures were carried out after all participants had demonstrated adequate understanding and provide written informed consent.

Methods

Diagnoses and mood state were verified with the Structural Clinical Interview for DSM-IV (SCID-IV) (13), the Hamilton Rating Scale for Depression, 21 items (HAM-D) (14), and the Young Mania Rating Scale, (YMRS) (15). Absence of mood symptoms at least one month before the interview, as well as scores less than six on the HAM-D and the YMRS scales defined euthymia. Participants completed the Barratt Impulsiveness Scale version 11A (BIS-11A) (16) to assess impulsivity. The BIS-11A is 21-item self-report inventory that measures impulsivity as a trait encompassing three domains: attentional impulsivity (intolerance for complexity and persistence); motor impulsivity (tendency to act without forethought); and non-planning impulsivity (lack of a sense of the future). Items are rated from one (absent) to four (most extreme). BIS-11A total scores for healthy individuals generally range between 50 and 60 (17).

Statistical analysis

All analyses were performed using the Statistical Package for the Social Sciences, version 18 for Windows (SPSS, Inc., Chicago, IL). The four groups were compared using the Games–Howell procedure. This is a pairwise comparisons procedure that protects the type I error rate when group variances are heterogeneous. All null hypotheses were rejected at a planned adjusted two-sided p-value of 0.05. We ran additional subgroups analyses comparing impulsivity in BD and UP with and without suicide attempts and past history of substance use.

Results

Demographic data

Forty-two (78%) BD patients, 25 (100%) UP patients, and 118 (87%) HC were from UTHSCSA and 14 (100%) NAR were from UNC, resulting in a greater number of participants from UTHSCSA ($\chi^2 = 70.3$, $p < 0.001$). There was no significant difference on the BIS-11A scores as a function of the recruitment site, and there were no differences between groups regarding gender. The NAR were older than the other groups ($p = 0.012$), and HC and NAR had significantly more years of education than the BD and UP groups ($p < 0.001$). Demographic data and BIS-11A scores are displayed in Table 1.

Group comparisons

The BD and UP groups scored similarly on total impulsivity measures as did the HC and NAR (Table 2). However, the BD and UP groups scored significantly higher than the NAR ($p < 0.001$ and $p = 0.02$, respectively) and HC ($p < 0.001$ and $p = 0.001$, respectively).

On the non-planning subscale the BD and UP groups scored similarly, and both scored higher than the HC ($p < 0.001$) and NAR ($p < 0.001$). However, the NAR scored lower than the HC ($p = 0.02$).

The BD and UP groups did not differ regarding motor impulsivity. However, the BD group scored higher than the HC ($p < 0.001$) and NAR ($p = 0.001$). The UP group scored higher than the HC ($p = 0.048$), but they did not differ from the NAR.

On attentional impulsivity there were no differences among the BD, UP, and NAR groups ($p > 0.40$), and all of these groups scored significantly higher than the HC ($p < 0.002$).

Suicide attempts and substance use disorder in the BD and UP groups—

Among the BD patients with available data ($n = 41$), 13 (31.7%) had attempted suicide

versus three (12%) in the UP sample. There were no significant differences on any of the BIS-11A scales between BD and UP patients with and without suicide attempt (Table 2). However, the BD and UP patients with past substance use disorder showed higher impulsivity than those without it (Table 3).

Discussion

As predicted, impulsivity was higher in euthymic BD and UP subjects compared to HC. This reinforces prior findings that elevated trait impulsivity in BD is relatively independent of mood state (7, 18), but is contrary to results previously reported in UP (1, 3), contradicting the suggestion that high impulsivity in UP patients is a consequence of acute symptoms (1, 3).

Peluso et al. (1) and Corruble et al. (3) observed lower impulsivity in euthymic UP patients; however, their patients were taking antidepressant medication that can ameliorate the lack of hope for the future (1), potentially explaining the difference between the studies. Thus, we suggest that the deleterious effects of impulsivity on BD, such as substance misuse and mood instability (8, 9, 10), may be extended to UP.

Impulsivity can also contribute to destructive behaviors, exposure to harmful situations, and severe long-term consequences (8, 19, 20). These behaviors can lead to stressful life events. As there is a strong relationship between stress and relapse in mood disorders (21), we suggest that maintenance of elevated impulsivity during euthymic mood states may increase the risk of recurrence as well as initiate episodes in vulnerable individuals by exposure to stressful situations.

Patients had fewer years of education than the HC and NAR. This difference may partially be a consequence of impulsivity. Attentional impulsivity is associated with poor performance on tasks requiring sustained attention (22) and impulsive individuals display a pattern of difficulty in scholarly achievement that seems to persist from preschool to adolescence (7, 22, 23). However, it is also possible that lower educational achievement is a consequence of mental disorders that may contribute to impulsivity (24).

Previous studies observed a positive association between impulsivity and alcohol and drug misuse in BD and UP (9, 10), which our results support and extend to euthymic subjects. In contrast, although suicide attempts are strongly associated with impulsivity (4, 5, 10), questionnaire-rated impulsivity did not predict past suicidal behavior in our euthymic patients. Therefore, questionnaire-rated impulsivity alone is not reliable as a suicide indicator, and aggression and hostility should be present (6). Further, while questionnaire-rated impulsivity did not differentiate BD subjects with severe suicidal behavior in an earlier study, laboratory-measured impulsivity was higher in subjects with history of severe suicide attempts (5).

Another interesting result was that the NAR scored similarly to patient samples, but significantly higher than HC on attentional impulsivity and lower than HC on non-planning impulsivity. Impairment on tasks requiring sustained attention has been previously noted in the offspring of BD (25). This deficit was also observed among the offspring of BD that later developed BD (25). Indeed, early onset of BD is associated with increased attentional impulsivity (26). These observations, together with evidence that a positive family history of BD is a strong predictor of future bipolar illness (27), suggest the possibility that increased attentional impulsivity and decreased non-planning impulsivity in NAR might represent a risk factor for future development of mood disorder. Alternatively, decreased non-planning impulsivity may be an adaptation that protects the NAR from expressing the illness.

Therefore, strategies targeting impulsivity in vulnerable populations might potentially forestall BD onset or lessen its consequences, at least concerning substance abuse.

There are some limitations to consider when interpreting these results. There were no controls for anxiety and personality disorders, which have been shown to be associated with high impulsivity (28). The sample sizes varied across groups, and there were no offspring of UP patients. The NAR group was small, but they nonetheless could be distinguished from the HC on attentional impulsivity. This finding requires independent confirmation in a larger sample. Samples were not matched with respect to age, education, or geographic location. However, there were no differences among the patient samples regarding demographic factors. This work was cross-sectional, so we cannot determine whether impulsivity precedes or follows symptom development or multiple mood episodes. Finally, impulsivity is complex, and human laboratory or behavioral measures may detect facets of impulsivity that questionnaires do not (17).

In conclusion, trait impulsivity was elevated patients with BD and UP, confirming that impulsivity is relatively independent of mood state, and was higher in past substance users. Attentional impulsivity was elevated in NAR, which might signal a vulnerability to develop affective disorders. This result should be replicated in larger samples, including UP offspring, to assess the predictive value of impulsivity on the development of mood disorders.

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Table 1

Demographic data and BIS-11A scores as a function of diagnostic group

	Euthymic bipolar (n = 54)	Euthymic unipolar (n = 25)	Unaffected relatives (n = 14)	Healthy controls (n = 136)	Statistic ^a	p-value ^a
Recruitment site UTHSCSA/UNC, n	42/12	25/0	0/14	118/18	$\chi^2 = 70.3$	< 0.001
Age, years, mean (SD)	36.8 (12.1)	35.6 (12.8)	49.9 (14.1)	37.1 (14.0)	$F(3,225) = 6.1$	0.012
Education, years, mean (SD)	13.8 (2.8)	12.8 (4.2)	15.3 (2.6)	15.9 (2.9)	$F(3,225) = 19.7$	< 0.001
Gender, female, n (%)	35 (64.8)	16 (64.0)	11 (78.6)	88 (64.7)	$\chi^2(3) = 70.3$	ns
Past substance abuse, n (%)	22 (40)	4 (16)	0 (0)	0 (0)	$\chi^2(3) = 70.3$	ns
Total impulsivity, mean (SD)	73.9 (13.2) ^b	67.4 (16.5) ^b	54.6 (9.9) ^c	53.2 (9.1) ^c	$F(3,225) = 49.1$	< 0.001
Motor impulsivity, mean (SD)	26.1 (5.0) ^b	22.8 (6.0) ^{b,c}	19.7 (4.6) ^{c,d}	19.4 (3.5) ^d	$F(3,225) = 36.2$	0.001
Attentional impulsivity, mean (SD)	21.1 (4.7) ^b	19.0 (5.9) ^b	19.8 (2.0) ^b	14.0 (3.9) ^c	$F(3,225) = 43.2$	< 0.001
Non-planning impulsivity, mean (SD)	26.6 (6.0) ^b	25.7 (5.8) ^b	15.0 (5.1) ^c	19.7 (4.1) ^d	$F(3,225) = 43.6$	< 0.001

BIS-11A = Barratt Impulsiveness Scale, version 11A; UTHSCSA = University of Texas Health Science Center, San Antonio; UNC = University of North Carolina at Chapel Hill; ns = not significantly different at the $p < 0.05$ level.

^aThe statistical tests and p-values refer to the omnibus tests comparing the four population means.

^{b,c,d}For BIS-11A means that share the same superscript are not significantly different at the $p < 0.05$ level after adjusting for multiple comparisons by the Games-Howell procedure.

BIS-11A scores for euthymic bipolar and unipolar disorder subjects as a function of past suicide attempt

Table 2

	BD/suicide attempt (n = 13) ^a	BD/no suicide attempt (n = 28) ^a	Statistic ^a	p-value	UP/suicide attempt (n = 3)	UP/no suicide attempt (n = 22)	Statistic	p-value
BIS total	78.9 (15.8)	71.6 (10.5)	$t_{(39)} = 1.75$	ns	80.5 (21.4)	65.7 (15.5)	$t_{(23)} = 1.49$	ns
Attentional	22.2 (5.5)	20.6 (4.0)	$t_{(39)} = 1.05$	ns	25.1 (6.5)	18.2 (5.5)	$t_{(23)} = 2.00$	ns
Motor	28.4 (6.0)	25.1 (4.0)	$t_{(39)} = 2.12$	ns	26.5 (8.7)	22.3 (5.6)	$t_{(23)} = 1.14$	ns
Non-planning	28.2 (6.4)	25.9 (6.0)	$t_{(39)} = 1.12$	ns	29.0 (6.3)	25.3 (5.7)	$t_{(23)} = 1.04$	ns

Values are reported as mean (standard deviation). BIS-11A = Barratt Impulsiveness Scale, version 11A; BD = bipolar disorder; UP = unipolar disorder; ns = not significantly different at the $p < 0.05$ level.

^a 13 patients in the bipolar disorder group were excluded due to missing data.

BIS-11A scores for euthymic bipolar and unipolar disorder subjects as a function of past substance use disorder

Table 3

	BD/SUD (n = 22) ^a	BD/no SUD (n = 27)	Statistic ^a	p-value	UP/SUD (n = 4)	UP/no SUD (n = 21)	Statistic	p-value
BIS total	76.4 (11.8)	66.8 (8.9)	$t_{(47)} = 2.10$	0.04	90.7 (13.3)	63.0 (13.1)	$t_{(23)} = 3.83$	0.001
Attentional	22.2 (3.6)	20.3 (4.8)	$t_{(47)} = 1.11$	ns	26.8 (6.3)	17.5 (4.6)	$t_{(23)} = 3.87$	0.002
Motor	26.2 (0.8)	22.5 (6.1)	$t_{(47)} = 2.64$	0.01	30.8 (4.7)	21.3 (4.9)	$t_{(23)} = 3.47$	0.018
Non-planning	30.8 (4.1)	25.9 (5.8)	$t_{(47)} = 3.38$	0.02	33.0 (3.9)	24.3 (5.0)	$t_{(23)} = 3.67$	0.004

Values are reported as mean (standard deviation). BIS-11A = Barratt Impulsiveness Scale, version 11A; BD = bipolar disorder; SUD = substance use disorder; UP = unipolar disorder; ns = not significantly different at the $p < 0.05$ level.

^aFive bipolar disorder patients were excluded due to missing data.