Published in final edited form as:
J Affect Disord. 2013 February 20; 145(2): 232–239. doi:10.1016/j.jad.2012.08.005.

Posttraumatic Stress Disorder, Depression, and Health-related Quality of Life in Patients with Bipolar Disorder: Review and New Data from a Multi-Site Community Clinic Sample

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Abstract

Background—Evidence suggests that patients with bipolar disorder have an elevated risk for comorbid posttraumatic stress disorder (PTSD) compared to those without a bipolar diagnosis. Although bipolar disorder is associated with decreased health-related quality of life (HRQOL), it is unclear whether comorbid PTSD interacts to affect HRQOL.

Method—Baseline data from a multi-site study of patients with bipolar disorder were analyzed. Patient surveys ascertained clinical and demographic information, including physical and mental HRQOL based on the SF-12, mood symptoms (PHQ-9, Internal State Scale), and self-reported co-occurring conditions including PTSD.

Results—Overall (N=384), 43.5% of patients self-reported co-occurring PTSD. Patients with PTSD had lower physical and mental HRQOL scores compared to those without PTSD (mean (SD) for those with and without PTSD, respectively): Mental Component Scale score 30.51 (8.22) and 32.86 (8.35); Physical Component Scale score 35.56 (7.77) and 37.21 (7.20). After adjusting for demographic and clinical factors including mood symptoms, multivariable linear regression analyses revealed that PTSD was no longer significantly associated with physical or mental HRQOL; however, depressive symptoms were independently associated with mental HRQOL (Beta −0.63, $p<0.01$).

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Conflicts of Interest:
None of the authors have conflicts of interest—financial or non-financial—regarding the content described in this paper.

Contributors:
Amy Kilbourne designed the study, wrote the protocol, and provided input and revisions to the manuscript. Laura Bajor managed the literature searches, assisted with the analysis, and wrote the manuscript. Zongshan Lai and Myra Kim undertook the statistical analysis and provided input and revisions to the manuscript. David Goodrich, Christopher Miller, Robert Penfold, and Mark Bauer provided input and revisions to the manuscript. All authors contributed to and have approved the final manuscript.

Conclusion—Depressive symptoms may explain the association between PTSD and mental HRQOL. Clinicians working with these patients will want to emphasize treatment of depression as important towards improving HRQOL for this group.

MeSH Keywords

Quality of Life; Bipolar Disorder; Posttraumatic Stress Disorders; Comorbidity

1. Introduction

Health-related quality of life (HRQOL) is a reliable indicator of disease burden that may be overlooked, especially among persons with chronic mental illness. These individuals are frequently burdened by medical and psychiatric comorbidities that require assessment beyond traditional measures of mental health symptom severity. Quality of life encompasses multiple domains of mental as well as physical function that also make it a useful indicator of treatment satisfaction and effectiveness.

A growing body of evidence suggests that there is an increased incidence of PTSD among individuals diagnosed with bipolar disorder compared to individuals from the general population. Table 1 reports rates of comorbidity across several studies. Findings varied but were consistently higher than that found in the general population.

Although a number of studies have reported that individuals diagnosed with bipolar disorder have lower HRQOL than the general population (Berlim et al., 2004; Dean et al., 2004; Kilbourne et al., 2009b; Michalak et al., 2008; Vojta et al., 2001; Zhang et al., 2006), it is unclear whether this impairment in function is attributable to the cumulative burden of co-occurring conditions, mood symptoms, or both. There is increasing recognition that posttraumatic stress disorder (PTSD) is a common comorbidity in this population, which has also been associated with decreased HRQOL (Gudmundsdottir et al., 2004; Lunney and Schnurr, 2007; Schnurr et al., 2006; Schnurr et al., 2009; Schnurr and Lunney, 2011b; Zatzick et al., 1997).

Several studies examining the effect of bipolar disorder on mental HRQOL have been published within the past ten years. A recent systematic literature review concluded that mental HRQOL of bipolar patients was highest in those who were euthymic and significantly lower among patients experiencing acute mood symptoms (Dean et al., 2004). Notably, the review found that patients in depressive episodes reported greater reductions in mental HRQOL than those in manic episodes. In addition, the presence of psychosis, rapid cycling, and substance abuse all negatively impacted mental HRQOL. Finally, the review found an inverse association between mental HRQOL and the number of mood episodes reported by patients.

Preliminary data also suggests that the type of mood episode experienced by a patient may influence the degree of impairment in mental HRQOL. For example, one cross-sectional study assessed mental HRQOL across mood states in 86 patients with bipolar disorder at four Department of Veterans Affairs medical centers (Vojta et al., 2001) and demonstrated that although both mania and hypomania decreased scores for mental HRQOL, depressive symptoms had the most significant negative influence on mental HRQOL in patients with bipolar disorder. Furthermore, mixed mood symptoms were found to negatively impact mental HRQOL to nearly the same extent that depressive symptoms did, indicating that the presence of depressive symptoms during a mood episode plays a salient role in contributing to impairments in mental HRQOL among patients with bipolar disorder.

Additional studies provide evidence for the relationship between depressive symptoms and reduced mental HRQOL. For example, one study summarized data from seven large, randomized, double-blind safety and efficacy trials that employed the Short Form-36 Health Survey (SF-36) to assess mental HRQOL in 920 bipolar patients who had recently experienced an episode of acute bipolar depression (Yatham et al., 2004). Findings included a significant inverse correlation between mean SF-36 scores and depression scores on the Hamilton Rating Scale for Depression (HAM-D). This study also reported that mean SF-36 scores were lower than published HRQOL data in samples with unipolar depression on four of eight scales on the SF-36.

Depressive symptoms experienced by patients diagnosed with bipolar disorder may result in greater impairments in mental HRQOL than the impairments reported by patients with unipolar depression. A study of mental HRQOL in subjects with both unipolar and bipolar depression used the World Health Organization Quality of Life Instrument Short Version (WHOQOL BREF) and controlled for severity of depressive symptoms using the Beck Depression Index (BDI), assessing 89 patients with unipolar depression and 25 patients experiencing bipolar depression (Berlim et al., 2004). The bipolar group demonstrated significantly lower scores on the scale “Psychological Quality of Life” than the unipolar group, even when controlling for depression symptom severity. However, the study did not propose a hypothetical mechanism that might account for this difference.

A study of baseline HRQOL data for the first 2000 participants in the Systematic Treatment Enhancement Program for Bipolar Disorder using the SF-36 and Quality of Life Enjoyment and Satisfaction Quotient (QLESQ) (Zhang et al., 2006) demonstrated that for the bipolar population studied, mental HRQOL scores fell significantly below national average (mean (SD) =31.8 (13.7), where 50 is considered “average”). Bivariate analysis showed significant differences in mental HRQOL based on mood state where depressive symptoms correlated with lower scores on both the mental and physical subscales of the SF-36 as well as overall QLESQ score. These differences remained for mental HRQOL and overall QLESQ scores after covariate analysis accounting for sociodemographic and clinical covariates.

Finally, a one year prospective study of 334 Veterans diagnosed with bipolar disorder used the SF-12 (Kilbourne et al., 2009b) to predict changes in mental HRQOL scores based on multivariate linear regression models and path analysis. Consistent with the findings cited previously, depressive symptoms were associated with lower mental HRQOL scores both at baseline and a year later, while a Bipolar II or PTSD diagnosis had no effect on HRQOL. Illicit drug use was also found to be associated with decreased mental HRQOL.

A growing body of literature suggests that PTSD is independently associated with a significantly decreased HRQOL. An archival analysis of data from the National Vietnam Veterans Readjustment Study examined correlation between presence of PTSD diagnosis and HRQOL (Zatzick et al., 1997). Scores for diminished well-being, physical limitations, compromised physical health, and unemployment were significantly correlated with PTSD. Of note, 73% of the Veterans with PTSD also were diagnosed with comorbid major depressive disorder.

More sophisticated analyses have also examined the effect of PTSD symptom severity on HRQOL by accounting for the mediating effects of depression and anxiety. Gudmondsdottir and colleagues used structural equation modeling to show that the direct negative influence of PTSD on QOL may be more accurately explained by the intensity of PTSD symptoms. Specifically, more intense PTSD symptoms exacerbate anxiety and depression which in turn serve to further decrease HRQOL (Gudmundsdottir et al., 2004).

Several studies led by the researchers Schnurr and Lunney also examined the effect of chronic exposure to PTSD and QOL. The first examined QOL in 326 male Vietnam Veterans with chronic PTSD who participated in a group therapy trial and found that at baseline, PTSD severity was correlated with poorer psychosocial HRQOL (Schnurr et al., 2006). A second study examining the influence of gender on outcomes (Schnurr and Lunney, 2008) found no significant differences between the genders pertaining to the association between HRQOL and PTSD. In 2009, this group published a review of studies that examined the relationship between PTSD and HRQOL in Veterans of Iraq and Afghanistan (Schnurr et al., 2009). Although the nature of PTSD symptoms experienced by these Veterans was less chronic than their Vietnam counterparts, they experienced similar decreases in HRQOL measures. In their most recent study, the team examined work-related QOL and PTSD in female veterans. All PTSD symptom clusters were independently associated with occupational impairment. Of note, depressive symptoms correlated with all occupational domains measured, independent of PTSD symptom intensity.

Given the high personal and societal costs experienced by patients with this illness (Dean et al., 2004; Michalak et al., 2008), bipolar disorder is an important “tracer condition” in which to study the effects on HRQOL, meaning that it is often studied in standardized comparisons between systems of care and provider groups, controlling for diagnosis severity, comorbidity, and other case-mix variables, to compare outcomes across populations (Clardy et al., 1998; Kessner, 1973). No known studies to date have examined the association between PTSD and HRQOL among patients with bipolar disorder apart from small select samples (Simon et al., 2004). The purpose of this study was to examine the impact of PTSD on HRQOL among patients with bipolar disorder, and whether clinical factors including affective symptoms explain the association.

2. Methods

The Recovery-Oriented Collaborative Care (ROCC) study compared two different strategies to implement an evidenced-based practice for bipolar disorder entitled Life Goals Collaborative Care Model (LGCC) at five community mental health clinics and one primary care setting in Michigan and Colorado. The ROCC protocol underwent approval by Institutional Review Boards at the University of Michigan and the University of Colorado, Denver. Specifics regarding the design and implementation of ROCC are available elsewhere (Kilbourne et al., 2012; Kilbourne et al., 2007). In brief, the ROCC study involved 384 patients from sites randomized to receive enhanced versus standard implementation assistance to promote the uptake of an LGCC intervention. Although ROCC placed a major emphasis on factors having to do with the success of implementation efforts, participant baseline data was available for purposes of this paper.

2.1 Study Overview and Participants

The target population was adults with a clinical diagnosis of bipolar disorder (bipolar I, II, NOS) who were receiving care from the participating clinical sites. Patients diagnosed with bipolar II and NOS were included because functional outcomes have been shown to be suboptimal for these patients. Potential participants were initially identified using International Statistical Classification of Diseases and Related Health Problems, Version 9 codes (ICD-9) from billing data based on at least one outpatient visit. Inclusion criteria included adult mental health patients with a diagnosis of bipolar type I, II, or NOS. Exclusion criteria included any condition that would impede proper conduct of the informed consent process, such as intoxication or dementia. Patients meeting eligibility criteria were invited to participate in the study, underwent an informed consent process, and completed a baseline psychosocial self-report survey.

2.2 Measures

Baseline data were collected by means of a survey administered to patients via paper or computer tablet formats. Questions were read to patients who were not capable of self-administration and their verbal responses were recorded. The scales used to measure the dependent variable, HRQOL, were the Mental and Physical Component Subscales (MCS, PCS) of the SF-12 (Ware et al., 1996). These are subparts of a shortened form of the SF-36 that has been widely tested and cross-validated for measuring mental and physical well-being (Gandek et al., 1998).

PTSD diagnosis was assessed via self-report from the survey, in which participants were asked “Has your doctor ever told you that you have any of the following?” with posttraumatic stress disorder included as one possible answer. Covariates included clinical and demographic factors based on previously published literature. Clinical factors included mood symptoms and alcohol or drug use. Demographic factors included age, sex, race, education level, employment status, and living situation. Depressive symptoms were assessed via the PHQ-9, which is based on the nine DSM-IV criteria for diagnosing major depressive disorder and has been widely tested and validated (Kroenke et al., 2001). Current mood state was measured using the Internal State Scale (ISS), a 15-item self-report measure designed to provide a simple mood state self-report. The ISS consists of 4 subscales: Activation, Well Being, Depression Index, and Perceived Conflict. An algorithm using scores from the Activation and Well Being subscales identifies individuals in manic, depressed, mixed, and euthymic states. Activation, Depression Index, and Perceived Conflict correlate significantly with clinician scaled scores for, respectively, manic symptoms, depressive symptoms, and global psychopathology (Bauer et al., 1991; Bauer et al., 2000; Glick et al., 2003).

Alcohol use was measured with the AUDIT-C scale (Dawson et al., 2005a; Dawson et al., 2005b). Drug use was assessed by querying for type of drug used from a list that included marijuana, cocaine, methamphetamines, other stimulants, abuse of any prescribed drugs, and the category “other” (Kessler et al., 1998). Participants who indicated that they had a positive drug use history were then asked about frequency of use by being asked to specify “once per month or less often”, “2–4 times a month”, “2–3 times a week”, or “4 or more times a week”.

2.3 Data Analysis

For descriptive statistics means and standard deviation were provided for continuous variables, while frequency distribution was used for categorical variables. Chi-square tests for categorical variables (e.g., presence of co-existing psychiatric symptoms) and F tests for continuous variables (e.g., MCS and PCS) were conducted to compare these characteristics between the PTSD vs. non-PTSD groups. Multiple regression models were then used to examine the associations between PTSD status and patients’ perceptions of mental and physical health after adjusting for covariates. For each outcome variable for PCS and MCS, we first fit a regression model without PHQ-9 depression score and ISS-symptom variables (i.e., depression, mixed mood disorder and mania). We then fit a full model with the later variables added as covariates. All analyses were conducted using SAS 9.2 (Cary, NC, USA).

3. Results

3.1. Participant Demographics

Recruitment yielded 384 participants across the seven study sites. Table 2 reports demographic information about participants, who had an average age of 42 and were predominantly female, white, and at least high school educated. 167 of the 384, or 43.5%, of

study patients with bipolar disorder endorsed having been diagnosed with PTSD at some point during their lifetime.

3.2. Bivariate Analyses

Table 3 reports results of bivariate analysis for participants who self-reported PTSD versus those who did not using t-test or chi-squared test. Having self-reported PTSD was significantly associated with lower MCS scores, higher PHQ-9 scores, mood activation as measured by ISS, and female gender. Absence of PTSD was associated with euthymia and hazardous drinking.

3.3. Multiple Regression Models

Table 4 reports results for two covariate regression models. In the base model, which excluded mood symptom ratings, PTSD was significantly correlated with decreased mental HRQOL. After adding PHQ-9 scores, PHQ-9 scores but not presence of PTSD were significantly correlated with decreased MCS scores. Age was associated with increased MCS scores and decreased PCS scores, while hazardous drinking was significantly correlated with increased PCS scores.

In the full model, which included mood symptom ratings, PHQ-9 scores and mood states as measured by Internal State Scale were included as covariates to control for the effects of mood. Hazardous drinking as measured by the AUDIT-C was significantly correlated with increased PCS scores.

4. Discussion

Baseline data from this large, multisite randomized controlled trial found that 43.5% of study participants diagnosed with bipolar disorder and treated in community settings also self-reported a co-morbid diagnosis of PTSD. Bivariate analyses of baseline assessments of such participants diagnosed with bipolar disorder and comorbid PTSD showed a significant relationship between presence of comorbid PTSD and significantly reduced mental and physical HRQOL. Presence of PTSD was also related to elevated PHQ-9 scores, mood activation as measured by ISS, and female gender. These findings are consistent with previous studies establishing this relationship (Gudmundsdottir et al., 2004; Lunney and Schnurr, 2007; Schnurr et al., 2006; Schnurr and Lunney, 2008, 2011a; Schnurr et al., 2009; Schnurr and Lunney, 2011b; Zatzick et al., 1997). However, results also showed a counterintuitive association between hazardous drinking and the absence of PTSD.

The association between PTSD and reduced MCS scores was found to be significant in the initial regression model that did not include PHQ-scores or mood state. This is not surprising given that depressive symptoms, shown in the literature to frequently accompany PTSD and to be strongly related to reduced mental HRQOL, were not yet accounted for (Goldney et al., 2000). Association between increased age, increased MCS scores, and decreased PCS scores is in line with previous studies demonstrating this effect (Fenn et al., 2005). Increased MCS scores might be explained by the possibility that patients who endure mental illness over time develop greater abilities to cope but remain subject to the physical hazards of age.

It may be useful to consider the concept of allostatic load, wherein individuals are predisposed to premature morbidity and mortality via a combination of pathological disease processes and unhealthy behaviors they engage in to cope with negative affective states (Goldstein et al., 2009). Moreover, exposure to certain psychiatric medications (Saarni et al., 2010) may interact synergistically with pathophysiological and behavioral factors to contribute to a higher than average risk for metabolic disorder and obesity (Elmslie et al., 2000; Fagiolini et al., 2008a; Fagiolini et al., 2008b; Gildengers et al., 2008). Without

intervention, these physical risk factors can put these patients at greater risk for cardiac, orthopedic, and other conditions that can further reduce HRQOL.

The relationship between PTSD and reduced MCS score became non-significant in the full regression model when PHQ-9 and mood scores were taken into account. In this model, depressive symptoms as measured by PHQ-9 were associated with lower MCS score while age continued to show significant relationship to improved MCS score. Of the studies reviewed in the introduction section of this paper, Vojta, Zhang, and Kilbourne explicitly mention depressive symptoms as important negative influences on quality of life in bipolar disorder. Gudmundsdottir, Schnurr (2009), and Zatzick found depressive symptoms to have a negative correlation with quality of life in patients with PTSD. Given this consistency of association between depressive symptoms and decreased mental HRQOL in each disorder, the finding of depression as a significantly negative influence on MCS scores in our study sample is not surprising.

Results suggest that there is a system of interdependent factors influencing quality of life in the population with comorbid bipolar disorder and PTSD. Given the findings of our full covariate model and evidence discussed in the introduction section of this paper (Gudmundsdottir et al., 2004), it seems reasonable to speculate that depression has the most direct effect on mental HRQOL, and that the odds of a patient in this population becoming depressed are increased by both bipolar disorder and PTSD. Findings from Goldney and Vojta suggest that depressive symptoms are associated with a downward-spiral phenomena, where depression is correlated with role limitations, decreased occupational function, lower energy levels, and higher likelihood of living in impoverished conditions, all of which have a cumulative negative impact HRQOL over time. Although our study is cross-sectional and thus not representative of change over time, the longitudinal preponderance of depression in bipolar disorder as well as the strong relationship between PTSD and depressive symptoms serves to amplify the clinical importance of the negative effect such depressive symptoms might potentially have on the HRQOL of a given patient over the course of their lifetime (Judd et al., 2002; Judd et al., 2003; Michalak et al., 2008). The question remains of how best to address HRQOL issues in actual practice.

A number of psychopharmacological approaches may have promise towards mitigating psychiatric symptoms experienced by this population. Lithium, lamotrigine, quetiapine, olanzapine, risperidone, and aripiprazole have been found to raise mental HRQOL in patients with bipolar disorder (Chand et al., 2004; Endicott et al., 2008; Hirschfeld et al., 2006; Keck et al., 2003; Namjoshi et al., 2004; Zarzar et al., 2007), while use of divalproic acid has not been shown to lead to such improvement (Revicki et al., 2003). None of these studies looked specifically at patients with comorbid PTSD.

Although the SSRI-class antidepressants sertraline and paroxatine also hold FDA approval for treatment of PTSD and therein the promise of addressing a wide spectrum of symptoms through use of a single medication, the potential for induced mood switch may be an unacceptable risk for many patients in this cohort (Altshuler et al., 2006; Brady and Clary, 2003; Leverich et al., 2006; Marshall et al., 2001; Post et al., 2001; Post et al., 2006). Some evidence suggests that adjunctive use of lithium may mitigate switch risk (Henry and Demotes-Mainard, 2003) but this combination may not be tolerable or otherwise acceptable for all patients. In addition, there is evidence that lithium is less effective in bipolar patients with concurrent anxiety disorders (Boylan et al., 2004) and also less effective in patients in mixed-manic states (Perlis et al., 2004).

In addition to pharmacological treatments, a number of effective psychosocial approaches are recommended to treat aspects of both mental disorders. For treatment of depression,

cognitive behavioral therapy (CBT) and interpersonal therapy (IPT) carry the most evidence of effectiveness in the short term (APA, 2000) and have also been shown to reduce risk of relapse and recurrence (Frank et al., 1990; Jarrett et al., 2001). Several reviews (Amstadter et al., 2007; Bomyea and Lang, 2012; Pietrzak et al., 2011) describe psychosocial interventions appropriate for PTSD including prolonged exposure, cognitive therapy, anxiety management training, psychoeducation, interpersonal therapy, acceptance and commitment therapy, psychodynamic therapy, and attention modification. Evidenced-based psychosocial modalities such as cognitive behavioral, interpersonal, social rhythm, and family focused therapies, psychoeducation, behavioral activation, and collaborative care strategies (Castle et al., 2010; Kilbourne et al., 2005; Kilbourne et al., 2009a; Kilbourne et al., 2009b; Michalak et al., 2005; Miklowitz and Otto, 2007; Patelis-Siotis et al., 2001; Zaretsky et al., 2008) are available for patients with bipolar disorder. Given evidence of effectiveness across all three disorders of concern, cognitive and interpersonal therapy appear to be strong choices for treating the comorbid bipolar/PTSD population, although selection of therapy in any given case will depend on situational factors and availability.

This study is not without limitations. One limitation is a possible lower threshold for PTSD diagnosis by self-report as compared to use of structured interviews. Most available evidence regarding accuracy of self-reported diagnoses is from general internal medical studies, results of which indicate that reliability of such reports is good but not perfect. Rates of concurrence were between 82 and 96% when the diagnostic information requested from patients was relatively simple, such as being able to identify osteoarthritis vs. fracture as cause for hip replacement (Parimi et al., 2010) or knowing whether or not one had hyptertension (Alonso et al., 2005). For conditions with more complex diagnostic criteria, such as chronic bronchitis, accuracy of self-report ran as low as 12.5% (Bobadilla et al., 2002). Accuracy was higher in populations that were older and more educated; our population's average age was 42 with the majority at least high school educated. Given these characteristics as well as the fact that even formal diagnostic scales for PTSD rely on patient self-report of symptoms, we estimate that accuracy of self-reported PTSD diagnosis in this study was closer to the 82–96% range than the 12.5% found in the bronchitis study. In addition, evidence suggests that PTSD symptoms are generally underreported in primary care settings, leading to decreased rates of diagnosis (Lecrubier, 2004) which could potentially skew rates of self-report due to a high false-negative rate.

The higher than typical rate of bipolar/PTSD comorbidity found in this study may be due to an increased false-positive rate but could also suggest differences in this study population as compared to those of previous studies that yielded lower rates, such as greater exposure to trauma in their daily environment. In either event, it is unlikely that potentially lowering the diagnostic threshold across the sample by the use of self-reported diagnosis would bias the associations demonstrated in this study.

Furthermore, in considering our somewhat higher finding of bipolar/PTSD comorbidity than rates of lifetime comorbidity found in other public sector samples as discussed in the introduction, it is worth noting that the rate in this study is fairly well aligned with Kessler's finding of 39% lifetime comorbidity in the community population sampled for the National Comorbidity Study (Kessler et al., 1997), which is arguably the closest possible representation of a "true" community sample. In addition, evidence regarding higher prevalence of PTSD rates in women should be considered given the that the ROCC study sample was 66.67% female (Lilly and Valdez, 2012). Evidence also shows that odds of a bipolar patient having a comorbid anxiety disorder increase substantially after age 30, and also with the number of years since diagnosis of bipolar disorder (Sala et al., 2012).

Finally, the finding that those abusing alcohol reported higher PCS scores might be due to a tendency of patients with substance use disorders to have impaired perception of HRQOL (Havassy and Arns, 1998). It might also be an artifact of the most physically ill segment of the study population being unable to tolerate alcohol, thus skewing response data so that highest PCS scores correlated with alcohol abuse without actually indicating a cause/effect relationship.

In conclusion, this cross sectional study found that PTSD was a common psychiatric comorbidity among a large sample community-based mental health patients treated for bipolar disorder and that this combination of psychiatric disorders significantly undermines HRQOL. These findings underscore the importance of proper screening and treatment for these two debilitating conditions because impairments in HRQOL are closely related to individuals being able to achieve important recovery outcomes. Though further research is required before specific mechanisms and the relationships between them can be definitively stated, depressive symptoms appear to be largely responsible for decreased HRQOL in the population of bipolar patients who participated in the ROCC study. Given the inherent difficulties and potential lack of effectiveness presented by psychopharmacological intervention, clinicians working with these patients may choose to emphasize psychosocial treatments as important towards improving HRQOL for this group, especially those that emphasize increased social support.

Acknowledgments

Role of Funding:

This work was supported by NIMH (R01 MH79994 to AMK) and the Department of Veterans Affairs Research Grant (IIR 10-314 to MSB). The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

The authors wish to thank Kristen Abraham and Kristina Nord who generously assisted with the literature search portion of this project.

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Table 1

Rates of Comorbid Bipolar Disorder and PTSD in Prior Studies

Study	Population	Rate of Current Comorbidity	Rate of Lifetime Comorbidity
Keck 1995 (Keck et al., 1995)	71 inpatients admitted for mania/mixed mania	n/a	17%
Kessler 1997 (Kessler et al., 1997; Kessler et al., 1995)	29 bipolar I patients responding to National Comorbidity Study	n/a	39%
Mueser 1998 (Mueser et al., 1998)	50 in- and outpatients	40%	n/a
Strakowski 1998 (Strakowski et al., 1998)	77 patients on first admission for psychosis, all manic/mixed episodes	4%	21%
McElroy 2001 (McElroy et al., 2001)	288 bipolar I/II patients from community outpatient setting	7%	n/a
Neria 2002 (Neria et al., 2002)	102 patients on first admission for psychosis	n/a	11%
Simon 2003 (Simon et al., 2003)	122 treatment seeking outpatients	19%	n/a
Simon 2004 (Simon et al., 2004)	475 treatment- seeking outpatient bipolar I/II patients from STEP-BD	5%	17%
Bauer 2005 (Bauer et al., 2005)	328 inpatient veterans w/bipolar disorder	25%	28%
Kilbourne 2009 (Kilbourne et al., 2009b)	334 patients enrolled in Continuous Improvement for Veterans in Care: Mood Disorders study	n/a	22%

Table 2

Patient characteristics

	N (%)
Demographics	
Age, years (mean±SD)	42.0±11.3
Female	256 (66.7)
White	261 (70.7)
> High school education	324 (85.7)
Employed	89 (23.2)
Live alone	126 (33.5)
History of homelessness	148 (40.0)
Clinically significant affective symptoms	
SF-12 MCS, mean (SD)	31.8 (8.4)
SF-12 PCS, mean (SD)	36.5 (7.5)
ISS Depression, mean (SD)	7.7 (6.0)
ISS Activation, mean (SD)	20.3 (12.7)
ISS Wellbeing, mean (SD)	16.9 (7.8)
PHQ9, mean (SD)	13.0 (6.4)
PHQ9 Score ≥10	261 (68.0)
Health Behaviors	
Hazardous Drinking	57 (15.8)
Hospitalized in past 6 months	97 (25.7)
Visited ER in past 6 months	124 (33.7)
Substance use in the past year	122 (31.8)
Current smoker	190 (57.6)
Self-reported Medical Risk Factors	
Hypertension	121 (32.4)
Arthritis/Pain	188 (50.1)
Coronary artery disease	17 (4.6)
Myocardial infarction	14 (3.8)
Depression	358 (95.7)
PTSD	167 (44.9)
Diabetes	59 (16.1)
Dyslipidemia or family history	173 (46.9)
MI family history	106 (29.4)

Table 3

Results of Bivariate Analysis

	PTSD (n=167)	No PTSD (n=217)	t-test or Chi-Square	p-value
SF-12 Health-Related Quality of Life				
MCS-12	30.51 (8.22)	32.86 (8.35)	−2.63	<0.01
PCS-12	35.56 (7.77)	37.21 (7.20)	−2.06	0.04
Mood Symptoms				
PHQ-9	14.74 (6.05)	11.65 (6.36)	4.81	<0.01
ISS				
Activation scale	22.91 (12.46)	18.30 (12.46)	3.58	<0.01
Well-being scale	16.38 (7.71)	17.21 (7.82)	−1.03	0.30
Specific ISS Mood States			11.66	<0.01
Euthymia	31 (20.81)	71 (36.22)		
Depression	7 (4.70)	3 (1.53)		
Mixed	36 (24.16)	38 (19.39)		
Mania	75 (50.34)	84 (42.86)		
Demographic Characteristics				
Age, yrs (SD)	42.24 (10.32)	41.89 (12.11)	0.31	0.75
Female	134 (80.24)	122 (56.22)	24.49	<0.01
White	116 (69.88)	145 (71.43)	0.11	0.74
College education	27 (16.27)	44 (20.75)	1.23	0.26
Unemployed	130 (77.84)	149 (68.66)	4.00	0.04
Health Behaviors				
Hazardous drinking - past month	53 (31.93)	87 (41.63)	3.72	0.05
Any illicit sub use -past year	59 (35.33)	64 (29.49)	1.48	0.22

Table 4

Results of Covariate Regression Models

	MCS-12				PCS-12			
First model	**β**	**95% CI**	**t**	**p**	**β**	**95% CI**	**t**	**p**
PTSD	−2.10	−3.95, −0.25	−2.23	0.02	−1.11	−2.73, 0.51	−1.34	0.18
Age	0.13	0.05, 0.22	3.15	<0.01	−0.15	−0.22, −0.08	−4.00	<0.01
Female	−0.11	−2.08, 1.86	−0.11	0.91	−1.53	−3.26, 0.20	−1.73	0.08
White	−0.02	−1.99, 1.96	−0.02	0.98	0.48	−1.25, 2.21	0.54	0.58
≥College education	0.21	−2.18, 2.61	0.18	0.86	1.26	−0.83, 3.36	1.18	0.23
Unemployed	−0.91	−2.96, 1.14	−0.87	0.38	−0.97	−2.77, 0.83	−1.06	0.29
Hazardous drinking	0.62	−1.30, 2.55	0.63	0.52	1.66	−0.03, 3.35	1.93	0.05
Any illicit sub use	−0.06	−2.09, 1.98	−0.06	0.95	−0.96	−2.74, 0.82	−1.05	0.29
Full model	β	95% CI	t	p	β	95% CI	t	p
PTSD	−0.12	−1.74, 37.83	−0.15	0.88	−0.58	−2.23, 1.07	−0.69	0.49
Age	0.11	0.04, 0.18	3.00	<0.01	−0.16	−0.23, −0.08	−4.19	<0.01
Female	0.23	−1.46, 1.92	0.27	0.79	−1.25	−2.97, 0.48	−1.42	0.15
White	0.59	−1.10, 2.28	0.68	0.49	0.45	−1.27, 2.18	0.52	0.60
≥College education	0.39	−1.66, 2.44	0.37	0.71	1.24	−0.85, 3.33	1.16	0.24
Unemployed	−0.06	−1.83, 1.72	−0.06	0.95	−0.71	−2.52, 1.09	−0.77	0.44
AUDIT-C	0.26	−0.11, 0.64	1.40	0.16	0.51	0.13, 0.89	2.65	<0.01
Any illicit sub use	0.15	−1.60, 1.89	0.16	0.87	−1.08	−2.86, 0.70	−1.19	0.23
PHQ-9 score	−0.63	−0.77, −0.49	−8.90	<0.01	−0.16	−0.30, −0.02	−2.24	0.02
ISS-Mania	1.43	−0.56, 3.41	1.41	0.16	0.04	−1.98, 2.07	0.04	0.96
ISS-Mixed	−1.48	−4.15, 1.19	−1.09	0.28	−1.05	−3.77, 1.67	−0.76	0.44
ISS-Depression	−1.89	−4.85, 1.08	−1.25	0.21	0.58	−2.44, 3.59	0.38	0.70