

## Effects of Group Mindfulness-Based Cognitive Therapy on Depression and Role Impairment in a Comorbid Psychiatric Population

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### Abstract

**Objective:** Mindfulness-based cognitive therapy (MBCT) has demonstrated positive effects in reducing psychological symptoms associated with disorders such as anxiety and depression. The purpose of this study is to determine whether participating in a 10 week group program of Mindfulness-Based Cognitive Therapy (MBCT) would affect symptoms of depression and anxiety, as well as disability status of outpatients who present naturalistically with comorbid mood and anxiety disorders to a tertiary care centre.

**Methods:** Outpatients were referred by a healthcare professional to the Mood and Anxiety Disorders Mindfulness-Based Cognitive Therapy group program. Individuals were assessed for psychiatric diagnoses using the MINI Neuropsychiatric Interview. Participants were randomized to an intervention group (n=30) or a waitlist control group (n=33) of outpatients. Participants completed packages of outcome measures including the BDI, BAI, SCL-90-R, DEQ, RSQ and SDI before, immediately following and three months after participation in the 10 week MBCT program.

**Results:** Significant differences between groups were found for BDI depression severity scores ( $p < 0.05$ ) and for level of impairment in work ( $p < 0.05$ ) and social/leisure ( $p < 0.05$ ) activities as measured by the SDI. Differences across groups were not found on the SCL-90-R depression subscale, the SCL-90-R anxiety subscale or on the BAI. Likewise, differences between groups were not seen for both the rumination and distraction subscales of the RSQ.

**Conclusion:** Group MBCT shows preliminary efficacy in reducing symptoms of depression and improving functional status in a highly comorbid psychiatric population, many of whom had not reached full remission from depressive symptoms prior to program participation. Overall a 9% reduction in BDI scores was observed in participants randomized to the intervention group. MBCT may also be a useful treatment for individuals with mild to moderate depression. Ultimately, when used as an adjunctive treatment to individual's typical psychiatric treatment, MBCT may lead to improved management of mood and anxiety disorder symptoms and quality of life. Recommendations for future empirical inquiry are presented.

**Keywords:** Mindfulness-based cognitive therapy (MBCT); Mindfulness; Depression; Anxiety; Generalized anxiety disorder; Comorbid; Symptoms; Mindfulness-based stress reduction (MBSR); Impairment; Treatment

### Introduction

Mood and anxiety disorders affect a significant percentage of the world's population. The World Health Organization reported that approximately 350 million individuals globally are impacted by depressive disorders [1] making it the second leading cause of disability globally [2]. Specifically, Major Depressive Disorder (MDD) has been found to have lifetime prevalence usually in the 4-10% range, with 12 month prevalence estimates ranging from 3-6% [3].

Anxiety disorders have been found to be the most prevalent class of mental disorders in the general population, with an estimated lifetime prevalence of 16% and with a 12-month prevalence of 11%. Interestingly, these estimates are higher in Western developed countries in comparison to the levels found in developing countries [4]. A meta-regression analysis undertaken using data from 22 countries was conducted in 2012 and it concluded that 1 in 14 people meet the diagnostic criteria for an anxiety disorder at any point in time [5]. Furthermore, anxiety disorders have an estimated lifetime comorbid prevalence rate as high as 75% in individuals with a depressive disorder [6].

As such, MDD and anxiety disorders are now understood to be chronic, life-long illnesses, which greatly impair the lives of sufferers. Thus, the probability of achieving remission from generalized anxiety disorder (GAD), panic disorder with agoraphobia (PD) or social anxiety disorder (SAD) over a 12 year period is as low as 40-60% [7].

MDD, anxiety disorders and specifically panic disorder are all rather common in patients who are repeatedly referred to the hospital with medically unexplained symptoms [8]. A recent depressive or manic relapse, suicidal ideation and sleep disturbance are all commonly associated with the presence of comorbid anxiety disorders [9]. As

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well, fluctuations in occupational functioning have been found to be associated with concurrent psychiatric disorders, with Lecrubier [10] reporting that people with concurrent depression and anxiety lost an average of 47 days (in which they could not perform their normal activities of daily living) in the previous 6 months [10]. Furthermore, individuals with comorbid anxiety disorders report more visits to a psychiatrist and higher medication use [9]. As a result, it is not unforeseen that the financial strain of depression and anxiety on the healthcare system is substantial, with comorbid illness increasing costs by roughly 45% per person with a mental disorder and another chronic condition [11].

Recent research has estimated the economic burden of mental illness in Canada in 2003 at \$51 billion [12]. Financially speaking, the impact of mental disorders in the workplace is immense, as large proportions of the economic burden are associated with lost productivity due to disability claims, absenteeism and staff turnover [13-15].

In response, cost-containing interventions, which act to limit the use of long-term pharmacotherapy and improve rates of remission for depression, have been investigated. Mindfulness-based interventions aimed at reductions of psychological symptoms of distress and enhancement of quality of life, are increasingly applied and popular in various settings for both mental health care and somatic health care [16]. Mindfulness practice involves meditative focusing and refocusing of attentiveness on sensations, thoughts and feelings as they arise on a moment-to-moment basis [17]. Mindfulness-Based Stress Reduction (MBSR) is an established program shown to reduce symptoms of stress, anxiety and depression. MBSR is believed to alter emotional reactions by specifically modifying cognitive-affective processes [18]. Recently Mindfulness-Based Cognitive Therapy (MBCT) was developed with its added emphasis on self-monitoring, attention training, and frequent practise of metacognitive approaches, which has made it an even more suitable intervention for decreasing the core symptoms of various psychological disorders [19].

Ultimately, these interventions are aimed at the cultivation of an open-minded and non-judgmental awareness of whatever is happening at each successive moment of perception. Kabat-Zinn's [20] 8 week group intervention protocol of MBSR, involving aspects of practiced meditation, is undertaken to bring one's full attention and acceptance to each moment in time [20,21]. It has been shown to be effective in treating chronic pain [22], increasing the rate of resolution of psoriatic lesions in patients with psoriasis [23], reducing symptoms of Panic Disorder and Generalized Anxiety Disorder [24,25], decreasing psychological symptoms including anxiety [26] and in limiting mood disturbance and stress in cancer patients [27]. As well, there is now strong evidence for MBCT's efficacy in preventing depressive relapse in recovered patients who have had more than two previous episodes of major depression [28,29]. The advantage of MBCT in preventing depression relapse may be its specific focus on systematic group training in the combination of aspects of both mindfulness meditation and cognitive behavioural therapy (CBT), specifically combined to prevent recurrence of the depressive cycle of passivity, dysfunctional thoughts and ruminative efforts [30].

Mindfulness-based interventions have also shown to be of benefit in borderline personality disorder (BPD). A repeated measures analysis by Sachse et al. [31] on individuals with borderline personality disorder indicated a significant change on measures of attentional control with 56% of treatment completers showing a reliable improvement in mindfulness [31].

Individuals living with OCD, who completed an 8 week MBCT program, were found to be living more actively in the present moment, with improved capability to acknowledge unpleasant sensations, a calmer attitude in daily living as well as improved mood and sleep [32]. Even though MBCT was originally designed to prevent relapse for patients suffering from recurrent depression, the study conducted by Hertenstein et al. suggested that patients living with acute OCD could also benefit from this intervention [32].

Overall, MBCT emphasizes changing the awareness of and relationship to thoughts, rather than changing thought content, by offering a beneficially positive approach to coping with emotional pain and distress [33]. Moreover, Reibel et al. [34] reported significant improvements in health-related quality of life, physical symptoms and psychological distress in a heterogeneous patient population after participation in an 8 week MBSR program, with maintenance of the majority of improvements at one year follow-up [34].

Anecdotal evidence suggests a potential role for MBCT in clients suffering with multiple mental health issues including anxiety and depression as well as in reducing driving anger, suicidal behaviour and binge eating [35-37]. Research also suggests that individuals with higher levels of mindfulness are better able to monitor their sense of well-being by virtue of greater emotional awareness, understanding, acceptance and the ability to appropriate or repair unpleasant mood states [38-40].

Although employing a combination of both mindfulness based meditation and cognitive therapy is a relatively new form of group treatment, it continues to show promise in preventing depressive relapse. MBCT has been shown to reduce the relapse rate from 68-78% to 3-40% in MDD patients with three or more previous episodes [41]. It has also been shown to be more effective than maintenance medication in decreasing residual symptoms and refining both physical and psychological quality of life (QoL) [42]. Furthermore, in use with comorbid patients, recent studies with mindfulness have shown positive results in combatting anxiety and depression symptoms experienced prior, during, and post stressful situations [43]. This has been attributed to MBCT's ability to teach participants to be more aware of and relate differently to their feelings, thoughts and bodily sensations. Additionally, it has been suggested that routine meditation practice can theoretically produce positive lasting effects on emotion regulation and executive functioning [44,45].

With these findings in mind, we undertook the task of developing a study that would address these gaps in the literature, with a series of MBCT groups run by a clinical social worker (Kate Kitchen), for patients with comorbid psychiatric issues including a variety of mood and anxiety disorders. This study was constructed to provide an opportunity to evaluate its impact on depression and anxiety symptoms in typical comorbid psychiatric patient populations, and to serve as a point of comparison with previous research. It was hypothesized that participation in a 10 week MBCT program would improve role functioning and reduce depressive and anxiety related symptom severity for individuals who presented naturalistically in a tertiary care centre with chronic comorbid mood and anxiety disorders.

## Methods

### Subjects

Outpatients who were referred to the Mood and Anxiety Disorders Mindfulness-Based Cognitive Therapy group program were recruited for the study using convenience sampling through a natural practice referral process. The study was conducted at the Centre for Addiction

and Mental Health (CAMH) in Toronto, Canada in the year 2000. The Centre for Addiction and Mental Health Research Ethics Board approved the study design and all subjects provided written informed consent for participation.

Study inclusion criteria were: ambulatory status, being 18-65 years of age, and meeting DSM-IV criteria for concurrent mood (Dysthymic Disorder; Major Depressive Disorder; Bipolar Disorder, Type II) and/or anxiety disorders (Generalized Anxiety Disorder, Social Phobia, Panic Disorder with or without Agoraphobia, and Obsessive-Compulsive Disorder) [46]. Exclusion criteria included: an acute major depressive episode determined by the clinician to be the primary diagnosis, serious suicidal risk, post-traumatic stress disorder, current substance abuse, past or current psychosis, and engagement in current psychotherapy or counseling.

## Measures

The M.I.N.I.-International Neuropsychiatric Interview (MINI) is a semi structured diagnostic inventory for DSM-IV and ICD-10 psychiatric disorders. The MINI has good validity and reliability for all disorders examined in the present study [47].

The Sheehan Disability Inventory (SDI) is a 3-item self-report instrument that assesses level of functional impairment in work, social life/leisure activity, and family life/home responsibilities [48]. Participants rate themselves on present level of functioning on a scale from 0 (not at all) to 10 (very severely). The SDI has shown acceptable test-retest reliability, construct and criterion-related validity, and sensitivity to change in a sample of outpatients with panic disorder and comorbid depression [49]. The SDI has been shown to have good psychometric properties in a more recent study that was conducted on a sample of 1001 primary care patients who met criteria for one of six psychiatric disorders [50].

The Beck Depression Inventory – Second Edition (BDI-II) is a 21-item self-report measure designed to assess the presence and severity of depression [51]. Items are based on DSM-IV diagnostic criteria for major depressive episode and are rated on a 4-point present state severity scale. Responses are summed generating a total score from 0 to 63, with greater scores indicating greater depression severity. The BDI-II has high internal consistency and has been shown to possess two factors: cognitive-affective and somatic symptoms of depression [52]. The BDI and BDI-II have been used widely in outcome studies and both have shown good psychometric properties [53].

The Beck Anxiety Inventory (BAI) is a 21-item self-report instrument designed to evaluate the severity of physical symptoms of anxiety over the previous seven days [51-54]. Ratings are made on a 4-point severity scale from 0 (Not at all) to 3 (Severely, I could barely stand it) on the basis of present state. Total response scores range from 0 to 63, with greater anxiety severity associated with higher scores. The BAI has been shown to possess adequate test-retest reliability and convergent validity [55].

The Hopkins Symptom Checklist-90-Revised is a 90-item self-report measure of psychopathology (with 9 factors) designed for use with outpatients [56]. Ratings are made on a 5-point (0=not at all; 4=extremely) symptom frequency scale for the past seven days. The SCL-90-R is widely used and has been shown to have discriminative validity with a sample of 899 psychosomatic patients [57]. The SCL-90-R subscales “anxiety” and “depression” have also shown to have concurrent validity with diagnoses of anxiety and depression according to DSM-III-R criteria [58].

The Response Styles Questionnaire (RSQ) is a 71-item measure with rumination and distraction subscales [59]. The 22-item rumination subscale assesses the frequency with which individuals think about their symptoms of depression on a four-point scale from “almost never” to “almost always.” Higher scores are related to more severe and longer episodes of depression, distorted interpretations of hypothetical life events, the rate of recovery from depression, and depressive information processing biases [59-62].

## Procedures

The original data collection was undertaken in 2000, using DSM IV TR criteria. Subjects referred to the MBCT program that were currently on a waiting list were interviewed by the fifth author of the current study (Kate Kitchen) to ensure suitability and commitment for this intensive intervention program. The final author (M.K.) assessed all potential participants using the MINI in order to ascertain diagnoses according to DSM criteria. Potential subjects were then offered a place in the 10 week MBCT program and research study once it was established that inclusion criteria were met. Participation in the MBCT treatment program at the hospital was not conditional upon consent to participate in the research study. Upon acceptance into the study and the participant’s signature on the letter of informed consent, each participant who entered the study completed the baseline instrument package (Appendix A and Table 1).

Each participant was assigned a subject number and was randomly assigned to one of two groups using a random numbers generator; either to the 10 week intervention group to begin approximately 2 weeks later or to a 10 week wait-list control group. All subjects in both groups were reevaluated after the intervention group completed the program 10 weeks later (time 2). Subjects who had been in the wait-list control group were then given the opportunity to complete the 10 week MBCT program. Finally, a 3 month follow-up evaluation of both groups occurred using the same instrument package approximately 90 days after the final group session (time 3).

## Intervention

The MBCT group intervention followed the protocol described by Segal et al. [63] with the exception of providing the content over a 10 week period rather than an 8 week period. The study duration was adapted based on the discretion of the fifth author of the current article (Kate Kitchen), who recognized a need to adapt the protocol to meet the needs of our particular client population, a group of outpatients with multiple diagnoses with very few exclusionary criteria. This modification was beneficial in providing a naturalistic and inclusive service, allowing for additional time to be spent on orientation. Participants viewed an introductory mindfulness videotape during session 1 in order to inspire hope and expectation regarding the utility of the group intervention [64]. As well, additional time was provided to account for learning of a lengthier list of mindful stretching and yoga poses, and for allowing participants to use homework tapes from Kabat-Zinn’s [20] MBSR protocol. Finally, due to the high level of chronicity and comorbidity of the study population, session 7 was expanded into two sessions in order to allow participants to integrate several cognitive therapy strategies to enhance the likelihood of internalizing relapse prevention strategies [63].

The MBCT group protocol was designed to help participants become more aware of, and to relate differently to their thoughts, feelings, and bodily sensations through practices that brought moment-to-moment awareness of body sensations, breath, sounds, sights, tastes, smells,

and thoughts. Specific instructions during group sessions focused on helping participants become more aware of both 'negative' and 'positive' thoughts and feelings as they arose in the mind and on changing one's relationship to thoughts (not owning or calling thoughts "self"). Teasdale and colleagues [29] described this as facilitating "decentered" views, such as: "Thoughts are not facts" and "I am not my thoughts". The intervention also aimed to assist subjects in incorporating mindfulness practice into their daily lives.

Participants were initially aware that they would be performing an hour of homework daily to ensure that the learning of mindfulness was reinforced. Subjects were asked to commit to spending one hour of homework each day practicing the mindfulness techniques with the aid of a provided guided audiotaped meditation tool. Self-reported compliance with weekly homework engagement was evaluated immediately post-intervention and at three-month follow-up. It was expected that integration into daily life and potential benefits drawn from this therapy would require ongoing practice on a daily basis for 40 min, following course completion.

In addition subjects also participated in a mini retreat (one full "Day of Mindfulness" - from 10:00 am to 4:00 pm) on a Saturday approximately three-quarters of the way through the course. This "Day of Mindfulness" allowed participants the opportunity to practice and reinforce the learning of skills that had been taught throughout the program. Following the initial 10 week group, two follow-up sessions were scheduled at intervals of 1 and 3 months in order to support learning and continued practice.

### Statistical analyses

Demographic variables were analyzed using descriptive statistics. Continuous variables following an approximate normal distribution were compared using the Student's *t*-test for independent samples, or paired *t*-tests where appropriate. Variables violating the normality assumptions were compared using the Mann-Whitney rank sum test. Categorical variables between the two groups were analyzed using Fisher's exact test. We did not correct for multiple inference testing due to the exploratory nature of the study. All statistical tests were two-tailed and considered statistically significant at  $\alpha < 0.05$ . The SAS System for Windows version 9.1 (SAS Institute, Inc., Cary, North Carolina), R software (version 3.1.0; R Foundation for Statistical Computing, Vienna, Austria) and IBM SPSS Statistics Version 24.0 were used for all analyses and graphs.

### Results

Subjects who met criteria were recruited and randomly assigned to an intervention group or a 10 week wait-list control group. Both groups were matched for age and sex variations. Participants were screened at intake using the MINI to establish diagnoses, in which all participants endorsed a past history of depression. A total of 63 participants were enrolled in the study between September 2001 and June 2004. Baseline characteristics of the intent-to-treat sample are provided in Appendix A and Table 1. There were no statistically significant differences between the MBCT and waitlist-control groups on any of the baseline variables.

The total sample ( $N=63$ ) proved to be highly educated, with most participants holding undergraduate or professional university degrees. Most participants were also employed at least part-time, and more than half of both the waitlist and intervention groups had had some form of previous mindfulness experience (varying from reading to previous formal practice).

Thirty-two percent ( $n=20$ ) of the original sample dropped out of the group program prior to completing four or more sessions. Reasons for discontinuation in the study included: depressive relapse ( $n=2$ ); being too busy with work/school ( $n=7$ ); problems with childcare or family emergency ( $n=4$ ); transportation issues ( $n=1$ ); improved wellbeing (program seemed unnecessary) ( $n=1$ ); and unknown/lost to follow up ( $n=5$ ).

In the waitlist group ( $n=33$ ) 66.7% met criteria for current MDE (non-primary) and 26.7% met criteria for current dysthymia, compared to 63.3% and 23.3% of the MBCT group ( $n=30$ ), respectively. In regards to anxiety disorders in the waitlist group, current GAD was met by 43.3%, 60.0% met criteria for social phobia, 50.0% met criteria for current panic disorder, in comparison to 40.0%, 43.3% and 40.0% in the MBCT group, respectively. Other anxiety disorders also reported included current agoraphobia, which was met by 30.0% of the waitlist group and 23.3% who met criteria for current OCD, in comparison to 26.7% and 20.0% in the MBCT group, respectively. There were no significant differences between participants in the MBCT group who discontinued the study as compared to those who completed four or more sessions (Appendix A, Table 1 for a full description of this data). For all participant data collected at each time point (Appendix A, Table 2).

### Between group comparisons

From baseline to post intervention, between group comparisons revealed individuals in the MBCT intervention group had significantly lower BDI scores ( $M=13.5$ ,  $SD=11.0$ ) compared to the waitlist group ( $M=22.2$ ,  $SD=13.1$ ),  $t(34)=2.84$ ,  $p=0.007$ , with a large effect size of 0.95. In addition, when the percent change in BDI depression scores was calculated and compared across groups, a 9.4% decrease was found for the MBCT treatment group, compared to a 3.0% increase in BDI for the waitlist group.

Significantly lower scores were found from baseline to post intervention for self-report ratings of social/leisure impairment on the SDI in the MBCT intervention group ( $M=4.1$ ,  $SD=2.5$ ) compared to the waitlist group ( $M=5.8$ ,  $SD=3.2$ ),  $t(35)=2.20$ ,  $p=0.03$ . No significant differences across groups from baseline to post intervention were found on the SCL-90-R depression subscale, or on either measure of anxiety, the BAI or the SCL-90-R anxiety subscale. Likewise, differences between groups were not found for the rumination and distraction subscales of the RSQ or the work, family or home impairment questions on the SDI. Appendix A, Table 3 shows full statistical report of these results.

From post intervention to the three month follow up period, the MBCT group ( $M=13.2$ ,  $SD=9.3$ ) reported significantly lower BDI scores compared to the waitlist group ( $M=17.3$ ,  $SD=14.1$ ),  $t(24)=-3.03$ ,  $p=0.006$ , with a large effect size of 1.25. All other measures did not significantly differ between groups. Appendix A, Table 4 shows full statistical report of these results.

### Within group differences

Within group comparisons revealed significant changes for the MBCT group post intervention ( $M=13.5$ ,  $SD=11.0$ ) compared to baseline ( $M=19.4$ ,  $SD=11.3$ ) scores on the BDI,  $t(14)=3.10$ ,  $p=0.008$ . Scores also significantly decreased post intervention ( $M=4.4$ ,  $SD=3.0$ ) compared to baseline ( $M=5.6$ ,  $SD=3.1$ ) for SDI work impairment,  $t(15)=2.57$ ,  $p=0.02$  and for SDI social/leisure impairment post intervention ( $M=4.1$ ,  $SD=2.5$ ) compared to baseline ( $M=5.5$ ,  $SD=2.7$ ),  $t(15)=2.97$ ,  $p=0.01$ . All other measures were not significant. From post intervention to the three-month follow up, no scores were significant for the MBCT intervention group (Appendix A, Table 5 and Appendix B, Figures 1-9).

For the waitlist control group, significant differences were found post intervention ( $M=18.3$ ,  $SD=11.5$ ) compared to baseline ( $M=21.4$ ,  $SD=10.8$ ) for SCL-90-R Depression scores,  $t(14)=2.64$ ,  $p=0.02$ . Scores on the RSQ Rumination subscale also decreased post intervention ( $M=4.4$ ,  $SD=10.2$ ) compared to baseline ( $M=54.4$ ,  $SD=13.6$ ),  $t(7)=3.71$ ,  $p=0.01$ . Comparison of post intervention scores ( $M=22.2$ ,  $SD=13.1$ ) to the 3 month follow up period ( $M=17.3$ ,  $SD=14.1$ ) revealed significant differences for the BDI,  $t(14)=3.35$ ,  $p=0.005$ . Additionally, scores on the RSQ Rumination subscale were also significant at the 3 month follow up period ( $M=57.4$ ,  $SD=18.6$ ) compared to post intervention ( $M=46.4$ ,  $SD=10.2$ ),  $t(4)=-2.90$ ,  $p=0.004$ . Lastly, three-month follow-up scores ( $M=4.3$ ,  $SD=3.1$ ) significantly decreased compared to post intervention ( $M=5.1$ ,  $SD=3.0$ ) for the family/home impairment subsection of the SDI. All other results were not significant (Appendix A, Table 6 and Appendix B, Figures 1-9).

Pearson correlations were calculated for changes across time in BDI ratings from baseline to post intervention with demographic variables. Changes in BDI scores were correlated negatively for the MBCT intervention group with presence of Panic Disorder,  $r(13)=-0.66$ ,  $p=0.008$ , and presence of Generalized Anxiety Disorder,  $r(13)=-0.55$ ,  $p=0.03$ . Changes in BDI scores for the waitlist group did not significantly correlate with any baseline variable. Changes in anxiety ratings as measured by the BAI correlated significantly for the MBCT intervention group with total number of diagnoses  $r(14)=-0.68$ ,  $p=0.004$ , presence of Dysthymic Disorder,  $r(14)=-0.61$ ,  $p=0.01$ , presence of Panic Disorder,  $r(14)=-0.57$ ,  $p=0.02$  and presence of Generalized Anxiety Disorder,  $r(14)=-0.59$ ,  $p=0.02$ . For the waitlist control group, changes in BAI scores significantly correlated with presence of Obsessive Compulsive Disorder,  $r(18)=-0.49$ ,  $p=0.03$ . All other baseline variables did not significantly correlate with change in BAI scores. Changes in SDI-Work ratings correlated negatively with presence of Obsessive Compulsive Disorder,  $r(18)=-0.49$ ,  $p=0.03$  for the waitlist control group, and with mean number of diagnoses,  $r(14)=-0.68$ ,  $p=0.004$ , current Dysthymia,  $r(14)=-0.61$ ,  $p=0.01$ , current Panic Disorder,  $r(14)=-0.57$ ,  $p=0.02$ , and current Generalized Anxiety Disorder,  $r(14)=-0.59$ ,  $p=0.02$  for the MBCT intervention group. Changes in SDI-Social/Leisure correlated negatively with presence of current Social Phobia,  $r(14)=-0.51$ ,  $p=0.04$  and current use of an antipsychotic,  $r(14)=-0.51$ ,  $p=0.04$  for the MBCT intervention group. Changes in SDI-Family/Home correlated with current use of an antidepressant,  $r(19)=0.50$ ,  $p=0.02$ , and use of a current mood stabilizer,  $r(19)=-0.50$ ,  $p=0.02$  for the waitlist control group, and with current Panic Disorder,  $r(14)=-0.51$ ,  $p=0.05$  for the MBCT intervention group. All other correlations were not significant (Appendix A, Tables 7-12).

Self-reported estimated hours of weekly mindfulness practice time while enrolled in the 10 week MBCT program was also gathered post participation (Time 2). The MBCT intervention group practiced on average 4.38 h/week. The amount of practice time was significantly negatively correlated with depression scores for the MBCT intervention group as measured by the BDI,  $r(9)=-0.62$ ,  $p=0.04$  and was also found to predict a decrease in BDI scores for the intervention group,  $F(1, 24)=4.90$ ,  $p=0.04$ ,  $R^2=0.17$ . Amount of practice time was not correlated with change in anxiety scores as measured by the BAI. Appendix A, Table 7 represents mindfulness practice time undertaken by the MBCT treatment group.

Depressive remission rates between groups were compared by calculating the number of participants whose BDI scores decreased to 10 or less at post intervention. A score of 10 was determined as the cut-off point for remission, based on similar values that have been reported

in the literature as indicative of mild or minimal depression [51,65]. The MBCT treatment group displayed a significantly greater percentage of participants whose depression scores dropped to 10 or less at time 2 ( $p<0.05$ ). Specifically, 28.6% and 33.3% of individuals had a score of 10 or less at baseline, compared to 46.7% and 19.4% of individuals post intervention for the MBCT group and control group, respectively. At the 3 month follow up, there were no significant differences between the groups as 47.1% and 43.8% of participants had scores of 10 or less for the MBCT group and control group, respectively.

Independent t-tests were conducted to assess differences in participants who remitted at time point 2 to non-remitted participants for baseline characteristics and all psychometric scales. Participants who remitted had higher education,  $t(43)=-2.90$ ,  $p=0.001$ , and reported lower baseline scores on the BDI ( $M=12.8$ ,  $SD=8.4$ ) compared to non-remitters ( $M=24.1$ ,  $SD=11.2$ ),  $t(34)=3.10$ ,  $p=0.004$ , SCL-90-R depression ( $M=14.46$ ,  $SD=8.02$ ) compared to non-remitters ( $M=23.75$ ,  $SD=9.29$ ),  $t(43)=3.15$ ,  $p=0.003$ , SDI work impairment ( $M=3.33$ ,  $SD=3.34$ ) compared to non-remitters ( $M=6.75$ ,  $SD=2.29$ ),  $t(34)=3.61$ ,  $p=0.001$ , SDI social/leisure impairment ( $M=4.08$ ,  $SD=2.27$ ) compared to non-remitters ( $M=6.46$ ,  $SD=2.67$ ),  $t(34)=2.63$ ,  $p=0.01$  and SDI family/home impairment ( $M=2.42$ ,  $SD=2.19$ ) compared to non-remitters ( $M=5.25$ ,  $SD=2.54$ ),  $t(34)=3.29$ ,  $p=0.002$ . Remitted participants were also more likely to be taking fewer psychiatric medications ( $M=1.08$ ,  $SD=0.67$ ) than non-remitters ( $M=1.81$ ,  $SD=1.18$ ),  $t(43)=2.03$ ,  $p=0.01$ , mood stabilizers ( $M=0.00$ ,  $SD=0.00$ ) compared to non-remitters ( $M=0.24$ ,  $SD=0.43$ ),  $t(44)=2.0$ ,  $p=0.003$  and antipsychotics ( $M=0.00$ ,  $SD=0.00$ ) compared to non-remitters ( $M=0.24$ ,  $SD=0.43$ ),  $t(44)=2.0$ ,  $p=0.003$ . Post intervention, remitted individuals only differed significantly from non-remitted individuals on the BDI; all other psychometric scores were not significant.

## Discussion

Previous research has established the efficacy of MBCT in preventing future depressive episodes in homogeneous samples of depressed outpatients [28,29]. We sought to examine whether a cohort of highly comorbid psychiatric outpatients who were seen naturalistically in a tertiary level health care centre would benefit from participation in a 10 week MBCT group program while also receiving psychiatric treatment as per usual. The study's findings support the argument that learning and practicing mindfulness based cognitive therapy strategies as an augmentation therapy in a group context can be beneficial for reducing subsyndromal levels of depressive symptomatology and improving functional status in outpatients with multiple psychiatric disorders (mean number of DSM-IV diagnoses=3.75) who are already receiving what is considered optimal psychiatric treatment. Indeed, a 9.4 percent drop in BDI ratings was seen for randomly assigned participants in the group-based MBCT intervention, whereas the BDI ratings of those in the waitlist control group increased by approximately 3 percent while waiting to participate in the program, irrespective of receiving psychiatric treatment as per usual. At the three-month follow up period, these results remained significant, further supporting the protective effects of MBCT at preventing or delaying a new episode of depression.

Due to the high percentage of subjects meeting criteria for current Major Depressive Disorder or Dysthymic Disorder, our findings are also suggestive of MBCT's utility in treating outpatients who continue to experience moderate levels of depression. In Teasdale et al. [29] study, the median sample baseline BDI score was 10.0; however, in contrast, the median BDI score at baseline in our study was 19.0, which is representative of moderate depression. This may

suggest that moderately depressed individuals who have not achieved full remission of symptoms may benefit from participation in group MBCT intervention, and that this participation may be a factor in helping patients with multiple psychiatric disorders move toward remission of depressive symptoms with reduced impairment. Our finding that increased time spent practicing MBCT outside of group session correlates with, and furthermore predicts, decreased scores on the BDI in the intervention group specifically corroborates the idea that manualized group MBCT improves depressive symptoms even in individuals with past experience with mindfulness.

Furthermore, baseline characteristics were found to differ between remitters and non-remitters. Remitters had less depressive symptoms and functional impairment in multiple aspects of their lives and were taking fewer psychiatric medications. This suggests individuals who are higher functioning in multiple aspects of their lives might be more likely to benefit from the MBCT intervention, thus increasing chance of remission from persistent depressive symptoms, and specifically should be targeted as good candidates to benefit from MBCT as part of their regular treatment regimen.

Given the importance of achieving full remission of depressive symptoms, these findings become extremely valuable. Failure to achieve remission of depressive symptoms (Hamilton Depression Scale <7; Montgomery Åsberg Depression Rating Scale <10) is associated with increased risk of relapse and treatment resistance [66-68], continued psychosocial limitations [69], decreased ability to work and decreased workplace productivity [70,71], as well as potential worsening of morbidity/mortality of other conditions [72-74].

Interestingly and in contrast, no statistically significant differences were found across groups on measures of anxiety, suggesting that this treatment provided a rather specific approach to treatment for depressive symptomatology specifically. An alternative explanation might suggest that the BAI is not an ideal measure of the changes in anxiety or, specifically, worry. As such, the BAI may not have been helpful in determining the ways in which MBCT allowed participants to develop a new relationship with their anxiety, or potentially how it may have allowed them greater acceptance and ability to engage in the world despite the presence of anxiety symptoms. This argument is supported by anecdotal evidence amassed by the fifth author (Kate Kitchen) over several years of MBCT instruction. Future research in this area may be better interpreted with the use of scales such as the Penn State Worry Questionnaire (PSWQ) [75] or the GAD-7 [76] to assess changes in anxiety disorders with MBCT.

Unexpectedly, no significant differences in rumination were found between groups as measured by the RSQ. Rumination has been reported in the literature as a key component of depression and has improved in previous MBCT trials assessing depression [77,78]. The lack of significant results reported here might be partly due to a small sample size. Additionally, rumination has been reported to be characteristic of mixed depressive/anxious populations [79]. Due to the highly comorbid nature of the present sample and the lack of improvement on anxiety measures, it is possible that rumination symptoms might not have been targeted to a significant extent. Rumination has also been reported to persist following remission from a depressive episode [80] and can be specifically targeted with rumination-focused CBT for individuals with residual depressive symptoms [80,81]. Future research should examine rumination-focused CBT in highly comorbid populations similar to the current study.

Health, from an occupational perspective, has been defined as

possessing an array of skills, which enable a person to achieve his or her vital goals in his or her own environment. Occupational health, which is reflective of a good quality of life and the ability to adapt to circumstance, is a goal for everyone, including those who suffer from chronic impairments [82]. Previous mindfulness research has suggested that people with higher natural levels of mindfulness reported feeling less stressed, anxious, and depressed, and have an overall mindful state momentarily associated with a greater sense of well-being [83-85].

## Limitations

In considering the results of the current study, various limitations must be taken into account. These limitations include: lack of social support or psycho-educational control group, a methodology that was not double-blinded (potentially resulting in therapeutic personality bias), the sole use of self-report measures (instrument bias) and referral filter bias (results may only be generalizable to chronic populations rather than to all individuals with comorbid mood and anxiety disorders). As mentioned above, the current study did not measure worry, which may be a mechanism by which anxiety is manifested. As well, the study also did not assess in great enough detail the effectiveness of MBCT on the quality of life post-treatment, which can be addressed in the future using standardized self-report scales focusing on such areas.

## Conclusion

Finally, results from the current study do not quantify how much of participants' improvement could be attributed to participation in the MBCT program or to social support received from shared illness experiences. Future research in this area should monitor number of previous episodes of depression for all participants in order to facilitate comparison with the results of two previous outcome studies [28,29].

The use of a natural practice model wherein participants were not excluded based on prior psychotherapy experience or current pharmacotherapy, allowed for a wide variety of sufferers to be assessed using the MBCT method. Including a 3 month follow up assessment allowed researchers to make predictions regarding both instant responses to the MBCT program and remission rates following participation in either the MBCT group or the waitlist control group. Moreover, it can be noted that any significant results obtained in this study were seen in a sample that may be more chronic than typical (due to outside referral practices to the MBCT program). Many participants in this study also reported having extensive experience with psychotherapy (predominantly CBT) and mindfulness, suggesting the benefits of MBCT extend to groups who have already experienced numerous other treatments including other psychotherapies.

Results from the present investigation can be of use in future studies examining the effects of MBCT in various psychological disorders in chronic patients. These results also demonstrate the need to include more standardized tests with greater reliability and validity for the analysis of relapse rates. This study can be considered a pilot study for future studies conducted in conjunction with pharmacological interventions and be utilized as a suggestion of potential benefit of MBCT in a variety of clinical populations. Mindfulness training, specifically MBCT, is thus a promising psychosocial intervention, which can be offered in a group format, rendering it a cost effective therapeutic option in a population of more chronic patients.

While it has been stated that the methodologies of MBCT studies (including this one) are often limited by small sample sizes, single-centre enrolment and lack of blinded assessments; all of which are evident gaps in the present study as well [86,87], the present study does

provide support for the benefits of MBCT for complex patients with one or more psychiatric disorder.

## Contributors

Munira Mohamed wrote the first draft of the manuscript and approved the final. Andrew Welch coordinated and conducted the study, and contributed to the writing of the manuscript. Kate Kitchen coordinated the groups and performed the diagnostic assessments, along with contributing to the writing of the paper. Marci Rose contributed to the writing of the manuscript. David Hallett performed the statistical analyses. Michele Davis, Constantina Tsigielis, Christina D'Ambrosio, Leena Anand, Melissa Furtado, Alexa Fine and Kathryn Fotinos contributed to the writing of the manuscript and post-facto analysis. Martin Katzman designed the trial methodology, supervised the statistical analysis, coordinated the study and contributed to the writing and final editing of the manuscript.

## Conflict of Interest

Munira Mohamed, Alexa Fine, Kathryn Fotinos, Andrew Welch, Kate Kitchen, Marci Rose, Michele Davis, Constantina Tsigielis, Christina D'Ambrosio, Leena Anand and Melissa Furtado have nothing to disclose.

Martin A Katzman has participated on advisory boards and/or similar committees for Allergan, Bedrocan, Bristol-Myers Squibb, Eli Lilly, Genuine Health, Janssen Canada, Lundbeck, Merck, Pfizer, Purdue, Shire, Tweed; has received research funding from Canadian Foundation for Innovation, Lotte and John Hecht Memorial Foundation, Biotics, Lundbeck, AstraZeneca, Janssen, Pfizer, Genuine Health, Shire.

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