# Effects of Mindfulness-Based Cognitive Therapy and Cognitive Behavioral Therapy on Symptomatic Generalized Anxiety Disorder: A Randomized Controlled Trial

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**Research Article**

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# Abstract

**Background:** Mindfulness-based cognitive therapy (MBCT) is a promising treatment for generalized anxiety disorder (GAD). Cognitive behavioral therapy (CBT) is currently considered a first-line treatment for GAD. The objective of this study was to examine the efficacy of MBCT in symptomatic GAD patients compared with CBT for a variety of outcomes of anxiety symptoms, as well as depressive symptoms, overall illness severity, quality of life and mindfulness.

**Methods:** Adult patients with GAD (n = 138) were randomized to a MBCT or CBT group. Both groups received either MBCT or CBT in addition to treatment-as-usual (TAU). The primary outcomes were the anxiety response and remission rates, as measured using the Hamilton Anxiety Scale (HAMA). Secondary outcomes included scores on the HAMA, the state-trait anxiety inventory (STAI), the Hamilton Depression Scale (HAMD), the Severity Subscale of the Clinical Global Impression Scale (CGI-S), and the 12-item Short-Form Health Survey (SF-12) , as well as mindfulness measured by the Five Facet Mindfulness Questionnaire (FFMQ). Assessments were performed at baseline, 8 weeks after treatment, and at a 3-month follow-up. For primary analyses, response and remission rates were analyzed by the $\chi 2$ test in the two groups at each assessment time. For the secondary analyses, separate two-way mixed ANOVAs were performed to compare the mean differences in all secondary outcomes.

**Results:** The anxiety remission rate of the two groups significantly differed (63.8% in the MBCT group vs. 44.6% in the CBT group, p = 0.040, Cohen's d = 0.39) but not in anxiety response rate (86.2% vs. 80.4%, p = 0.402; Cohen's d = 0.16) at 8 weeks. Overall illness severity and mindfulness were significantly different between the groups at 8 weeks. There were no significant differences between the two groups at the 3-month follow-up. **Conclusions:** Our data indicate that MBCT was effective in reducing anxiety symptoms in GAD patients. While MBCT appeared to have better short-term benefits, the long-term benefits of CBT may be superior.

**Trial registration:** registered at chic.org.cn (registration number: ChiCTR1800019150, registration date: 27/10/2018).

# Background

Generalized anxiety disorder (GAD) is characterized by chronic and persistent worry(1). Effective treatments for GAD include pharmacotherapy and psychotherapy(2, 3). Only 50%−60% of GAD patients respond to pharmacotherapy, and 30%−50% of GAD patients experience remission(4, 5).

The disadvantages of pharmacotherapy include side effects, premature discontinuation, and a significant risk of relapse(6, 7). A large proportion of patients prefer psychotherapy to pharmacotherapy. Among the various forms of psychotherapy, cognitive behavioral therapy (CBT) is considered a first-line treatment for GAD(8, 9). Nevertheless, CBT is not widely offered in clinical practice. In addition to a shortage of trained CBT therapists, individual sessions are expensive in healthcare systems with limited resources(10). Thus, more treatments for GAD are needed.

Mindfulness is the awareness that emerges through intentionally focusing, in a non-judgmental way, on how things are in the present moment(11). Instead of changing thoughts themselves, the intension of mindfulness is to change one's relationship with their thoughts(12). Mindfulness-based cognitive therapy (MBCT), which combines the practice and principles of mindfulness with CBT components, was originally developed to prevent the recurrence of depression for patients in recovery(13). MBCT is currently recommended by NICE guidelines for the treatment of recurrent depression(13-15).

Although some randomized controlled studies (16) have evaluated the effects of Mindfulness-based interventions for treating GAD in adults, most of these had small sample sizes(17, 18), examined adults in a specific age group or demographic(19, 20), included participants with heterogeneous diagnoses including anxiety disorders other than GAD(19, 21). Furthermore, although MBCT and CBT have common features, evidence directly comparing their efficacy for the treatment of GAD is lacking (22-24). We designed the current study to address the above-mentioned limitations of previous research.

### Research objectives

Our primary objective was to evaluate the effects of MBCT, adapted for treating GAD (MBCT-A), by comparing it with group CBT designed to treat symptomatic GAD (CBT-A). We hypothesized that MBCT-A would be as effective as CBT-A in improving symptoms of anxiety. Our other objectives were to investigate the effects of MBCT-A and CBT-A in terms of psychic and somatic anxiety symptoms, state and trait anxiety symptoms, depression symptoms, overall illness severity, quality of life and mindfulness. We included the CBT-A group for active comparison because CBT has been suggested to be a high-intensity intervention for GAD and it is recommended by current guidelines(9). Furthermore, CBT is considered to be the gold standard for evaluating the efficacy of new and promising interventions (25).

# Methods

### Design

This study is a parallel randomized controlled trial with two groups: MBCT-A vs. CBT-A (with a 1:1 allocation ratio). We did not include a no-treatment control group because we were comparing a relatively new treatment with a well-established treatment, and we considered our study to be more ethical if all participants received some form of intervention (26).

The study was approved by the Ethics Committee of the Sixth Hospital of Peking University before initiation of the trial. Each participant was fully informed and agreed to the randomization process. Informed consent forms were obtained from all participants.

The trial was registered at chic.org.cn (registration number: ChiCTR1800019150, registration date: 27/10/2018).

### Population and Recruitment

Participants were recruited from the Outpatient Department of the Sixth Hospital of Peking University from November 2018 to November 2019 via a) posters distributed in outpatient clinics and b) recommendations from psychiatrists who worked in the Sixth Hospital of Peking University but were not involved in the study.

A trained research assistant first screened all interested participants by telephone or in-person appointments. Diagnostic screenings were then independently made by an attending psychiatrist in accordance with the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV). The principal investigator (B.X.H) conducted a final screening using the study inclusion and exclusion criteria to determine eligibility.

All patients concurrently continued their regular outpatient psychiatry visits for medication management during the study period (treatment-as-usual, TAU) at the Sixth Hospital of Peking University. The regular outpatient psychiatry visits did not include psychotherapy, and the average consulting time was about 10 min per patient, with an average of one visit every two weeks.

We used the following **inclusion criteria**:(a) Aged 18-65 years; (b) diagnosis of GAD; (c) score of ≥14 on the Hamilton Anxiety Rating Scale (HAMA)(27); (d) medication for on a stable dose for ≥1 month; (e) ability to understand and communication in Chinese. **Exclusion criteria were:** (a) Diagnosis of any organic mental disorder, schizophrenia, schizoaffective disorder, major depression disorder, or bipolar disorder; (b) abuse of alcohol or other substances in the past 12 months; (c) any conditions that were potentially life-threatening or could severely limit participation (e.g. serious suicidal ideation, antisocial personality disorder, severe or unstable medical illness, pregnancy, breastfeeding); (d) current engagement in psychological treatment for GAD; (e) a history of attending 4 or more mindfulness sessions in the past 2 years. Participants were withdrawn from the study if they (a) had any suicidal behavior or suicide attempts; (b) withdrew their informed consent; or (c) were absent for more than three therapy sessions during the study period.

## Randomization Allocation, Concealment, and Blinding

Randomization was performed using computer-generated random numbers that were generated by an independent statistician. Sealed envelopes were used to conceal the randomization sequence. The intervention types were written on sheets of paper that were placed inside opaque envelopes. After the informed consent forms were signed, research assistants opened the envelopes in order and noted the group assignment for the corresponding participants. The participants were notified that the treatments received in both study groups could be helpful in improving anxiety symptoms.

The study was approved by the Ethics Committee of the Sixth Hospital of Peking University before initiation of the trial.

## Intervention and Control

## Intervention: MBCT-A

The adapted MBCT-A protocol followed the manual described by Segal, Williams, and Teasdale(13, 28). We made several adaptations to render the MBCT appropriate for treating GAD. These changes were developed on the basis of (1) the dissimilar characteristics between GAD and depression, (2) the different needs when attempting to improve current anxiety symptoms vs. preventing a relapse of depression, and 3) clinical experience. The first author (S.S.J) and co-first author (X.H.L) wrote the adapted manualized protocol, which largely reflected the classic protocol for MBCT.

Qualified instructors with more than two years of experience delivered the MBCT-A program. The MBCT-A instructors were supervised by 2 certified MBCT supervisors during the intervention period. The MBCT-A group attended weekly 2-hour sessions over an 8-week period with 20–25 participants in each session. In the MBCT-A manual, the pre-course orientation information was integrated into Session one; psychoeducation about anxiety was integrated into Session four; one-day retreat part of the program was integrated into Session six. Practices in the MBCT-A included mindful eating, body scans, sitting meditation, 3-min breathing space exercises, mindful stretching, and mindful walking.

During the intervention period, participants in the MBCT-A group were given daily audio homework exercises. All participants were instructed to practice mindfulness meditation for 30 min a day and to report their daily mindfulness practice via a messaging and social media application (WeChat).

## Control: CBT-A

The CBT-A program followed a manualized protocol originally authored by the corresponding author (X.B.H), that had been used successfully in previous clinical trials(29). The main aim of CBT is to change or challenge the "dysfunctional" thoughts related to generalized anxiety, and to introduce the participant to various relaxation techniques.

Two qualified therapists with either a psychiatry or psychotherapy background led each CBT-A group. The corresponding author X. B. H supervised the CBT-A therapists during the study period. Participants in the CBT-A group attended weekly 1.5 h sessions over 8 weeks with 10–15 participants in each group. Each CBT-A session had a particular theme. Weekly homework was assigned at the end of each session, and was handed in to the therapists and discussed in the following session.

## Measurements

The outcome measures were collected at baseline (T1), week 8 (post-intervention, T2), and at a 3-month follow-up assessment (T3). Four trained psychiatric residents who kept blind to patient's treatment allocation conducted patient assessments. Demographic and baseline clinical information including age, sex, education history, marital status, ethnicity, residential location, religious beliefs, age of onset, course of GAD, and use of medication was collected using a questionnaire.

## Primary Outcome

The primary outcomes were anxiety response and remission, as measured by the HAMA (27) at 8 weeks and at a 3-month follow-up assessment. The HAMA is a 14-item scale used to evaluate symptom severity in patients with anxiety disorders. For this study, remission was defined as a HAMA total score of less than 7, and response was defined as a ≥ 50% decrease relative to the baseline.

## Secondary Outcomes

The secondary outcome measures included the total, psychological, and somatic anxiety symptoms measured by the HAMA, state and trait anxiety symptoms measured by the state-trait anxiety inventory (STAI-S, STAI-T), depressive symptoms measured by the Hamilton Depression Rating Scale (HAMD), overall illness severity measured by the Clinical Global Impression-Severity (CGI-S) scale, and quality of life measured by the 12-item Short-Form Health Survey (SF-12). Mindfulness was measured using the Five Facet Mindfulness Questionnaire (FFMQ), on which a higher total score (range 39–195) suggests a higher level of mindfulness(30). This scale has been translated into Chinese and validated(30).

## Sample Size

Because no previous studies had compared MBCT with CBT for the treatment of GAD, we used the findings from two studies, one which compared the effects of CBT and medication(29) and the other which compared the effects of MBCT-A and medication(31), for our sample size calculation. Assuming the response rate for MBCT was 0.767 and the response rate for CBT was 0.636 with a type I error-set of 5% and a type II error-set of 20%, we calculated the sample size per group to be 57 participants. With a presumed drop-out rate of 20%, we aimed to recruit 69 participants per group.

## Data Analysis

All analyses were based on the intention-to-treat principle and statistics were conducted using IBM SPSS Statistics ver. 22.

The baseline characteristics of the two groups were compared using an independent samples t-test or Mann-Whitney's U test for continuous variables and the χ2 test for categorical variables.

For our primary analyses, we used the χ2 test to analyze the response and remission rates in the two groups at each assessment time (8 weeks after the start of the treatment, 3-month follow-up). The effect size estimates were presented using Cohen's d, and were interpreted as small effects (0.2–0.5), moderate effects (0.5 to 0.8), and large effects (≥ 0.8)(32). For the secondary analyses, we performed separate two-way mixed ANOVAs to compare the mean differences in all secondary outcomes. Group (MBCT-A vs. CBT-A) was used as a between-subjects factor and time (baseline, 8 weeks after treatment onset, 3-months follow-up) was used as a within-subjects factor. The Bonferroni post hoc test was used for post hoc comparisons at each assessment. Partial eta squared ($\eta2p$) values were calculated for all significant findings. Significance level was set at $p < 0.05$.

# Results

## Baseline characteristics and dropout rates

Out of the 682 screened participants, 168 (24.6%) were successfully recruited (Shown in Fig. 1). A total of 138 participants finally attended the intervention sessions, including 82 women and 56 men, with a mean age of 35.94 (SD = 11.05) years. Of all the recruited participants, 17.9% (14 and 16 in the MBCT-A and CBT-A groups, respectively) did not attend any intervention sessions. There was no difference in this proportion between the two groups. This was viewed as pre-treatment attrition and not included in the data analyses.

The basic participant demographics and baseline clinical data for both groups are listed in Table 1. The baseline characteristics were not statistically different between the MBCT-A group (n = 69) and CBT-A group (n = 69).

There were 58 (84.1%) and 56 (81.2%) participants in the MBCT-A and CBT-A groups, respectively, who attended at least 6 out of the 8 sessions. Compared with the 114 participants who completed the treatment, the 24 participants who dropped out had a shorter course of GAD (p = 0.005) but no significant differences in other characteristics at baseline. The dropout rates in the MBCT-A and CBT-A groups were 15.9% and 18.8% at 8 weeks (p = 0.653) and 18.8% and 21.7% at the 3-month follow-up (p = 0.672), respectively.

## Table 1. Baseline participant data

|  |  | MBCT（n=69） | CBT（n=69） | P |
|---|---|---|---|---|
| Age, years, mean (SD) |  | 35.1 (10.1) | 36.8 (11.9) | 0.373[a] |
| Female, n (%) |  | 38 (55.1) | 44 (63.8) | 0.386 |
| Education, years, mean (SD) |  | 15.7 (3.6) | 15.1 (3.2) | 0.331[a] |
| Marital status, n (%) | single | 30 (43.5) | 19 (27.5) | 0.145 |
|  | married | 36 (52.2) | 46 (66.7) |  |
|  | divorced | 3 (4.3) | 4 (5.8) |  |
| Ethnicity（Han）,n (%) |  | 63 (91.3) | 68 (98.6) | 0.115 |
| Location (city）,n (%) |  | 66 (95.7) | 66 (95.7) | 1.000 |
| Religion (none-religious）,n (%) |  | 57 (82.6) | 59 (85.5) | 0.817 |
| Age of onset, years, mean (SD) |  | 29.5 (10.1) | 30.6 (11.5) | 0.534[a] |
| Course of GAD, months, mean (SD) |  | 72.9 (95.1) | 73.9 (83.4) | 0.501[b] |
| HAMA, mean (SD) |  | 24.1 (7.1) | 23.3 (7.1) | 0.377[b] |
| HAMD, mean (SD) |  | 11.5 (5.1) | 11.2 (4.7) | 0.653[a] |
| CGI-S, mean (SD) |  | 4.4 (0.8) | 4.3 (0.8) | 0.682[b] |
| STAI-state, mean (SD) |  | 53.1 (14.9) | 50.6 (14.2) | 0.295[b] |
| STAI-trait, mean (SD) |  | 55.7 (12.5) | 53.7 (10.7) | 0.326[a] |
| SF-12, mean (SD) |  | 21.2 (6.3) | 23.1 (6.0) | 0.071[a] |
| FFMQ, mean (SD) |  | 111.3 (14.8) | 112.0 (17.0) | 0.782[a] |
| Use of antidepressants ,n (%) | SSRI | 50 (72.5) | 53 (76.5) | 0.696 |
|  | SNRI | 19 (27.5) | 16 (23.2) |  |
| Use of benzodiazepines, n (%) |  | 24 (34.8) | 24 (34.8) | 1.000 |
| Use of atypical antipsychotics , n(%) |  | 11 (15.9) | 7 (10.1) | 0.449 |

*p < 0.05. a Independent samples t-test. b Mann-Whitney's U test.

## Primary outcomes

At 8 weeks, the HAMA remission rate in the MBCT-A group was significantly higher than that in the CBT-A group (63.8% in the MBCT-A group vs. 44.6% in the CBT-A group, p = 0.040, Cohen's d = 0.39). However,

the response rates were not significantly different (86.2% in the MBCT-A group vs. 80.4% in the CBT-A group, p = 0.402; Cohen's d = 0.16) (shown in Table 2).

At the 3-month follow-up assessment, neither the remission rate (48.2% in the MBCT-A group vs. 48.1% in the CBT-A group, p = 0.994, Cohen's d = 0.19) nor the response rate (80.4% in the MBCT-A group vs. 74.1% in the CBT-A group, p = 0.432, Cohen's d = 0.00) were statistically different between the two groups (shown in Table 2).

Table 2. Primary outcomes

|  | MBCT | CBT | Effect size | P value |
|---|---|---|---|---|
| 8weeks | N=58 | N=56 | (Cohen's d) | |
| HAMA response(n,%) | 50 (86.2) | 45 (80.4) | 0.157 | 0.402 |
| HAMA remission(n,%) | 37 (63.8) | 25 (44.6) | 0.392 | 0.040* |
| 3months | N=56 | N=54 | | |
| HAMA response(n,%) | 45 (80.4) | 40(74.1) | 0.150 | 0.432 |
| HAMA remission(n,%) | 27 (48.2) | 26 (48.1) | 0.191 | 0.994 |

*means p◻0.05

## Secondary outcomes

The two-way mixed ANOVAs with time as the repeated measure, intervention group as the between-subjects factor, and HAMA total score, HAMA psychic score, HAMA somatic score, HAMD score, and SF-12 score as the dependent variables all revealed a significant main effect of time but no significant intervention group × time interaction (shown in Table 3). To further explore the time effect, we performed pairwise comparisons with the Bonferroni correction. Both groups showed significant improvements in HAMA total, psychic, and somatic scores, HAMD scores, and SF-12 scores between the baseline and immediate after-treatment assessments (T1 to T2) and between the baseline and 3-month follow-up assessments (T1 to T3) (shown in Online Supplementary Table 1).

The two-way mixed ANOVAs with time as the repeated measure, the intervention group as the between-subjects factor, and STAI-S, STAI-T, CGI-S, and FFMQ scores as dependent variables revealed a significant main effect of time and a significant intervention group × time interaction (shown in Online Supplementary Table 2). Therefore, a simple effects analysis was performed in STAI-S, STAI-T, CGI-S, and FFMQ scores.

The CGI-S scores revealed significant group simple effects at the 8-week assessment, $F(1,53) = 1.403$, $P = 0.001$ (not shown in Online Supplementary Table 2). This indicates that the MBCT-A group exhibited a significantly greater decrease in CGI-S scores compared with the CBT-A group immediately after the

intervention. However, these enhanced improvements had not persisted at the three-month follow-up assessment in the MBCT-A group, as indicated by the lack of a significant difference between the two groups at this time point.

Comparing the FFMQ scores revealed a significant simple effect of group at 8-weeks, F(1,53) = 5.104, P = 0.028 (not shown in Online Supplementary Table 2). Thus, while the level of mindfulness increased in both groups immediately post-treatment, the increase was significantly greater in the MBCT-A group.

There were no significant group simple effects in STAI-S, STAI-T scores at the 8-week assessment and no significant group simple effects in all STAI-S, STAI-T, CGI-S, and FFMQ scores at the 3-month follow-up assessments.

Table 3. Secondary outcomes: the two-way mixed ANOVA results.

| variable | Main effects for time | | | Main effects for group | | Interaction(Time×Group) | | |
|---|---|---|---|---|---|---|---|---|
| | F | P | partial η2 | F | P | F | P | partial η2 |
| HAMA total | 302.98 | 0.000* | 0.737 | 0.26 | 0.610 | 2.14 | 0.127 | 0.019 |
| HAMA psychic | 198.63 | 0.000* | 0.648 | 0.01 | 0.912 | 1.78 | 0.171 | 0.016 |
| HAMA somatic | 237.60 | 0.000* | 0.687 | 0.56 | 0.455 | 1.38 | 0.255 | 0.013 |
| HAMD | 82.79 | 0.000* | 0.434 | 0.02 | 0.888 | 1.16 | 0.317 | 0.011 |
| CGI-S | 195.80 | 0.000* | 0.645 | 2.94 | 0.089 | 5.80 | 0.004* | 0.051 |
| STAI-S | 80.25 | 0.000* | 0.426 | 0.11 | 0.741 | 3.56 | 0.030* | 0.032 |
| STAI-T | 108.74 | 0.000* | 0.502 | 0.18 | 0.671 | 4.28 | 0.015* | 0.038 |
| SF-12 | 99.94 | 0.000* | 0.481 | 0.27 | 0.603 | 2.03 | 0.134 | 0.018 |
| FFMQ | 53.55 | 0.000* | 0.331 | 1.28 | 0.261 | 5.26 | 0.006* | 0.046 |

Listwise deletion resulted in a final sample size of. n = 110

*means p⏍0.05

# Discussion

To the best of our knowledge, this is the first study to compare MBCT with high intensity, evidence-based group CBT, which is considered the first-line of psychotherapy for treatment of GAD(2, 3, 9). We obtained three main findings:

First, with CBT-A as an active control, MBCT-A was effective in reducing anxiety symptoms in symptomatic GAD patients. After the 8-week treatment period, 86.2% of the patients in the MBCT-A group and 80.4% of the patients in the CBT-A group achieved a response, and 63.8% and 44.6%, respectively, achieved remission. Given that all of the participants had significant anxiety symptoms (HAMA scores higher than 14) under TAU at baseline, we interpreted the improvement as an effect of the treatment. MBCT-A was also effective in improving a wider range of outcomes, including well-being, overall illness severity, depression symptoms, and state and trait anxiety symptoms. These findings are not only concordant with our hypothesis, but are also in line with previous studies demonstrating the effectiveness of MBCT in treating GAD[20, 25].

Second, at the 8-week assessment, the MBCT-A group had a significantly higher remission rate and a greater reduction in overall illness severity. However, at the 3-month follow-up visit, no differences between the two groups remained statistically significant. One plausible explanation for this difference is the request that participants in the MBCT-A group report their mindfulness practice in a WeChat group on a daily basis, which could have promoted engagement. It is widely accepted that for MBI participants, there is a significant association between the extent of practice and positive intervention outcomes[33]. By contrast, in the CBT-A group, weekly homework was handed in to the therapists and discussed in the following session. Thus, this difference in the homework expectations may account for the advantage of MBCT-A at the 8-week visit.

However, at the 3-month follow-up visit, there was a drop (63.8–48.2%) in the HAMA remission rate in the MBCT-A group but not the CBT-A group. A previous study[25] found that, compared with psycho-education with exercise control, MBCT led to short-term but not long-term benefits for patients with chronic insomnia. This is not surprising, as vigorous practice is essential for the beneficial effects of MBCT. These data indicate that MBCT should not be delivered in a one-time or short-term way, but rather, a long-term pattern should be encouraged and integrated via deliberate lifestyle modification.

Finally, unlike anxiety symptoms, the trait-related outcomes, including trait anxiety and trait mindfulness, showed further improvements at the 3-month follow-up visit compared with at 8 weeks, although this was not statistically significant (shown in Fig. 2). A previous study found similar changes in anxiety symptoms among GAD patients randomly assigned to MBCT, CBT-based psychoeducation, or usual care[20, 25]. Thus, the benefits of MBCT may not be limited to symptomology, but may promote a positive change in personality. Indeed, we found a significant improvement in the quality of life, which was reflected in the change in SF-12 scores. To some extent, MBCT may reflect cultural context, core values, and attitudes regarding life.

Our study has several strengths. To our knowledge, it is the first study with a relatively large sample size to compare MBCT and high intensity CBT among Chinese GAD patients. Additionally, there was high homogeneity in the participant diagnoses, adding to the generalizability of the findings. Furthermore, the interventions were delivered by trained and experienced instructors in accordance with standard protocols, thus demonstrating implementation of the treatment for future reference.

Our study also has several limitations. First, we did not have a no-treatment control or a wait-list control. Current evidence suggests that GAD is a chronic condition that is unlikely to improve naturally over time(1). Considering this and that we were comparing a new treatment with a well-established one, we thought it more ethical to provide treatment to both groups(26). Second, due to practical difficulties, we did not collect data on the mindfulness exercises in the MBCT-A group or the behavior exercises in the CBT-A group. Third, as the two groups had multiple and overlapping specific and non-specific components, which components led to the positive effects was not clear. Further study is necessary to elucidate this point. Finally, we did not match the total treatment time between the two groups. As shown in a previous study(34), more treatment time may produce larger effects. We chose not to match the treatment time between the two groups in consideration of clinical practical applications.

## Conclusion

MBCT was effective in reducing anxiety symptoms in GAD patients. While MBCT appeared to elicit more short-term benefits, CBT was associated with greater long-term benefits during the follow-up period. Taking into account the differences in treatment priorities and components between MBCT and CBT, our results suggest that these two evidence-based interventions are beneficial for treating GAD patients.

## List Of Abbreviations

MBCT: Mindfulness-based Cognitive Therapy; GAD: generalized anxiety disorder; CBT: Cognitive Behavioral Therapy; TAU: treatment-as-usual; HAMA: Hamilton Anxiety Scale; STAI: the State-Trait Anxiety Inventory; HAMD: Hamilton Depression Scale; CGI-S: Clinical Global Impression Scale; SF-12: 12-item Short-Form Health Survey; FFMQ: Five Facet Mindfulness Questionnaire; MBCT-A: MBCT, adapted for treating GAD; CBT-A: CBT designed to treat GAD; DSM-IV: Diagnostic and Statistical Manual of Mental Disorders, fourth edition; LB: lower bound; UB: upper bound; SE: standard error.

## Declarations

### Ethical approval and consent to participate

This study was approved by the Ethics Committee of the Sixth Hospital of Peking University before the conduction of the trial (NO.2018-29). All procedures were conducted ethically in accordance with the World Medical Association Declaration of Helsinki. All participants provided written informed consent to participate in this research.

### Consent for publication

Publication consent was obtained from all authors.

### Availability of data and materials

All data needed to support the conclusions in the paper are present in the paper and/or the Supplementary Materials.

## Competing interests

All authors have no conflicts of interest to declare.

## Funding

## Authors' contributions

Xue-bing Huang designed the study, provided supervision for CBT group, and conducted revisions on the manuscript. Si-si Jiang and Xue-hua Liu contributed to the study design. Wu-xiang Xie contributed to the randomization, allocation, concealment, and blinding processes. Si-si Jiang and Xue-hua Liu were MBCT instructors and Zhi-juan Xie, Nan Han, Hai-jing Zhang, Xin-Yuan Lu, and Xuan-zi Zhou were CBT therapists. Measurement and data collection were performed by Yu-qi Zhao, Ai-deng Duan, Shu-qin Zhao, and Zhi-cheng Zhang. Si-si Jiang conducted data analysis and wrote a draft of the manuscript. All authors read and approved the final manuscript.

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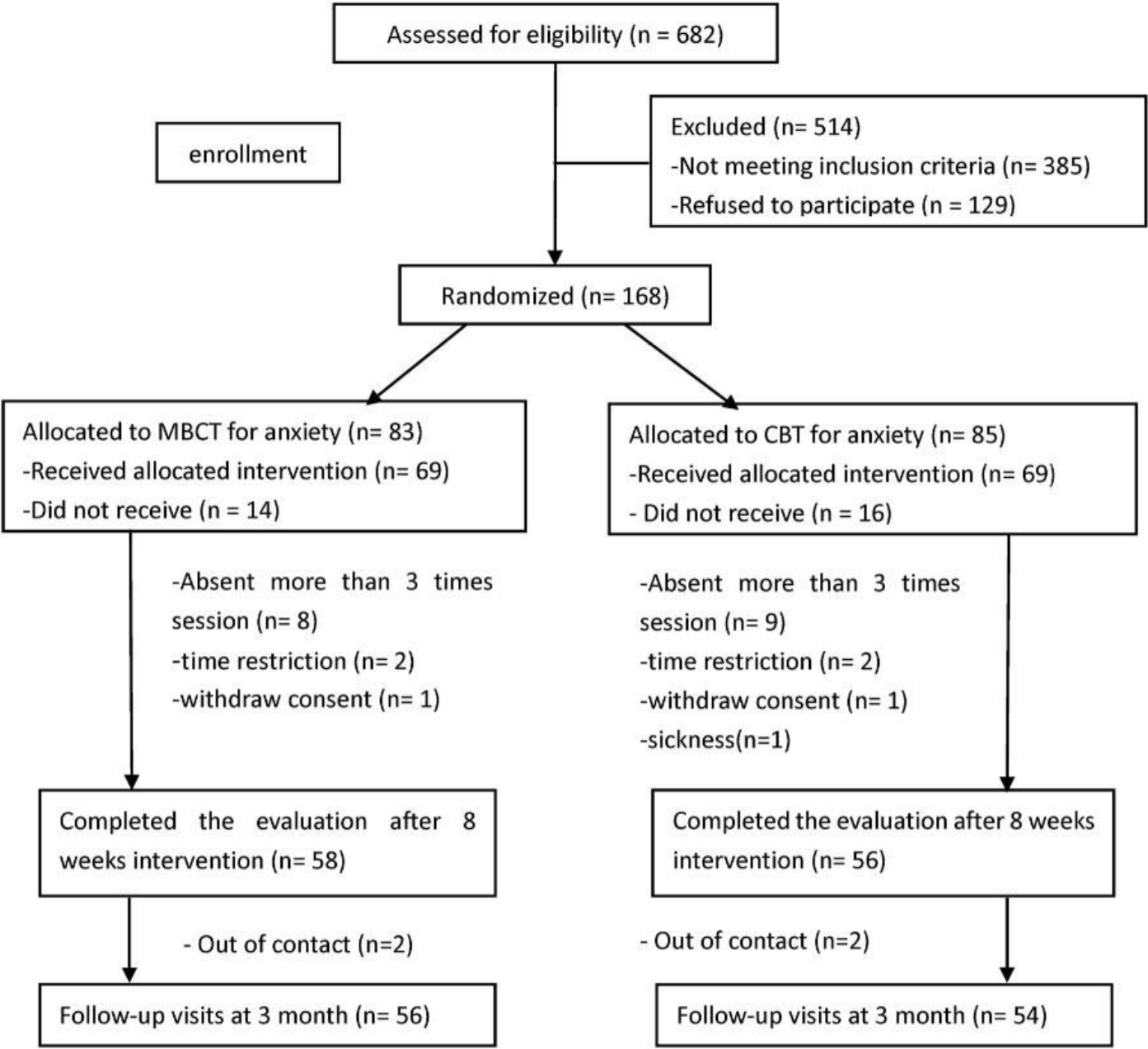
# Figures



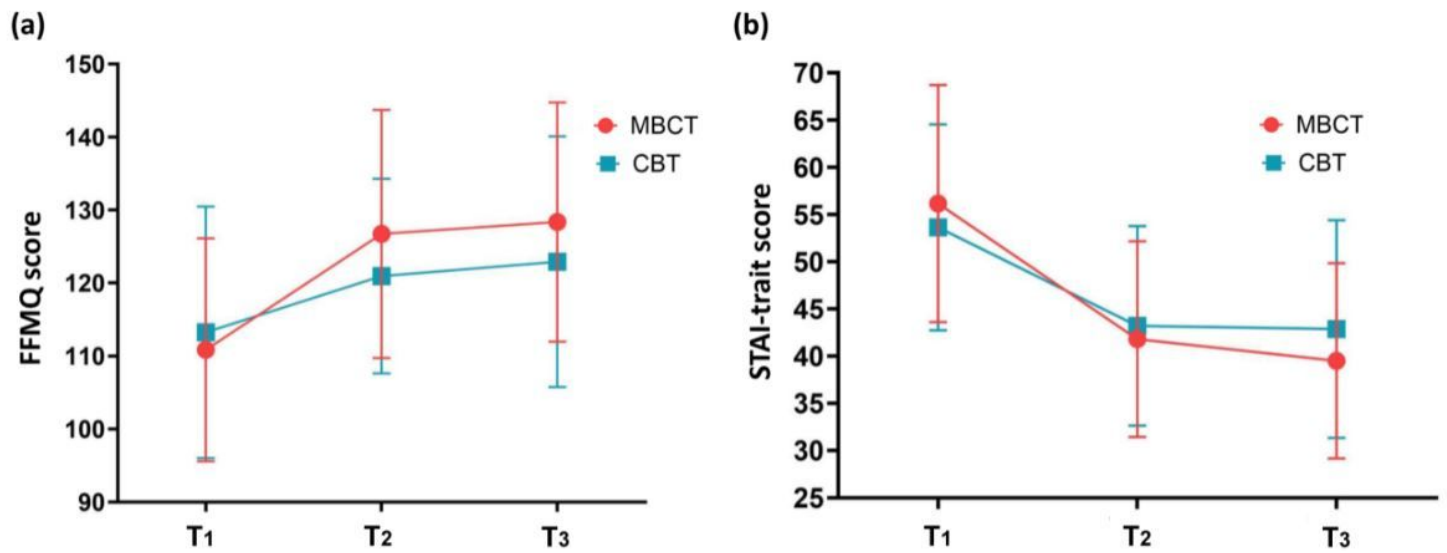**Figure 1**

Participant flow chart

**Figure 2**

Estimated marginal means for FFMQ and STAI-trait scores across time

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- OnlineSupplementaryTable1.doc
- OnlineSupplementaryTable2.doc