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Quality of life and impulsivity in bipolar disorder

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Abstract

Objectives—Bipolar disorder (BD) is a chronic psychiatric illness that impairs quality of life (QoL) in numerous life domains even when mood symptoms are not present and is characterized by elevated impulsivity. Many of the comorbid conditions that are associated with diminished QoL in BD also involve impulsivity. The objective of this project was to investigate whether impulsivity might mediate the effects of these comorbid conditions on poor QoL.

Methods—A total of 76 participants diagnosed with bipolar I disorder by the Structured Clinical Interview for DSM-IV Axis I disorders completed the Quality of Life in Bipolar Disorder (QoL-BD) scale, the Barratt Impulsivity Scale (BIS-11), and the Positive Urgency Measure (PUM). Participants were also assessed for comorbid DSM-IV diagnoses of anxiety, substance use, and impulse control disorders.

Results—Several subscales of the BIS-11 as well as the PUM total score were significantly negatively correlated with overall QoL. PUM total score remained a significant predictor of QoL after controlling for comorbid anxiety, substance use, and impulse control disorders. After controlling for impulsivity, comorbid disorders were no longer significantly related to overall QoL.

Conclusions—The data support the hypothesis that impulsivity, specifically positive urgency, is highly correlated with QoL in BD. Impulsivity was found to mediate the relation between QoL and several comorbidities in BD. Interventions targeting impulsivity might help to improve QoL in BD.

Keywords

bipolar disorder; impulsivity; quality of life

According to the World Health Organization, quality of life (QoL) refers to “individuals’ perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns” (1). Despite the fact that less than 4% of the population suffers from bipolar disorder (BD) (2), BD is estimated to be the ninth leading medical cause of global disability (3). Even when asymptomatic, persons with BD report QoL below normative levels (4). Indeed, subjective QoL in BD is lower than that found in depressive disorders, anxiety disorders, schizophrenia, and substance use disorders (5). While QoL is often reduced in BD, there is

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also significant variability among persons with this diagnosis. Harrow et al. (6) reported that more than one year following hospitalization, 74% of patients with BD had moderate impairment or poor outcome, while 26% showed a good outcome. Finally, many renowned artists, painters, musicians, and writers experience great success despite (or as a result of) their BD (7).

Considerable research has focused on the role of symptoms and treatment as predictors of QoL. Although symptoms, and in particular depressive symptoms, clearly interfere with QoL (8), they explain a small proportion of the variance in this construct. Notably, more than one-third of patients experience poor or very poor life satisfaction after full recovery from BD (9). Hence, researchers have begun to explore the contributions of other variables to QoL. In this study, we focused on the role of comorbid conditions and impulsivity in affecting QoL.

Although the evidence is mixed, data indicate that QoL is related to comorbid Axis I disorders. Among patients with BD, current substance or alcohol use disorders are related to reports of lower physical, psychological, environmental, social, and overall QoL (10, 11). Current anxiety disorders have also been correlated with lower QoL scores among patients with BD, even after controlling for potential confounds, such as demographic variables and depressive symptoms (12), and age and current substance abuse (13). The comorbidity of both substance abuse disorders and anxiety disorders with BD is high, with an estimated 61% of individuals with BD meeting lifetime criteria for a substance or alcohol use disorder (14), and an estimated 93% of individuals with BD meeting lifetime criteria for at least one anxiety disorder (15).

There are several reasons to assess the association between impulsivity and QoL in BD. Researchers have documented links between impulsivity and QoL in other disorders, such as attention-deficit hyperactivity disorder (ADHD) (16). Moreover, impulsive, risky behavior is one of the symptom criteria listed in the DSM-IV-TR for a manic or hypomanic episode. Indeed, impulsive behavior during mania can have negative long-term consequences for individuals with BD in ways that may affect QoL even after recovery from manic episodes. Patients with BD have higher impulsivity scores than do healthy controls, even when in a euthymic state (17–20), and impulsivity has been found to predict onset of BD (21).

It is also possible that impulsivity helps to explain why comorbid conditions are associated with lower QoL among persons with BD. For example, among individuals with BD, a history of alcohol or substance use disorders is related to higher self-reported and behavioral impulsivity (18, 22); indeed, higher impulsivity may explain BD patients' attraction to pleasurable, albeit risky, behavior, such as alcohol and drug use. Impulsivity is also correlated with current anxiety disorder symptoms in patients with BD (23). Because of these factors, in the present study we controlled for lifetime prevalence of anxiety, substance use, and alcohol use disorders in examining whether impulsivity served as a mediator of the previously published association of comorbid disorders with QoL in BD. Whereas anxiety, alcohol, and substance use disorders are associated with both QoL and impulsivity in BD, little research has been conducted examining the influence of comorbid impulse control disorders on QoL in BD. Because of the obvious relation between impulsivity as a construct and impulse control disorders, and the evidence that impulse control disorders are also elevated among persons with BD (24), we controlled for the presence of these disorders as well.

In this study, we assessed impulsivity using two well-validated self-report measures, the Barratt Impulsivity Scale (BIS-11) (25) and the Positive Urgency Measure (PUM) (26). The BIS-11 is a widely used measure of impulsivity that captures six factor-analytically derived

subscales: *Attention* (focusing on the task at hand), *Motor* (acting on the spur of the moment), *Self-control* (planning and thinking carefully), *Cognitive Complexity* (enjoy challenging mental tasks), *Perseverance* (a consistent life style), and *Cognitive Instability* (thought insertions and racing thoughts). BIS-11 scores have been shown to correlate with multiple laboratory measures of impulsivity (27) and to differentiate individuals with BD and alcohol abuse from healthy control participants (28). Higher scores on the subscales of this measure indicate greater impulsivity. Given the consistent findings that manic symptoms can exacerbate the elevated impulsivity observed in BD (20, 29), we were interested in whether people with BD might also experience difficulties with impulsivity during mildly positive mood states. The PUM is a 14-item self-report measure of the propensity to act impulsively during positive moods. PUM scores have been found to explain unique variance in several types of risky behavior, such as problem drinking or gambling, and also distinguish between disorders characterized by impulsivity in response to positive affect (alcohol use disorders) and those characterized by impulsive behavior in response to negative affect (eating disorders) (26). Higher PUM scores have also been found to predict longitudinal increases in illegal drug use and risky sexual behavior among college students (30). Factor analyses suggest that the PUM items comprise a single factor (26).

In sum, the goal of this study was to examine whether impulsivity is related to lower QoL among persons diagnosed with bipolar I disorder (BD-I). In addressing this question, we examined the conjoint contributions of impulsivity and comorbid conditions as a first step toward determining whether impulsivity mediates the link between comorbid conditions and QoL. We also examined the unique contributions of impulsivity after controlling for a range of potential confounds that could be related to both impulsivity and QoL, such as neuropsychological deficits (31), medication adherence (32), and symptom levels (33). We hypothesized that among individuals with BD, higher impulsivity would be related to impaired QoL even after controlling for potential confounds.

Materials and methods

Participants

Participants were recruited from the communities surrounding Stanford University, Stanford, CA, USA, and the University of Miami, Miami, FL, USA between 2006 and 2009 for a larger study. Ethical approval for this study, in accordance with the Helsinki Declaration of 1975, was granted by the Institutional Review Boards of Stanford University and the University of Miami. Most recruitment was completed through advertisements placed on the internet and in newspapers; some individuals were also referred by local clinics. To be eligible for the study, participants had to be between the ages of 18 and 65, be fluent English speakers, and meet criteria for BD-I. Exclusion criteria included a history of substance abuse or dependence in the last year, primary psychotic disorders, a history of brain injury or learning disabilities, and recent electroconvulsive treatment.

A total of 76 participants (30 men) with BD-I, and a mean age of 37.12 ± 11.68 years participated in this portion of the study; 38 of the participants were recruited and assessed at the University of Miami. Although all participants met diagnostic criteria for BD-I, the presence and number of comorbid Axis I disorders varied: 39 (52%) of the participants met criteria for a lifetime alcohol or substance use disorder; 38 (50%) met criteria for at least one lifetime anxiety disorder; and 30 (40%) met criteria for at least one lifetime impulse control disorder. Although the larger study included control participants, the QoL scale used here was designed to assess only participants with BD. Consequently, QoL was not measured in control participants.

Assessment

Participants who responded to the advertisements and contacted the study team were briefly screened by phone for medical exclusion criteria and for likely diagnosis of BD. Potential participants were then scheduled for individual appointments. Informed consent was obtained from all participants upon their arrival at Stanford University or the University of Miami.

Diagnostic criteria were assessed using the Structured Clinical Interview for DSM-IV for Axis I disorders (SCID-I). Diagnostic modules covered mood disorders, psychosis, alcohol and substance use disorders, anxiety disorders, and impulse control disorders. In addition to providing lifetime diagnoses, the SCID-I assesses current mood episodes. Before administering SCID-I interviews, interviewers completed extensive didactic and role play training, and achieved reliability with a series of gold-standard tapes. Inter-rater reliability was assessed by conjoint ratings of 10 randomly selected audio interviews. Inter-rater reliability for mania and depression, as assessed using intraclass correlation coefficient, was 1.0. After their eligibility was determined, the participants completed a battery of questionnaires, including the BIS-11 and the PUM (described above), as well as the Quality of Life in Bipolar Disorder (QoL-BD) (34) scale and measures of confounds.

The QoL-BD is a 93-item self-report measure of quality of life over the preceding week. This measure was developed to include a broader array of domains than have traditionally been captured in existing quality of life measures. Items drawn from previous scales were supplemented based on qualitative interviews with consumers, and from suggestions of an international team of BD researchers. The QoL-BD includes 13 factor-analytically supported subscales: physical, health care, mood, cognitive, leisure, social, spirituality, finances, household, stigma, independence, overall, and (if applicable), work and education (34).

Medication levels were coded using the Bauer Somatotherapy Index (35), which integrates prescribed dosages and nonadherence rates to estimate dose equivalence scores for lithium, antidepressants, traditional antipsychotics, novel antipsychotics, anxiolytics, and other psychotropic medications. High inter-rater reliability has been achieved, and medication scores have been found to predict important outcomes within BD such as suicidality (36).

Participants were also administered two neurocognitive measures: the Reverse Digit Span (RDS) task (37) and a Verbal Fluency (VF) task (38). The RDS task assesses working memory by measuring accurate recall of numbers in reverse order. The VF task assesses speed and flexibility of verbal processing by measuring number of words generated to a category prompt within one minute. In the version of the VF task used in the present study, participants were asked to list words that fit the categories of *items found in a grocery store* and *animals*.

Data analysis

Data were analyzed using SPSS Statistics 17.0. Before conducting primary analyses, correlations among key variables were computed. Next, regression was used to examine potential confounds with QoL scores, including site (Stanford or Miami), demographic variables (race, ethnicity, age, gender), neurocognitive measures, mood episode status, or somatotherapy scores.

We used linear regression to test the primary hypothesis that QoL-BD scores would correlate with BIS-11 scales and PUM score after controlling for lifetime comorbidities. For this analysis, we collapsed lifetime comorbidities assessed by the SCID-I into three yes/no variables based on the presence or absence of at least one disorder meeting diagnostic criteria: lifetime alcohol and substance use disorders (including alcohol abuse, alcohol

dependence, non-alcohol substance abuse, and non-alcohol substance dependence); lifetime anxiety disorders (including panic disorder, agoraphobia, social phobia, specific phobia, obsessive compulsive disorder, posttraumatic stress disorder, and generalized anxiety disorder); and lifetime impulse control disorders (including intermittent explosive disorder, pathological gambling, kleptomania, trichotillomania, compulsive shopping, and pyromania).

Results

Bivariate relations of impulsivity and comorbid conditions with quality of life Four of the six BIS-11 subscales were correlated significantly with overall QoL-BD score: Attention ($r = -0.42$, $p < 0.001$), Motor Impulsiveness ($r = -0.26$, $p = 0.023$), Self-control ($r = -0.41$, $p < 0.001$), and Cognitive Instability ($r = -0.28$, $p = 0.014$). Neither Cognitive Complexity nor lack of Perseverance was correlated significantly with QoL-BD (Cognitive Complexity $r = -0.13$, $p > 0.27$; Perseverance $r = -0.21$, $p > 0.07$). Total PUM score was significantly correlated with overall QoL-BD score ($r = -0.52$, $p < 0.001$).

We used independent groups *t*-tests to investigate the relations among diagnostic comorbidities, QoL, and impulsivity scores (n's varied by one person for some comorbidities). We confirmed previous findings (10–13) that the lifetime presence of comorbid conditions was related to decreased QoL. Compared with BD participants without these disorders, QoL was significantly lower for BD persons who were also diagnosed with alcohol and substance use disorders: $t(73) = 2.87$, $p = 0.005$; anxiety disorders: $t(74) = 3.28$, $p = 0.002$; and impulse control disorders: $t(74) = 2.34$, $p = 0.022$. Participants with and without comorbid disorders also differed on BIS-11 subscale scores. Specifically, individuals with a history of alcohol and substance use had higher scores on the Self-control subscale than did participants without this comorbidity [$t(73) = -2.38$, $p = 0.02$]; individuals with a history of anxiety disorders had significantly higher scores on the Self-control [$t(74) = -2.28$, $p = 0.026$] and Cognitive Instability subscales [$t(73) = -2.67$, $p = 0.009$] than did individuals without anxiety disorders; and individuals with impulse control disorders had significantly higher scores on the Attention [$t(74) = -3.11$, $p = 0.003$], Self-control [$t(74) = -2.26$, $p = 0.027$], and Cognitive Instability subscales [$t(73) = -3.55$, $p = 0.001$] than did individuals without these disorders. Individuals with alcohol and substance use disorders and those with anxiety disorders also had significantly higher PUM total scores [$t(68) = -2.51$, $p = 0.015$ and $t(69) = -2.36$, $p = 0.021$, respectively] than did individuals without these comorbidities.

Analyses of potential confounds

We examined whether demographic, clinical, cognitive, or treatment variables are confounds for QoL or impulsivity. We conducted a multiple regression analysis with site, demographic variables (age, sex, ethnicity, race), clinical variables (current depression, current mania, or current hypomania), cognitive variables (RDS and VF scores) and treatment variables (Bauer medication coding) as predictors and QoL as the criterion variable. In the final model, only site differences remained significant ($\beta = 6.894$, $t = 2.53$, $p = 0.014$). This variable was controlled for in the multivariate analyses below.

Multivariate analyses

We examined whether impulsivity scales predicted QoL after controlling for site confound and comorbid diagnoses. We conducted a hierarchical linear regression analysis predicting QoL with site in block 1, comorbid diagnoses in block 2, and impulsivity measures in block 3. Site accounted for 8.60% of the variance, $F\Delta (1,67) = 6.31$, $p = 0.014$. After controlling for site, comorbid diagnoses accounted for 13.8% of the variance, $F\Delta (3,64) = 3.80$, $p =$

0.014. After controlling for comorbid diagnoses, forward selection entry was used to assess which, if any, of the five significant impulsivity scores were significantly related to the QoL. Only PUM total score accounted for a significant proportion of additional variance in QoL, $r^2\Delta = 0.14$, $F(1,63) = 13.74$, $p < 0.0005$. The total model was significant, $F(5,63) = 7.18$, $p < 0.001$, and accounted for 36.3% of the variance in QoL scores. In the final model, positive urgency was the only significant predictor of QoL scores, $\beta = -0.40$, $t = -3.7$, $p < 0.0005$.

Finally, we examined whether impulsivity, as measured using BIS-11 and PUM scores, mediated the associations between comorbid conditions and QoL (39). More specifically, we examined whether the effects of comorbid conditions remained significant after controlling for impulsivity. Thus, the regression described above was conducted with site in block 1, the five significant impulsivity measures in block 2, and comorbid diagnoses in block 3. After controlling for these factors, lifetime comorbidities were no longer significant predictors of overall QoL (substance and alcohol use disorders: $t = -1.37$, $p = 0.18$; anxiety disorders: $t = -1.13$, $p = 0.26$; impulse control disorders: $t = -0.52$, $p = 0.60$).

Discussion

The goal of this study was to examine whether QoL in BD was related to a broader range of comorbid conditions, and to assess the conjoint role of impulsivity and comorbid conditions in relation to QoL in BD. The current study was distinguished by control of a set of potential confounds and by attention to specific forms of impulsivity.

With respect to comorbidity, we replicated the findings of previous research that comorbid psychiatric diagnoses of anxiety and substance use disorders were related to diminished QoL in BD. This research extends previous work by documenting that impulse control disorders are also related to lower QoL in this population.

A core goal of the present study, however, was to consider the conjoint contributions of comorbid conditions and impulsivity to QoL outcomes. In bivariate correlations, several forms of impulsivity, including attentional, motor, and positive urgency, were related to diminished QoL. In the multivariate analyses, the one form of impulsivity that appeared to be most central for the prediction of QoL was positive urgency. Our results indicate that 14% of the variance in overall QoL among patients with BD could be accounted for by variance in positive urgency, even after controlling for comorbid conditions. These findings were not confounded with medication levels, neurocognitive functioning, or the presence of a current depressive or (hypo)manic episode. Because none of the other, more general, impulsivity measures was significant in the multivariate analyses, it appears that impulsivity specifically during positive mood states is particularly detrimental to QoL within BD. Consistent with the idea that this form of impulsivity might mediate the effects of comorbid disorders on poorer QoL, no form of comorbidity was correlated significantly with QoL after controlling for impulsivity.

Although these results suggest a promising new avenue of research in BD, we should note several limitations of the present study that temper our findings. First, we were unable to control for some of the factors that have been shown to relate to QoL in previous research, such as subsyndromal symptoms of depression [see (33) for review] or psychological interventions (40). Second, it is important to note that because our study was cross-sectional, the causal nature of the relations among variables is unclear. As a related point, future work should explore whether other facets of impulsivity might also be relevant for QoL in BD (29, 41). Finally, although we considered comorbid conditions as independent variables, it is possible that poor QoL contributes to symptoms such as anxiety. Thus, future studies should

examine more specific aspects of symptoms and treatment, and should obtain longitudinal data to help build a more refined model of the predictors of quality of life.

While there are certainly more questions to be answered, the present findings provide a first step toward understanding QoL in BD. To date, researchers have documented that although symptoms and treatment are related to QoL, they explain a relatively small proportion of the variance in this construct. Given that functional outcomes such as QoL have been identified as a more meaningful target of treatment outcome studies than have symptom measures (42), it is critical that both researchers and practitioners strive to understand the predictors of QoL. The strong links between impulsivity and quality of life documented in this study, along with the increasing evidence that BD is related to elevations in impulsivity, should motivate researchers to explore this area further. By investigating the link between QoL and personality factors such as impulsivity, investigators can go beyond a strictly symptom-based approach to BD. Given the poor QoL among individuals with BD even during well periods, it is important to develop new treatment approaches to target improvements in quality of life and functioning. Research in other areas also indicates that impulsivity might be a helpful target for such intervention efforts. For example, neurofeedback treatment has been found to have a significant effect on impulsivity in ADHD (43), and a variation of Dialectical Behavior Therapy has been found to reduce impulsive behavior in an incarcerated population (44). In addition, many pharmacological agents can affect impulsivity [see (45) for a review of this literature]. Future research should investigate whether the psychological and psychiatric interventions that have proven effective in treating impulsivity in other disorders can also help to reduce impulsivity and improve quality of life for individuals with BD.

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