

Original Research

## **Impacts of Mindfulness-Based Cognitive Therapy (MBCT) on the Psychological and Functional Wellbeing of Patients with Bipolar Disorders**

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### **Abstract**

**Background:** This study investigated variations in psychic and somatic anxiety during and after completion of MBCT compared to baseline in patients diagnosed with BD. Secondary



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variables considered were sleep quality and quality of life, as well as depressive and manic symptoms.

**Methods:** HAMD-29, HAMD-7 and YMRS were administered at baseline (n=34), and every two weeks until the end of the eight-week program. PSQI (n=22) and Q-LES-Q-SF (n=29) were also administered at pre, mid- and post- MBCT assessments.

**Results:** Twenty-four (n=24) participants completed at least four out of the eight sessions of MBCT. Post-intervention relative to baseline, psychic anxiety dropped largely (Cohen  $d=0.74$ ), whilst somatic anxiety remained unchanged (Cohen  $d=-0.01$ ). In subgroups based on pre-MBCT mental status (anxious/non-anxious, depressed/non-depressed), anxious participants sustained a very strong decline in anxiety (Cohen  $d=1.67$ ), enough so that they no longer differed from non-anxious participants post-MBCT ( $p=0.261$ ). A similar post-MBCT convergence was observed between depressed vs. non-depressed participants at baseline (Cohen  $d=1.03$ ). A slight surge of depressive, anxious, and manic symptoms was noted at Week 6. Sleep quality and quality of life improved post-MBCT relative to baseline with a moderate effect size (Cohen  $d=0.57$  and  $0.70$ , respectively).

**Conclusions:** BD diagnosed participants with more symptoms of anxiety and depression at baseline appeared to benefit the most from MBCT. A strong effect on psychic anxiety was found, but none on somatic anxiety. Better sleep quality and quality of life were observed. Manic symptoms improved slightly. More research, especially randomized control trials, are warranted.

### **Keywords**

Bipolar Disorders; mindfulness-based cognitive therapy; anxiety; depression; third wave; meditation

## **1. Introduction**

Bipolar disorders (BD) are severe and recurrent psychiatric illnesses. BD are characterized by abnormal mood swings, including feelings of euphoria, irritability, and psychomotor acceleration during hypomania or mania, and feelings of sadness, loss of interest, and futility during depressive episodes. BD affect about 2% of the population and generate important personal and societal costs [1].

The most prevalent comorbidity associated to BD is anxiety [2]. About 50% to 75% of patients with BD will suffer from an anxiety disorder (BD-A) during their lifetime, causing significant distress and/or difficulties in social and professional functioning, regardless of bipolar type [2, 3, 4]. In the Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD) [5], patients with BD-A attempted suicide twice as often as those with BD alone. A systematic literature review, [6] suggested that BD-A is associated with an earlier age of BD onset, more chronic symptoms of BD, worse quality of life, difficulties in assuming a productive role in society, slower recovery from a mood episode, diminished response to psychopharmacological treatments, and more suicidal behaviors. Hamilton [7] distinguished psychic anxiety (a feeling of mental agitation and psychological distress) from somatic anxiety referring to physical complaints (muscle aches, dry mouth, etc.). No studies involving psychosocial treatment for BD took this distinction into account.

Medication is the cornerstone of BD treatment. Patients are often prescribed a polypharmacy that does not completely eliminate symptoms detrimental to psychosocial functioning, for example insomnia, lack of energy, anxiety and, poor concentration [8]. Psychoeducation, Cognitive Behavioral Therapy (CBT), and Interpersonal and Social Rhythm Therapy (IPRST) have shown some interesting benefits [9, 10, 11] but a substantial proportion of BD patients remain symptomatic. This underlines an urgent need to develop new psychotherapeutic approaches, adjuvant to medication, in order to reduce BD symptoms, and promote illness acceptance and wellbeing despite chronicity.

Mindfulness refers to paying attention on purpose, in the present moment, non-judgmentally [12]. Mindfulness-Based Cognitive Therapy (MBCT) [13] constitutes one of many adaptations based on Kabat-Zinn's Mindfulness-Based Stress Reduction Program (MBSR), an eight-week secular program aiming at developing a different way of being with experience [12]. MBCT combines mindfulness meditation exercises from MBSR with tools from CBT (psychoeducation, metacognitive training, early symptoms detection, and corrective action plan). MBCT was originally developed as a maintenance program to prevent relapse in major depression [13]. Studies showed MBCT effectively does so [14, 15] or at least delays relapse [16]. A systematic review [17] documents the applicability and efficacy of MBCT also for insomnia [18], bulimia [19], suicidal behaviors [20, 21], panic and generalized anxiety disorders [22, 23], cancer [24], hypochondria [25], social phobia among adolescents [26], and attention deficit hyperactivity disorder [27]. However, a meta-analysis on mindfulness-based interventions [28] raises caution against portraying these approaches as universal panaceas. As a matter of fact, that meta-analysis did not support mindfulness' benefits for current anxiety disorders albeit results were more encouraging for depression. A lack of statistical power may explain shortcomings for current anxiety, so additional studies are needed before drawing any firm conclusion. A few studies, mostly pilots with small samples, investigated the efficacy of MBCT in BD, and some took into account the anxious comorbidity.

Williams et al. [29] used a subsample (n=14) from a previous study investigating MBCT effects on patients with a history of suicidal ideations or behaviors [15]. Although anxiety was not the primary outcome investigated, a statistical significant decrease of anxiety after MBCT treatment was found for patients with BD, whereas none was found for patients with unipolar depression. A subsequent pilot study [30] added psychoeducation about manic polarity and potential relapse triggers (interpersonal conflicts, sleep/wake disruptions) to MBCT. A non-significant trend towards improvement of depressive, manic, and anxious symptoms was found but the very small sample size (n=8) made the results inconclusive. A randomized control trial [31] with bipolar patients assigned either to treatment as usual (medical visits; n=47) or to MBCT plus treatment as usual (n=48) confirmed a significant statistical decrease of state anxiety scores, although the primary outcomes (time to depressive or hypomanic/manic relapse, number or severity of episodes at 12 months post-MBCT) were not significant. An important limitation was the attrition rate since only 22 of the 48 patients randomized to MBCT completed the 12-month follow-up interviews. Deckersbach et al. [32] investigated whether MBCT for BD could reduce residual mood symptoms and increase mindfulness, emotion-regulation abilities, psychological well-being, positive affect, and psychosocial functioning. The number of weekly sessions was augmented from 8 to 12 to include teaching of problem solving skills and compassion meditation. Home practice time requirements were reduced to better fit the needs of participants with BD and preventing

dropouts, given participants frequent struggles with attention and disorganized schedules [32]. At the end of MBCT and even more at the three-month follow-up, anxious rumination had significantly and importantly decreased. However, another pilot study with type I BD patients did not find any effects on anxiety symptoms post-MBCT [33]. However, data was available only for 12 participants, which could explain the lack of effect. A recent meta-analysis [34] reviewed 13 studies on MBCT and BD. Main findings suggest that MBCT does not precipitate mania, and preliminary evidence support positive effects on anxiety, residual depression, mood regulation, and broad attentional and frontal-executive control. An also recent study suggested long-term benefits of MBCT for BD, more precisely a heightened subjective awareness of self-capacity to improve one's health [35].

Psychic and somatic anxiety can impact quality of life and sleep. BD-A was associated with a poorer quality of life than BD only [36]. On the other hand, according to IPSRT, sleep quality exerts an important protective effect on mood stability, often making the difference between euthymia (normal or stable mood) and relapse [10].

Studies highlight possible benefits of mindfulness for BD-A and its correlates but have focused on depressive and manic symptoms as primary outcomes, before, after MBCT, and sometimes at follow-up. Anxiety was a secondary outcome, with only one of its two dimensions considered. The originality of the current study lies in the examination of specific effects of mindfulness on psychic and somatic anxiety during and after MBCT, and their relations to sleep, quality of life, and mood in the context of BD. Based on the results of prior studies, a steady decrease in psychic and somatic anxiety symptoms, as well as in depressive and hypomanic symptoms, and gradual improvements in quality of life and sleep were expected compared to baseline in BD patients.

## **2. Method**

### **2.1 Participants**

A total of 123 individuals from the Bipolar Disorders Clinic of the Douglas Mental Health University Institute (Montreal) were screened by experienced research assistants. Thirty-four patients who met inclusion criteria were recruited, having heard of the study through their treating psychiatrist, caseworker, or flyers in the waiting room. A preliminary meeting was held to explain the study and MBCT program. Written informed consent was obtained prior to beginning the intervention. The study had been approved by the Research Ethics Committee. Inclusion criteria were: (1) documented medical diagnosis of BD (BD-I, BD-II); (2) BD judged stable by the treating psychiatrist for at least one month; (3) motivation to practice mindfulness exercises 20 minutes daily at home; (4) completion of the equivalent of a high school diploma (around age 17). Exclusion criteria were: (1) previous participation to MBCT or MBSR; (2) electroconvulsive therapy (ECT) during the last six months; (3) severe and persistent suicidal ideations; (4) untreated PTSD; (5) personality disorder in foreground; (6) rapid cycling or cyclothymia; (7) diagnosis of BD secondary to a medical condition, or induced by a substance (for example tumor, cocaine consumption), or not otherwise specified; (8) active psychotherapy (more than once a month); (9) active practice of meditation or yoga (more than once a week); (10) attendance of a psychoeducational workshop on BD in the last six month; (11) anticipating to miss more than two MBCT sessions; (12) substance abuse (according to DSM-IV-TR).

## **2.2 Procedure**

Participants were met by a research assistant in the week preceding MBCT to gather sociodemographic data and complete pre-MBCT questionnaires. Hamilton Depression Rating Scale (HAMD), Young Mania Rating Scale (YMRS) were repeated at Weeks 2, 4, 6, and 8 (i.e. post-MBCT). Pittsburgh Sleep Quality Index and Quality of Life Enjoyment and Satisfaction Questionnaire- Short Form were administered at Weeks 0, 4 and 8. In total, four groups were held.

Following criteria were used to determine withdrawal from intervention: (1) important suicidal thoughts; (2) important depressive symptoms (HAMD  $\geq$  15); (3) important hypomanic/manic symptoms (YMRS  $\geq$  12); (4) psychotic symptoms; (5) clinical judgment of the instructor or treating team; (6) disruptive participant in spite of discussions with the instructor to rectify the situation; (7) participant's expressed wish to withdraw from the study. During the preliminary meeting, participants consented that the instructor could communicate with the treating psychiatrist or caseworker if needed. They were also encouraged to discuss any adverse effects in the group, during weekly practice inquiry, or privately with the instructors, caseworker, or psychiatrist. A written mid-group assessment was completed where participants were specifically asked about such adverse effects. No such effects were reported through any of the aforementioned indicators.

## **2.3 Treatment**

MBCT is an eight-week group program held weekly for 2 to 2.5 hours. Sessions teach participants formal and informal mindfulness practices with concrete exercises and discussions around organized themes (e.g., mindlessness or "automatic pilot", etc.). Each group included between 10 and 15 participants. For homogeneity of treatment, the manualized version of MBCT was used [13]. Written documentation and audio CD's were given to patients to practice daily, six days a week, at home. Formal mindfulness practices include the body scan (paying attention to physical sensations in different parts of the body sequentially), sitting meditation (paying attention to the breath or body parts, and later in the program to thoughts, emotions), hatha yoga or mindful movements, and mindful walking. Informal practices refer to daily activities that can be done mindfully (brushing teeth, taking a shower, etc.). Patients filled weekly logs to record home practice. Other home assignments included filling pleasant/unpleasant events calendars. Adjustments were made to encourage study retention and adherence to practice for BD participants. Ms. Susan Woods, an experienced MBCT instructor (private practice, Stowe, Vermont), was consulted (personal communication, September 2013). Suggestions included (1) shortening exercises to 20 minutes daily, (2) introducing mindful movements in early sessions to help participants cope with anxiety, and (3) adding manic polarity to psychoeducative exercises. More specifically, duration of exercises was shortened to promote adherence to daily practice in participants experiencing concentration difficulties and residual depressive symptoms (e.g. lack of energy, diminished interest for activities, sleepiness). Four groups were led by N. Poirier who cumulated over 10 years of experience as a clinical psychologist and was trained in MBCT by Dr Zindel Segal, Ph.D, and Ms Susan L. Wood. Professor S. Goulet was trained in MBSR by Jon Kabat-Zinn and Saki Santorelli, in Mindfulness-Based Cancer Recovery (MBCR) at the Tom Baker Cancer Center (University of Calgary, CA) by Linda Carlson, Michael Specia, and Shirley McMillan, and in

MBCT by Dr. Claude Fournier (Quebec City). S. Goulet is also an expert in mindfulness in the context of mild cognitive impairment with comorbid depression and anxiety symptoms [37, 38, 39, 40].

### **3. Assessment**

*Hamilton Depression Rating Scale (HAMD)*. The HAMD [7] is a semi-structured, clinician administered scale containing 7, 21 or 29 items to assess severity of depressive symptoms within the last seven days. HAMD-29 specifically was used in the current study. According to Bagby et al. [41] retest reliability for the Hamilton depression scale ranges from 0.81 to 0.98. The internal, interrater, and retest reliability estimates for the overall Hamilton depression scale are mostly good, as are the internal reliability estimates at the item level. Similarly, established criteria are met for convergent, discriminant, and predictive validity.

*Young Mania Rating Scale (YMRS)*. The YMRS [42] is an 11-item clinician administered widely used scale to rate the severity of manic symptoms based on the last 48 hours. Young et al. report high correlation between the scores of two independent clinicians on both the total score (0.93) and the individual item scores (0.66 to 0.92). Validity and sensitivity of the scale are also reported to be adequate.

*Pittsburgh Sleep Quality Index (PSQI)*. The PSQI [43] translated in French [44] is a 19-item self-report questionnaire on global quality of sleep and its disruptions in the last month. Acceptable measures of internal homogeneity, consistency (test-retest reliability), and validity were reported. A global PSQI score > 5 yielded a diagnostic sensitivity of 89.6% and specificity of 86.5% ( $\kappa=0.75$ ,  $p < 0.001$ ) in distinguishing good and poor sleepers [43].

*Quality of Life Enjoyment and Satisfaction Questionnaire- Short Form (Q-LES-Q-SF)*. The Q-LES-Q-SF [45] is a self-report questionnaire constituted by the first 14 items of the Q-LES-Q assessing satisfaction in multiple life domains (e.g. physical health, economic status, interpersonal relationships, etc.). Test-retest reliability is estimated between 0.74 and 0.86. Internal consistency and test-retest coefficients were estimated at 0.9 and 0.93, respectively [46].

#### **3.1 Statistical Analysis**

Intra groups, pre-, mid-, and post- intervention analysis were achieved with SPSS version 20.0. Considering the small sample size and heterogeneous distribution of variance, non-parametric statistics were selected. Mann-Whitney's *U* test for unique and related samples, and Spearman's Rho correlations were used to analyze pre- to post- MBCT differences. To assess correlations, post-minus pre- MBCT scores were calculated, and differences were correlated. Cohen's *d* was used to calculate effect sizes. Statistical significance threshold was set at 0.05. Descriptive data were also collected to characterize the sample.

### **4. Results**

Table 1 summarizes baseline demographic characteristics. Participants ( $n=24$ ) completed an average of 5.21 sessions (minimum=1, maximum=8) of MBCT ( $SD=2.06$ ). Of the 34 patients at entry, 10 dropped out. Reasons included lack of interest for MBCT or intolerable anxiety. Post-MBCT data was available for  $n=24$  (HAMD, YMRS),  $n=21$  (Q-LES-Q-SF), and  $n=20$  (for PSQI)

participants who attended at least four of the eight sessions (completers). PSQI and Q-LES-Q were introduced later in the study. T-tests for related samples showed no significant difference in attendance regarding gender, bipolar type, or age. Spearman’s Rho indicated no significant correlation between age and session attendance. No adverse effect of MBCT was reported during regular medical appointments, apart from raise in psychic and somatic anxiety during session and home practice that some participants reported during group discussions and in weekly logs. Weekly logs data was consistent with good adherence to home practice (six days out of seven, for 20 minutes).

**Table 1** Baseline demographic characteristics for completers (n=24).

Characteristics	n	%
Age		
19-35	5	21
36-49	7	29
50-63	12	50
Gender		
Female	11	54.2
Male	13	45.8
Bipolar Type		
I	9	37.5
II	15	62.5

#### 4.1 Outcome Measures

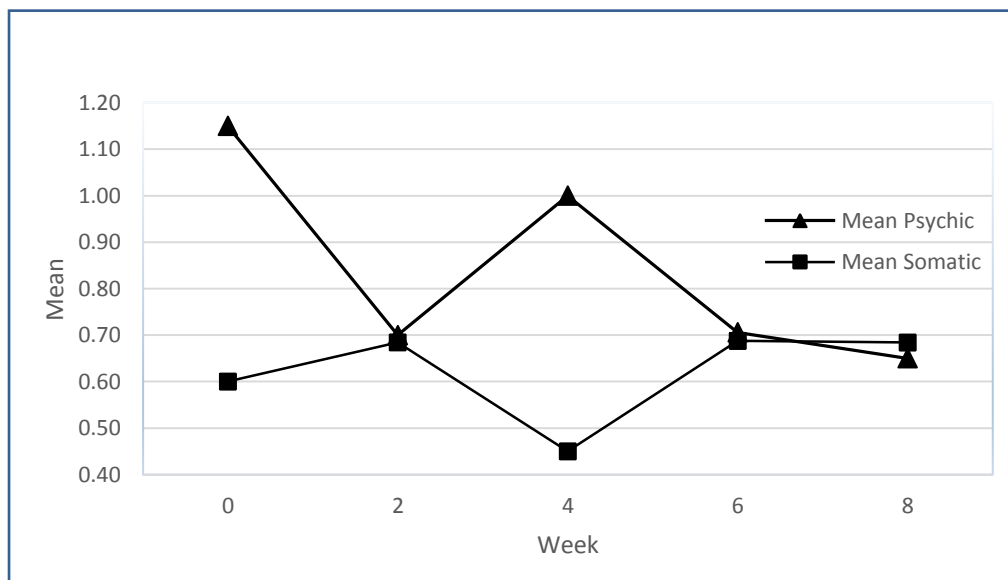
Table 2 summarizes results for completers (n=24) on YMRS, HAMD-29, and HAMD-7. Pre- to post- MBCT, scores of manic symptoms showed a steady decrease, with a small surge in symptoms at Week 6 before decreasing again. Likewise, scores on both HAMD scales diminished gradually throughout the program except for Week 6 where depressive and anxious symptoms were more present. Figure 1 displays variations in psychic and somatic anxiety across intervention.

**Table 2** Bi-Weekly scores for HAMD-29, 7 and YMRS with effect size for completers (n=24).

Week	Session Theme	HAMD-29			HAMD-7			YMRS		
		M(SD)	Cohen’s <i>d</i>	<i>p</i>	M(SD)	Cohen’s <i>d</i>	<i>p</i>	M(SD)	Cohen’s <i>d</i>	<i>p</i>
0	-	10.58 (8.04)	-	-	5.79 (4.59)	-	-	2.33 (3.19)	-	-
1	Automatic Pilot	-	-	-	-	-	-	-	-	-

2	Dealing with Barriers	9.50 (10.51)	0.12	0.354	4.46 (5.31)	0.28	0.076	2.13 (3.26)	0.06	0.819
3	Mindfulness of the Breath	-	-	-	-	-	-	-	-	-
4	Staying Present	8.33 (6.26)	0.14	0.714	4.38 (3.88)	0.02	0.924	1.75 (2.56)	0.13	0.567
5	Allowing/Leaving be	-	-	-	-	-	-	-	-	-
6	Thoughts are not Facts	8.50 (6.09)	-0.03	0.161	4.56 (3.82)	-0.05	0.174	2.21 (3.43)	-0.15	0.471
7	How can I best Take Care of Myself	-	-	-	-	-	-	-	-	-
8	Using what was Learned to Deal with future	7.11 (6.53)	0.22	0.231	3.84 (3.32)	0.20	0.304	1.53 (3.22)	0.20	0.551
Pre-Post			0.47	0.355		0.49	0.225		0.25	0.721

Note: HAMD, Hamilton Depression Rating Scale; YMRS, Young Mania Rating Scale.



**Figure 1** Bi-weekly mean psychic and somatic anxiety scores on HAMD-29 for MBCT completers (n=24).



To better assess the impact of MBCT on depression, psychic and somatic anxiety and explore whether more anxious or less anxious participants (with psychic and somatic anxiety confounded) depressed or less depressed benefited more from the intervention, completers were split into subgroups: depressed (n=14)/non-depressed (n=10), anxious (n=9)/non-anxious (n=15). A cut-off score for depression of 8 or more on the HAMD-29 was determined according to literature [7]. For the anxious subgroup, a score of 2 or more on items 10 and/or 11 of the HAMD-29 (psychic and somatic anxiety, respectively) had to be present. According to DSM 5 definition of anxiety disorders, significant distress related to symptoms is a landmark [1], hence the choice of cut-off scores. Seven out of twenty-four participants (29%) reached criteria for both anxiety subgroups. At entry, 3/9 completers met criteria for both psychic and somatic anxiety, 4/9 for psychic anxiety alone, and 2/9 for somatic anxiety. Table 3 summarizes the results. At the end of MBCT, there were no significant differences between anxious and non-anxious participants ( $p=0.261$ ), nor between depressed and non-depressed participants ( $p=0.604$ ). Results could not be explained by a deterioration of the non-anxious or non-depressed subgroups. Psychic anxiety scores post-MBCT strongly correlated with scores on HAMD-29 ( $Rho=0.639$ ,  $p=0.003$ ) and HAMD-7 ( $Rho=0.602$ ,  $p=0.006$ ). Somatic anxiety scores also correlated with HAMD-29 and HAMD-7 scores, but to a lesser extent (respectively  $Rho=0.468$ ,  $p=0.043$  and  $Rho=0.476$ ,  $p=0.039$ ). Interestingly, psychic and somatic anxiety scores were not correlated ( $Rho=0.021$ ,  $p=0.933$ ).

**Table 3** Pre- to post- MBCT differences on HAMD-29 and HAMD-7 for anxious/non-anxious, depressed/non-depressed completers.

	n	HAMD-29				HAMD-7			
		Pre-MBCT M(SD)	Post-MBCT M(SD)	Cohen's <i>d</i>	<i>p</i>	Pre-MBCT M(SD)	Post-MBCT M(SD)	Cohen's <i>d</i>	<i>p</i>
Anx	9	16.33 (8.93)	4.86 (3.85)	1.67	0.018	5.27 (4.59)	3.14 (2.85)	0.56	0.017*
Non-Anx	15	7.13 (5.15)	8.42 (7.53)	0.20	0.444	3.60 (2.44)	4.25 (3.62)	0.21	0.609
Anx vs Non-Anx (Pre- MBCT)				1.26	0.007*			0.45	0.003*
Anx vs Non-Anx (Post- MBCT)				0.60	0.261			0.34	0.650
Dep	14	15.64 (6.62)	8.10 (7.91)	1.03	0.074	8.36 (4.31)	4.10 (3.41)	1.10	0.037*

Non-Dep	10	3.50 (2.51)	6.00 (4.80)	0.65	0.089	2.20 (1.55)	3.56 (3.40)	0.51	0.396
Dep vs Non-Dep (pre- MBCT)				2.425	<0.001 *			1.90	<0.001 **
Dep vs Non-Dep (post- MBCT)				0.32	0.604			0.16	0.497

Note. HAMD, Hamilton Depression Rating Scale; Anx= Anxious; Non-Anx= Non-Anxious; Dep= Depressed; Non-Dep= Non-Depressed.

\*  $p < 0.05$ , \*\* $p < 0.001$ .

Pre- to post- MBCT difference on the PSQI suggest a medium effect size. Nonetheless, a drop in manic symptoms on the YMRS was linked to better sleep quality (item 6 of the PSQI,  $Rho=0.638$ ,  $p=0.004$ ), and so was a decrement in psychic anxiety ( $Rho=0.687$ ,  $p=0.002$ ). Post-MBCT, less psychic anxiety correlated with less problems staying awake during daytime (item 8,  $Rho=0.672$ ,  $p=0.002$ ). No significant correlations were found between somatic anxiety and PSQI items or total scores. For depressive symptoms, there was a positive correlation between HAMD-29 and PSQI scores ( $Rho=0.478$ ,  $p=0.045$ ). Improvements in HAMD-7 scores correlated with less problems falling asleep ( $p=0.004$ ). Completers also reported less problems keeping enthusiasm to get things done post-MBCT (item 9,  $p=0.039$ ), as well as using less medicine (prescribed or over the counter) to sleep (item 7,  $p=0.033$ ) and getting up earlier (item 3,  $p=0.017$ ).

**Table 4** Bi-Weekly scores for PSQI (n=20) and Q-LES-Q-SF (n=21) with effect size for completers.

Week	Session Theme	PSQI			Q-LES-Q-SF		
		M(SD)	Cohen's d	p	M(SD)	Cohen's d	p
0	-	8.60 (3.75)	-	-	49.57 (10.26)	-	-
1	Automatic Pilot	-	-	-	-	-	-
2	Dealing with Barriers	-	-	-	-	-	-
3	Mindfulness of the Breath	-	-	-	-	-	-
4	Staying Present	7.26 (3.30)	0.38	0.040*	49.14 (12.59)	0.04	0.862
5	Allowing/Letting be	-	-	-	-	-	-

6	Thoughts are not Facts	-	-	-	-	-	-
7	How can I best Take Care of Myself	-	-	-	-	-	-
8	Using What's Been Learned to Deal with Future Moods	6.67 (3.03)	0.18	0.952	60.95 (20.65)	0.69	0.163
Pre- Post			0.57	0.092		0.70	0.027*

Note. PSQI, Pittsburgh Sleep Quality Index; Q-LES-Q-SF, Quality of Life Enjoyment and Satisfaction Questionnaire-short form.

\*  $p < 0.05$

A significant difference was found from pre- to post- MBCT on total Q-LES-Q-SF scores. Participants with less psychic anxiety after MBCT tended to be more satisfied with their medication ( $Rho = -0.483, p = 0.050$ ) and their ability to function in daily life ( $Rho = -0.546, p = 0.019$ ). Less somatic anxiety was linked to more satisfaction with mood ( $Rho = -0.536, p = 0.022$ ) and social relationships ( $Rho = -0.500, p = 0.035$ ). On HAMD-29, less symptoms were correlated with a better satisfaction with life in general ( $Rho = -0.540, p = 0.021$ ) as well as satisfaction with medication ( $p = 0.037$ ), family relationships ( $p = -0.050$ ), social relationships ( $p < 0.001$ ) and mood ( $p = 0.030$ ). Less core depressive symptoms in HAMD-7 also correlated with satisfaction with life in general ( $Rho = -0.577, p = 0.012$ ), as well as social relationships ( $p < 0.001$ ), mood ( $p = 0.030$ ), and work ( $p = 0.031$ ).

## 5. Discussion

The aim of this study was to explore the efficacy of MBCT to manage comorbid psychic and somatic anxiety, sleep quality, quality of life, and mood in participants with BD, across the program. Our results suggest that MBCT helps alleviate not only psychic anxiety, but also depressive and manic symptoms, with additional benefits for sleep quality and quality of life.

A small to medium size effect was found as manic symptoms decreased. Participants in this study had a low mean score of symptoms at entry. To enroll in an eight-week program, participants had to be receptive, not disrupt group dynamics, and be stable mood-wise. Albeit leaving a small window for change between baseline and subsequent measurements, effect size suggests a positive impact of the intervention on manic symptoms, which warrants further investigation in the perspective of BD relapse prevention.

Depressive symptoms also improved in BD patients who completed MBCT. One could argue that HAMD-29 contains several anxiety-related items, but core symptoms on HAMD-7 dropped as well. These findings are in line with other studies on MBCT and BD [29, 30, 31, 32, 35]. Average participants at entry exhibited slight depressive symptoms, which fell below clinical threshold after the program.

Anxiety and depressive symptoms often go hand in hand. Depressive episodes would be linked to a current anxiety episode 67% of the time, and to a lifetime anxiety disorder 75% of the time. Conversely, in a subsample with anxiety disorder, 63% of participants suffered current depression and 81%, lifetime depressive disorder. Comorbidity was linked to longer duration of symptoms and severity [47]. In this study, the sample of completers who qualified as anxious at entry (37.5%) was below expectations based on literature [2,4]: 29% of participants met criteria for both depressive and anxious subgroups. Results suggest that MBCT helped alleviate comorbid symptoms of anxiety. Anxiety disorders are important risk factors for relapse in BD (depressive and hypomanic/manic) as well as for suicide [48]. Dropout rate was important (29%) but somewhat comparable to other MBCT trials [15,30] or MBSR [49]. Nonetheless, anxious participants seemed to have benefited the most from the program. Psychic anxiety responded better to the intervention, whilst somatic anxiety remained unchanged. This appears consistent with mindfulness underpinnings, i.e. that thoughts are to be noticed, welcomed without judgment or holding on to (decentering), thus changing one's relationship with experience (psychic anxiety) instead of the symptom per se (somatic anxiety) [50]. A better understanding of MBCT's differential impact on dimensions of anxiety could help manage these symptoms. Psychic anxiety is related to the concept of rumination seen in depression and targeted by MBCT [13]. The body scan, for example, aims at becoming aware of physical sensations, often tensions due to prolonged immobile posture. Acceptance is promoted by an invitation to fully experience these sensations, however uncomfortable these might seem, and witness how they naturally fluctuate in intensity or subside on their own [12]. This practice could help, for example, through learning not to add psychological suffering (anxiety) to the somatic dimension (raw sensation) [50].

The importance of regulating sleep patterns to prevent relapse is underscored by Interpersonal and Social Rhythm Therapy [10] and chronobiology theory [51, 52]. Insomnia or lack of sleep can trigger manic symptoms in BD patients, while hypersomnia can maintain depressive symptoms. When changes in social routine and stressful experiences disrupt sleep, the subsequent effects on mood may be marked. Results suggest that participants experienced improved quality of sleep linked to MBCT, which correlated with diminutions in manic symptoms and psychic anxiety. Participants reported less medication before bedtime, getting up earlier, and feeling less sleepy during the day and more enthusiastic for activities. Experiencing less psychic anxiety and taking less medication at bedtime could thus generate a cascade of positive impacts that improves perceived quality of life, an issue for several participants [36].

Participants with less anxiety (psychic or somatic), reported increased quality of life on several items, but for different reasons. Participants with less psychic anxiety after MBCT tended to be more satisfied with their medication and their ability to function in daily life. Less somatic anxiety was linked to more satisfaction with mood and social relationships. Across the program, measures of anxiety, depression and mania improved steadily until Week 6, where a small surge in symptoms appeared, before decreasing again. One hypothesis could be that the program requirement of voluntary exposure to unpleasant experience from Week 4 and subsequent weeks momentarily exacerbates suffering until participants learn to apply the teachings. Another possibility is that stillness from the newly introduced sitting meditation made participants more aware of unpleasant experience. A pattern of temporary symptom worsening could not be observed as well for sleep quality and quality of life, which improved from pre- to post- MBCT, because no measure was collected at the critical Week 6.

This study bears several limitations and results should be interpreted with caution. No research interview was conducted to confirm diagnoses (e.g. SCID-I or MINI) at the time of the study. Therefore, diagnoses on files might not perfectly match actual diagnoses (e.g., patients earlier diagnosed with BD-II who currently experience a manic episode). Sample size is small and there was no control group for comparison, therefore changes over time may not be specific to MBCT. No adherence scale for MBCT administration was used. The MBCT instructors included the main author of this paper, which might have involuntarily induced bias. Improvement of sleep functions independent of MBCT or uncontrolled factors (e.g., group support, pharmacological adjustments during the trial) could also be in play. Some measures were added after the beginning of the study, making the numbers of participants uneven. No mindfulness measure was involved, making it difficult once again to circumscribe active ingredients. Another limitation of this study was the use of the Hamilton Scale for Depression, instead of the Hamilton Anxiety Scale. The reason was that the project also targeted depressive symptoms in a context of relapse prevention, like the original MBCT program. Finally, the exclusion criteria made our sample not representative of the general bipolar population.

## **6. Clinical Implications**

MBCT for bipolar participants showed good feasibility and security. No participant left the program because of mood worsening or psychosis. Symptoms were alleviated despite the short length of the program, and the chronicity of the illness. Clinically speaking, patients expressed being satisfied with the program. Weekly logs showed good adherence to home practice.

Showing flexibility in the type of home practice and length (20 minutes in this study) was found helpful by participants. A mid-program assessment by the instructor, and regular medical appointments are recommended as well, to prevent illness decompensation.

MBCT seems to be a promising tool for the bipolar population, but randomized controlled trials are clearly needed. Future research should also investigate thoroughly impairments of role functioning, a major issue for at least half of people living with a bipolar disorder [53].

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## **Author Contributions**

The first and second authors conceptualized the project. The first and third authors helped the second author who designed the project. The first author administered the intervention. The third author managed data entry and conducted primary analysis. The first author did subsequent statistical analysis and the writing, under the direction of the fourth author. All authors were involved in reviewing the manuscript.

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