Research report

A Chinese Chan-based mind–body intervention for patients with depression

Agnes S. Chan a,b,c,n, Queenie Y. Wong a,d, Sophia L. Sze a,b, Patrick P.K. Kwong d, Yvonne M.Y. Han a,e, Mei-Chun Cheung f

a Department of Psychology, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong SAR, China
b Integrative Neuropsychological Rehabilitation Institute, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong SAR, China
c Henan Songshan Research Institute for Chanwuyi, Henan 452470, China
d Division II, Kwai Chung Hospital, New Territories, Hong Kong SAR, China
e Department of Special Education and Counselling, The Hong Kong Institute of Education, Tai Po, Hong Kong SAR, China
f Institute of Textiles and Clothing, The Hong Kong Polytechnic University, Kowloon, Hong Kong SAR, China

ARTICLE INFO

Article history:
Received 30 November 2011
Received in revised form 7 May 2012
Accepted 7 May 2012
Available online 25 July 2012

Keywords:
Depression
Mood
Attention
Somatic
Cognitive behavioral therapy
Mind–Body intervention

ABSTRACT

Background: Given the recent growing interest and encouraging findings in studies of alternative treatments for depression, the present randomized controlled trial study aimed to compare the effect of a newly developed Chinese Chan-based Dejian Mind–Body Intervention (DMBI) with the Cognitive Behavioral Therapy (CBT) on improving depressive symptoms in patients with depression.

Methods: Seventy-five participants diagnosed with major depressive disorder were randomly assigned to receive either 10-session CBT or DMBI, or placed on a waitlist. Pre-post measurements included record of anti-depressants treatment, ratings by psychiatrists who were blinded to the experimental design and self-report on mood measures, and performance in a cognitive test tapping concentration ability.

Results: Both the CBT and DMBI groups demonstrated significantly reduced overall depressive syndrome after intervention at large effect size (0.93–1.10). Furthermore, the DMBI group (p < 0.05), but not the CBT or waitlist groups, demonstrated significant reduction in intake of anti-depressants, and significant improvement in specific depression-related symptoms including difficulty in concentration (p = 0.002), and problems in gastrointestinal health (p = 0.02) and overall sleep quality (p < 0.001).

Limitations: This study has provided some evidence for the short-term effect of the DMBI on Chinese population. Its long-term effect on a larger sample and on Caucasian population warrants further investigation.

Conclusions: The present findings suggest that a Chinese Chan-based Mind–Body intervention has positive effects on improving mood and health conditions of individuals with depression.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

Psychological treatment for depression has been an interest of research for over three decades and has been consistently found to be effective; however, its degree of effect is relatively small. A recent review on the effectiveness of psychotherapy on adults with depression showed that the therapeutic effect of a combination of pharmacological and psychological treatment was significantly higher than pharmacological treatment alone (Cuijpers et al., 2009). This finding was consistent with another review on depressed inpatients (Cuijpers et al., 2011), patients with chronic depression (Keller et al., 2000), and children and adolescents with depression (Weisz et al., 2006) suggesting that psychotherapy has positive effect on reducing depressive mood. However, the additional effect of psychotherapy, although consistent, is small as revealed by the low range of effect size (d = 0.31) (Cuijpers et al., 2009). In sum, although psychotherapy has additional therapeutic effect to medication especially for individuals with more severe level of depression, the effect seems limited.

Given that the effect of traditional psychotherapy is limited, recently there has been growing interest in studying more innovative alternative methods such as mindfulness (Eisenbrath et al., 2008; Hofmann et al., 2010; Manicavasagar et al., 2011), Tai Chi (Sandlun and Norlander, 2000; Chou et al., 2004; Wang et al., 2004; Chan et al., 2005) and Mind–Body intervention (Nakao et al., 2001; Pilkinson et al., 2005; Chan et al., 2008a). A review paper reported that mindfulness-based therapy demonstrated
moderate effect for improving anxiety ($g = 0.63$) and mood symptoms ($g = 0.59$), which seems to be higher than that reported by studies on more conventional psychotherapy (Hofmann et al., 2010). Some studies on Chinese types of exercises also revealed promising results. Tsang et al. (2003, 2006) showed that elderly who have received about 15 weeks of qigong training showed less depressive mood and higher sense of self-efficacy. Another study on the effect of Tai Chi on Chinese elderly also reported reduced depressive symptoms after practicing three 45-minute sessions per week for three months (Chou et al., 2004). Thus, the studies on the alternative and complementary intervention are so far encouraging although has not been conclusive.

Given the encouraging studies on Chinese types of interventions (e.g., qigong and Tai Chi), the present study will examine the effectiveness of a newly developed Chinese Chan-based Mind–Body intervention for depression. This intervention, termed Dejian Mind–Body Intervention (DMBI) (Chan, 2009), was developed upon the medical principle of the Shaolin Temple. The intervention consists of psychosocial education, Mind–Body exercises and diet modification. A randomized controlled study has shown positive effects of this intervention on improving mood of a group of community-dwelling adults who reported to have depressive mood, and on improving some aspects of their physical health (Chan et al., 2011). Other studies have also suggested that this intervention is effective in improving cognitive functions and behavioral problems of patients with developmental and acquired brain disorders (Chan et al., 2008b, 2009, 2011). A recent study utilized the electrophysiological method to measure the electro-neural activities associated with the Mind–Body exercises in the DMBI (Chan et al., 2011). The results found that the Passive Dan Tian Breathing induced a relaxed and calm state of mind as reflected by elevated alpha asymmetry, and the Active Dan Tian Breathing induced an attentive state of mind as reflected by elevated theta coherence. These results suggested the possible explanation of its therapeutic effect to reduce stress and improve attention on individuals. In addition, this intervention has been applied at our center for several years to treat patients with various psychological problems and cognitive disorders, with about 85% of the clients showing different levels of improvement. Many of those clients have attained clinically significant improvement in their overall functional status or their capacity to work or study. For instance, an adult with depression was able to return to work after one-month DMBI; a child suffering from infantile spasm who could hardly walk at baseline was able to walk independently and steadily after 5-month intervention. Given the encouraging empirical findings and clinical observations, the primary goal of the present study is to examine the effect of the DMBI on patients with depression with a randomized controlled trial.

We choose to compare the effect of this newly developed intervention with cognitive behavioral therapy (CBT) because among the various psychotherapies, CBT is one of the widely applied psychological treatments for depression (Hepner et al., 2010). CBT aims to reduce the negative thought patterns of people with depression, to help people interpret their environment and interact with others in positive and realistic ways, to change the behaviors that may be related to the depression (Bulter et al., 2006; Shelton, 2009). In addition, a review study has concluded that the effectiveness of CBT in reducing depressive mood was similar to six other psychotherapies (nondirective supportive treatment, behavioral activation treatment, psychodynamic treatment, problem-solving therapy, interpersonal psychotherapy and social skills training) (Cuijpers et al., 2008). Similar finding was also concluded in another review study on the effectiveness of group CBT for depression (Oei and Dingle, 2008).

Given the previous positive results of CBT and DMBI on individuals with depression, it is anticipated that both treatments will show positive effect on reducing the depressive syndrome of the participants. The effect of DMBI will show at least similar if not greater effect than the CBT. In addition, as the DMBI is a Mind–Body intervention, it has showed positive effect on both mental and physical conditions on individuals in our previous studies and clinical observations. Thus, it is anticipated that participants in the DMBI, as compared to those in the CBT and waitlist groups, will show greater improvement on some common depression-related cognitive and physical symptoms, such as concentration difficulty, insomnia and gastrointestinal problems.

2. Methods

2.1. Participants

A total of 75 participants aged 28 to 62 and diagnosed with major depressive disorder who were outpatients recruited from the West Kowloon Psychiatric Center. All participants were screened by medical doctors and assessed to meet the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (American Psychiatric Association, 2000) criteria for major depressive disorder, as determined by the Structural Clinical Interview for the DSM-IV (Chinese-bilingual SCID–I/P version) (So et al., 2003) conducted by a clinical psychologist. Their SCID-based diagnosis revealed different severity levels of depression, including mild to moderate depressive episodes, or in partial remission. Participants with a history of head injury, seizure, stroke, other central nervous system disease, other comorbid psychiatric illness, or report of strong suicidal ideation were excluded. The 75 participants were randomly and equally assigned to one of the three groups: CBT, DMBI, and waitlist control. Randomization of participants to treatment conditions was conducted by a medical professional who was blind to the experimental design. The patients were also blind to the potential benefits of the two techniques. All participants were prescribed anti-depressants and continuously followed up by the psychiatrists who were not co-investigators and were blind to the group assignment and rationale of the present study.

For the two treatment groups, participants who have dropped out from the study or with $< 70\%$ attendance rate were excluded from the study, which resulted in 17 participants in the CBT group and 17 participants in the DMBI group. In the waitlist control group, 16 participants remained in the group after 9 withdrew from the study at post-assessment. Participants who have dropped out were due to unexpected change in work schedule or other personal commitments that have clashed with the training or assessment sessions. Among the participants who have completed the study with adequate attendance rate, 42% of them were employed, where 26% had a full-time job and 16% worked as part-time. More than two-thirds of participants were female, which could possibly be related to three reasons: (1) the prevalence rate of female having depression is higher than male, (2) female in Chinese society is generally more likely than male to participate in research, and (3) it is more possible for female (who are housewife or unemployed) to participate in the treatment that was run in weekdays. None of the female participant was pregnant during the study period. Yet, information on whether their depression might be related to hormonal changes (e.g., menopause) has not been collected. Among the totally 50 participants, their duration of having depression and receiving treatment with antidepressants varies from less than 1 year to 42 years, where 12% of them for less than a year, 64% for 1 to 10 years, 17% for 11 to 20 years, and the remaining 7% for more than 20 years. Table 1 shows the demographic and clinical characteristics of each group of participants at the baseline. The three groups are matched by age, $F(2,47)=0.20, p=0.82$; education level, $F(2,47)=1.73, p=0.19$; gender, $\chi^2(2)=1.10, p=0.58$; severity
of depressive disorder (SCID-based diagnosis: \( \chi^2(4) = 3.13, p = 0.54 \); Hamilton Psychiatric Rating Scale for Depression (HRSD; Hamilton, 1967): \( F(2,47) = 0.09, p = 0.91 \); Chinese version of Beck Depression Inventory (BDI-II; Beck et al., 1996; Chang, 2007): \( F(2,47) = 0.16, p = 0.86 \); duration, \( F(2,46) = 0.43, p = 0.66 \), and course of illness, \( \chi^2(2) = 0.40, p = 0.82 \); types, \( \chi^2(6) = 6.03, p = 0.42 \), and dosage, \( F(2,44) = 0.37, p = 0.69 \), of antidepressants prescribed.

### 2.2. Procedure

The study was conducted in accordance with the Helsinki Declaration of the World Medical Association Assembly. The research protocol was approved by the Joint The Chinese University of Hong Kong—New Territories East Cluster (Joint CUHK-NTEC) Clinical Research Ethics Committee (CREC) and the Kowloon West Cluster (KWC) CREC of the Hospital Authority in Hong Kong SAR. All participants were required to sign informed consent prior to the study and voluntarily participated in the study. Each participant was individually assessed by a psychiatrist and a research assistant on his/her medication record and depression-related syndrome with standardized questionnaires and cognitive test at the baseline and then after 10 weeks. The psychiatrist who performed the rating on the questionnaires was not the same as the psychiatrist who followed the patient was suggested not to change the type of medications throughout the study period, unless for unavoidable medical reasons. None of the participants have changed their type of antidepressants during the study period. All psychiatrists were blind to the experimental design and group assignment for each participant. After the baseline assessment, the two treatment groups underwent 10 weekly 90-min training sessions either on CBT or DMBI, whereas the waitlist control group did not receive any psychological intervention.

### 2.3. Intervention

The structure and format of the two treatment groups are designed to parallel each other, in terms of duration and frequency of sessions, group size, didactic teaching and learning elements, in-session sharing and discussion, and weekly home assignments. Two forms of interventions were administered by two different therapists. Both have over ten years of clinical experience as clinical psychologists. The clinical psychologist who ran the CBT group in this study has run the same kind of group regularly in the hospital, while the other clinical psychologist who ran the DMBI group is the one who has developed the DMBI. Throughout the 10 training sessions, participants in the treatment groups were taught on the fundamental principles and techniques of the corresponding interventions and monitored on their ability in mastering the techniques by the respective trainers.

#### 2.4. DMBI

This newly developed intervention is established on a Chinese Chan tradition, namely, Chanwuiyi (i.e., Zen, martial art and healing), from the Shaolin Temple. The intervention was termed DMBI as named after the Grand Master of Chanwuiyi—Shaolin (a Shaolin monk). The principle of DMBI is to alleviate psychological distress by understanding the root of problems in accordance with Buddhism philosophy, and enhance mental and physical health by practicing some of the Shaolin qigong exercises (i.e., Mind–Body exercises) and refining the diet to reduce the intake of food that will generate excessive internal heat. A major difference of this intervention from conventional psychological interventions is that it emphasizes integrative treatment on the mind and the body, which on the one hand, changes the thought process, and on the other hand, improves mental and physical health by practicing Mind–Body exercises and refining the diet.

The 10-session DMBI was delivered by a clinical psychologist who has over 10 years of clinical experience and is familiar with the DMBI model. Throughout the intervention, the participants were taught and practiced on four components: 1) “Listen to their body”; increase awareness of how unrealistic desires (i.e., greed), anger and obsession (i.e., craving for something or somebody beyond reality) affect their mental and physical health. Participants were advised to be aware of some physical signs (e.g., headaches, shortness of breath, lack of appetite, stomachaches, constipation, diarrhea), and then guided to reduce the psychosomatic problems. 2) Refining the

### Table 1

Demographic and clinical characteristics of participants at baseline.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>WL (n=16)</th>
<th>CBT (n=17)</th>
<th>DMBI (n=17)</th>
<th>F or ( \chi^2 ) (df)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (mean ± SD), years</td>
<td>45.44 ± 8.25</td>
<td>46.94 ± 6.54</td>
<td>47.06 ± 9.54</td>
<td>0.20(2,47)</td>
<td>0.82</td>
</tr>
<tr>
<td>Mean education (mean ± SD), years</td>
<td>8.06 ± 2.59</td>
<td>9.82 ± 2.46</td>
<td>9.18 ± 3.13</td>
<td>1.73(2,47)</td>
<td>0.19</td>
</tr>
<tr>
<td>Gender—female (%)</td>
<td>72.0</td>
<td>76.5</td>
<td>88.2</td>
<td>1.10(2)</td>
<td>0.58</td>
</tr>
<tr>
<td>Severity of illness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosis by SCID (%)</td>
<td></td>
<td></td>
<td></td>
<td>3.13(4)</td>
<td>0.54</td>
</tr>
<tr>
<td>MDD-PR</td>
<td>37.5</td>
<td>23.5</td>
<td>26.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDD-MoD</td>
<td>18.8</td>
<td>35.3</td>
<td>13.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDD-MoD</td>
<td>43.8</td>
<td>41.2</td>
<td>60.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRSD total score (mean ± SD)</td>
<td>11.56 ± 5.53</td>
<td>12.24 ± 3.90</td>
<td>12.06 ± 4.48</td>
<td>0.09(2,47)</td>
<td>0.91</td>
</tr>
<tr>
<td>BDI-II total score (mean ± SD)</td>
<td>28.13 ± 14.25</td>
<td>25.82 ± 14.09</td>
<td>28.29 ± 14.84</td>
<td>0.16(2,47)</td>
<td>0.86</td>
</tr>
<tr>
<td>Duration of illness (mean ± SD), years</td>
<td>10.44 ± 9.87</td>
<td>7.19 ± 6.68</td>
<td>9.18 ± 12.53</td>
<td>(0.43)(2,46)</td>
<td>0.66</td>
</tr>
<tr>
<td>Course of illness (%)</td>
<td>31.3</td>
<td>41.2</td>
<td>33.3</td>
<td>0.40(2)</td>
<td>0.82</td>
</tr>
<tr>
<td>First episode</td>
<td>68.8</td>
<td>58.8</td>
<td>66.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recurrent episode</td>
<td>56.3</td>
<td>81.3</td>
<td>58.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Types of antidepressant (%)</td>
<td>6.03(6)</td>
<td>0.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSRIs</td>
<td>56.3</td>
<td>12.5</td>
<td>5.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SNRIs</td>
<td>18.8</td>
<td>0</td>
<td>23.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TCAs</td>
<td>18.8</td>
<td>6.3</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dosage of antidepressant (mean ± SD), mg</td>
<td>56.7 ± 52.86</td>
<td>48.17 ± 67.63</td>
<td>41.03 ± 28.24</td>
<td>0.37(2,44)</td>
<td>0.69</td>
</tr>
</tbody>
</table>

Note: WL = waitlist control; CBT = Cognitive Behavioral Therapy; DMBI = Dejian Mind–Body Intervention; SCID = Structural Clinical Interview for DSM-IV; MDD = major depressive disorder; PR = partial remission; MoD = mild depressive episode; MoD = moderate depressive episode; HRSD = Hamilton Psychiatric Rating Scale for Depression; BDI–II = Chinese version of the Beck Depression Inventory; SSRIs = Selective Serotonin Re-uptake Inhibitors; SNRIs = Serotonin–Noradrenaline Reuptake Inhibitors; TCAs = Tricyclic Antidepressants.

* Prescription of other types of antidepressant or a combination of SSRIs with other type of antidepressant.
diet: reduce intake of some foods (including ginger, garlic, green onion, spicy foods, eggs, meat and fish) that will generate excessive internal heat and adversely affect their mood and physical health based on the Shaolin medical principle. It should be stressed that participants were not required to abstain from these foods, but advised to cut down their intake according to their own lifestyles and plans. Participants were also advised to consume food that are good for their health, including fresh vegetables, fruits, grains, beans, mushrooms, nuts and root vegetables (e.g., yam, taro). They were advised to gradually change their diet, guided to feel the changes after diet modification, and monitored on their progress. 3) Foster self-awareness and self-control: keep calm and relaxed when feeling distressed and angry by practicing self-guided massages (i.e., qigong), e.g., rolling their hands slowly up and down between the chest and the abdomen; resting their hands on their abdomen while quietly observing their breathing in and out; and massaging their nasal bridge. 4) Practice Shaolin Mind–Body exercises: these exercises, somewhat like Tai Chi and meditation, are sets of breathing exercises and slow movements that emphasize smooth, gentle and calm movements. The functions of the exercises are to reduce stress, increase flexibility of the four limbs, enhance strength of the legs, improve overall physical health and the circulation of Qi and blood. The practicing time was not fixed as participants were instructed to practice the exercises until they felt warm and relaxed, but not to the point of overexertion. The rationale for being flexible in practice is to facilitate participants to increase their sense of self-control and self-awareness (e.g., stop doing the exercise when feeling warm). The philosophy behind the Shaolin Mind–Body exercises is different from that of western cardiovascular exercises, where the prior does not require over sweating, as a little warm feeling with a little sweating is sufficient to achieve blood and Qi circulation.

2.5. CBT

The 10-session CBT protocol adopted in the present study is derived from a combination of sources, including Cognitive Therapy for Depression (Beck et al., 1987), Mind Over Mood (Greenberger and Padesky, 1995), and Cognitive Behavioral Therapy in Groups (Bieling et al., 2006). Typical treatment components include: (a) Progressive Muscular Relaxation; (b) behavioral activation; (c) self-monitoring; (d) cognitive restructuring, including evaluating and reconsidering interpretive and predictive cognitions; (e) cognitive techniques for deeply held core beliefs and deep-rooted conditional assumptions; (f) rehearsal of coping skills; and (g) relapse prevention.

The 10-session CBT was delivered by a clinical psychologist who has over 10 years of clinical experience and frequently applies this technique in her therapy sessions for hospital patients. At the beginning of the intervention, the participants received psychoeducation on the biopsychosocial model of depression, and familiarized themselves with the relationship between mood state, cognition and behavior. In each of the subsequent sessions, the therapist started with a review of the experiences of each participant over the past week, and monitored the progress of each participant in their practice of the treatment techniques. Finally, the therapist would set the stage for homework near the end of the session.

2.6. Measures

Change in intake of antidepressants was evaluated for each participant after 10-week period. The type and dosage of antidepressants prescribed by the psychiatrists, who were blind to the experimental design and group assignment, were recorded for each participant. Throughout the study, the psychiatrists have not changed the type of antidepressants on any participant.

Overall depressive syndrome was measured by the total score of the 17-item HRSD and the 21-item BDI-II before and after the intervention. While the HRSD was rated by the psychiatrists who were blind to the experimental design and group assignment for each participant, the BDI-II was rated by the participants themselves. The possible maximum score of the HRSD and the BDI-II is 52 and 63, respectively, with higher scores indicating more severe degree of depression. In addition, three sleep-related items (i.e., early insomnia, middle insomnia and late insomnia) in the HRSD were selected as a measure of the quality of sleep of each participant. Each of the three items was rated on a 3-point scale from 0 to 2, where higher score indicates greater difficulty and ‘0’ indicates ‘no difficulty’. The three scores were summed (range from 0 to 6) for pre-post comparisons.

Ability of concentration was assessed by the Digit Vigilance Test (Lewis, 1995), which requires participants to search for target digit “6” or “9” within an array of other distracting digits. The total time taken to complete the task will be used for pre-post comparisons, where shorter duration suggests higher work efficiency and better ability to remain concentrated on task.

Gastrointestinal health was tapped by participants’ rating on 13 items of the Gastrointestinal Symptoms Questionnaire (GSQ) (Bovenschen et al., 2006), which measuring three common gastrointestinal problems associated with depression (nausea, loss of appetite and bowel movement problems). Each item was rated on a 7-point scale (0–6), resulting in a summation score ranges from 0 to 78, where higher score indicates more severe gastrointestinal problems.

2.7. Data analysis

The SPSS (Version 15.0) statistical software package was used for data analysis. Baseline group differences in demographic and clinical characteristics were analyzed by ANOVA and χ² tests. The main analyses investigating treatment effects on mood measures and cognitive test were computed using repeated measures ANOVA and then followed by post hoc paired samples t tests, and between-group difference was analyzed using independent samples t tests with planned comparisons. Between-group comparison on the change in intake of antidepressants after intervention was conducted by χ² tests. The effect size in terms of Cohen’s d statistic was calculated to examine the difference between the pre- and post-means or between the means of two groups.

3. Results

3.1. Reduced intake of antidepressant

At the baseline, the three groups of participants were prescribed comparable types and dosage of antidepressants (p > 0.05; Table 1). After treatment, there was a significantly different proportion of participants across groups having reduced intake of antidepressants, χ²(2) = 5.61, p = 0.03. Further pair-wise comparison found that there were significantly more participants reduced antidepressants (6/17, 35%) after receiving 10-week DMBI, as compared to the waitlist control group (0/13, 0%), χ²(1) = 4.59, p = 0.02. The proportion of participants with reduced antidepressants in the CBT group (2/16, 13%) was comparable with that of the waitlist group, χ²(1) = 1.63, p = 0.10. It should be noted that there was no change in the type of antidepressants prescribed for any participant throughout the study period. Thus, the reduced intake of antidepressants in the DMBI group was probably unrelated to the change in the type of medication.

Further analyses were conducted on participants with more severe depression. At the baseline, there were 6 participants in...
each of the two treatment groups demonstrating moderate degree of depressive syndrome on the HRSD as rated by the psychiatrists. After intervention, 3 of the 6 moderately depressed participants in the DMBI group had reduced antidepressants, whereas none in the CBT group showed such reduction, $\chi^2(1) = 3.0$, $p = 0.04$. In addition, among the 6 participants (3 were moderately depressed and 3 were in partial remission) with reduced antidepressants in the DMBI group, half of them (3/6) showed concurrent reduction in tranquillizer usage.

### 3.2. Reduction in overall depressive syndrome

Psychiatrists’ rating on HRSD: at the baseline, the three groups were matched on the severity level of depression based on the HRSD rating by psychiatrist who were blind to the experimental design ($p = 0.91$; Table 1). The pre-post change in HRSD across groups was analyzed using two-way repeated measures ANOVA, with Time (Pre vs. Post) as the within-subject factor and Group (DMBI vs. CBT vs. waitlist) as the between-subject factor. There was a significant main effect of Time, $F(1,47)=25.23$, $p = 0.00$, but a non-significant interaction effect, $F(2,47) = 2.34$, $p = 0.11$. Subsequent post hoc paired t tests revealed that both CBT and DMBI groups demonstrated significantly reduced HRSD total score ($p < 0.001$) at large effect size (DMBI = 0.93; CBT = 1.03) after intervention, whereas the waitlist control group did not show any significant change ($p = 0.17$; Table 2). Both treatment groups showed significantly greater extent of improvement in overall depressive syndrome than the waitlist group (DMBI vs. waitlist: $t = 1.92$, $p = 0.03$, effect size = 0.61; CBT vs. waitlist: $t = 2.38$, $p = 0.01$, effect size = 0.77). The extent of improvement (i.e., average of percentage change in score of each individual) between two treatment groups was comparable (mean reduction in score: DMBI = 37% ± 48%; CBT = 46% ± 47%), $t(32) = 0.55$, $p = 0.30$. There were 62% and 69% of participants in the DMBI and CBT groups respectively demonstrating clinically significant improvement, as reflected by a change of HRSD score from an abnormal range (score 8–52) back to the normal level (score 0–7) or an improvement of at least two functional levels (e.g., from Severe Depression to Mild Depression).

### 3.3. Self-rating on BDI-II

The changes in psychiatrists’ rating were to some extent similar to those of participants’ self-evaluation on the BDI-II at pre- and post-intervention. The three groups were matched on their baseline BDI-II scores, indicating comparable degree of reported depressive syndrome ($p = 0.86$; Table 1). Similar to the multivariate result of the HRSD, there was a significant main effect of Time, $F(1,47) = 41.02$, $p = 0.00$. The results of post hoc t tests suggested that both DMBI and CBT groups demonstrated significantly reduced BDI-II scores ($p < 0.001$) at post-intervention with large effect size (DMBI = 1.10; CBT = 0.95; Table 2). Although the waitlist control group also reported significantly reduced BDI-II score after 10 weeks ($p = 0.02$), its extent of improvement (i.e., average of percentage change in score of each individual) was significantly lower than that of the DMBI group (waitlist: 17% reduction; DMBI: 42% reduction, $t = 2.38$, $p = 0.01$, effect size = 0.83), but was comparable to that of the CBT group (37% reduction, $t = 1.38$, $p = 0.09$, effect size = 0.48). There was 47% of participants in the DMBI group showing clinically significant improvement, which is defined as a change in BDI score from abnormal range (14–63) back to normal range (0–13) or an improvement of at least two functional levels (e.g., from Severe Depression to Mild Depression). These findings suggested that participants in the DMBI group felt more positive effect than those in the CBT groups.

### 3.4. Reduction in specific depression-related symptoms

#### 3.4.1. Ability of concentration

At the baseline, the three groups were matched on ability to concentrate on an attention task (i.e., the DVT), $F(2,46) = 0.43$, $p = 0.65$. The pre-post comparison as analyzed by repeated measures ANOVA showed a marginally significant Time by Group interaction effect, $F(2,46) = 2.94$, $p = 0.06$. The treatment effect was then explored with the post hoc paired t tests. It was found that the DMBI group got significantly 58 s faster (pre: 403.75 s; post: 345.56 s) at large effect size (0.91) (Fig. 1). In contrast, the treatment effect was not significant (Fig. 1). The DMBI group showed significantly greater extent of improvement than the CBT and the waitlist group ($t(1.97$ and 2.18, $p = 0.03$ and 0.02, respectively). It suggests that DMBI has greater effect on enhancing

### Table 2

<table>
<thead>
<tr>
<th>Measures/Group</th>
<th>Pre-treatment</th>
<th>Post treatment</th>
<th>t(df)</th>
<th>p</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRSD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL (n = 16)</td>
<td>11.56 ± 5.53</td>
<td>10.00 ± 4.41</td>
<td>−0.10 (15)</td>
<td>0.168</td>
<td>0.25</td>
</tr>
<tr>
<td>CBT (n = 17)</td>
<td>12.24 ± 3.90</td>
<td>6.82 ± 5.73</td>
<td>−4.24 (16)</td>
<td>0.001**</td>
<td>1.03a</td>
</tr>
<tr>
<td>DMBI (n = 17)</td>
<td>12.06 ± 4.48</td>
<td>6.88 ± 4.47</td>
<td>−3.84 (16)</td>
<td>0.001**</td>
<td>0.93a</td>
</tr>
<tr>
<td>BDI-II</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL (n = 16)</td>
<td>28.13 ± 14.25</td>
<td>23.50 ± 4.45</td>
<td>−2.62 (15)</td>
<td>0.019*</td>
<td>0.66b</td>
</tr>
<tr>
<td>CBT (n = 17)</td>
<td>25.82 ± 14.09</td>
<td>19.49 ± 4.60</td>
<td>−3.92 (16)</td>
<td>&lt; 0.001**</td>
<td>0.95a</td>
</tr>
<tr>
<td>DMBI (n = 17)</td>
<td>28.29 ± 14.84</td>
<td>17.94 ± 2.70</td>
<td>−4.54 (16)</td>
<td>&lt; 0.001**</td>
<td>1.10a</td>
</tr>
</tbody>
</table>

Note: WL = waitlist control; CBT = Cognitive Behavioral Therapy; DMBI = Dejian Mind–Body Intervention.

* $p < 0.05$.

** $p < 0.01$.

a Large effect size.

b Medium effect size.

---

Fig. 1. Percentage change in specific depression-related symptoms, including concentration difficulty, sleep problems and gastrointestinal problems, after intervention across three groups. WL = waitlist control; CBT = Cognitive Behavioral Therapy; DMBI = Dejian Mind–Body Intervention. *Positive score indicates post-intervention improvement. **Negative score indicates post-intervention deterioration. $p = 0.05$; *$p = 0.01$ based on results of paired samples t tests on pre-post change in specific depression-related symptoms.
concentration and work efficiency of patients with depression as compared to CBT.

3.4.2. Quality of sleep

At baseline, the three groups of participants were matched on the severity level of sleep problems as measured by the summation score of three insomnia items in the HSRS rated by the psychiatrists (p = 0.41). Results of repeated measures ANOVA demonstrated a significant Time by Group interaction effect, F(2,45) = 4.89, p = 0.01. Subsequent post hoc pre-post comparisons showed that the DMBI group had significantly 57% reduction in scores (pre: 2.63 ± 2.09; post: 1.13 ± 1.26; t = −3.99, p < 0.001) after intervention, at large effect size of 1.00 (Fig. 1). However, both the CBT (pre: 2.00 ± 1.41; post: 1.47 ± 1.46, t = −1.04, p = 0.16, effect size = 0.27) and the waitlist (pre: 1.88 ± 1.46; post: 2.81 ± 2.01, t = 1.64, p = 0.06, effect size = 0.41) groups did not show significant changes (Fig. 1). It suggests that DMBI was more effective than CBT on improving overall sleep quality of patients with depression.

3.4.3. Gastrointestinal health

At baseline, the severity level of three common depression-related gastrointestinal problems as measured by the GSQ were comparable across the three groups, F(2,45) = 1.29, p = 0.29. The pre-post changes across groups was analyzed by repeated measures ANOVA indicated significant Time by Group interaction effect, F(2,46) = 3.51, p = 0.03. Results of post-hoc paired samples t-tests showed that the DMBI group demonstrated significantly reduced score (pre: 16.82 ± 11.28; post: 11.59 ± 8.86; t = −2.14, p = 0.02, effect size = 0.52) after intervention, suggesting improvement in gastrointestinal health. In contrast, the CBT (pre: 11.13 ± 8.19; post: 11.13 ± 7.26; t = 0, p = 0.5, effect size = 0) and the waitlist (pre: 15.36 ± 10.92; post: 18.64 ± 12.16; t = 1.17, p = 0.13, effect size = 0.31) groups showed a non-significant change (Fig. 1). The extent of improvement in DMBI group (31%) was significantly greater than that of the CBT (0%; t = 1.84, p = 0.03) and the waitlist group (−21%; t = −2.30, p = 0.02). It seems that DMBI had some positive effects on improving gastrointestinal health of patients with depression, which was not observed in patients receiving CBT or on waitlist.

4. Discussion

The major goal of the present study was to examine the effect of a newly developed Chinese Chun-based Mind–Body intervention (i.e., DMBI) on enhancing mental and physical health of patients with depression. As compared with CBT, DMBI demonstrated similar effect on reducing overall depressive syndrome of depressed patients based on both psychiatrists’ rating and self-evaluation. Thus, on the one hand, the present results were consistent with those reported in the Western countries on CBT (Keller et al., 2000; Bultef et al., 2006; Oei and Dingle, 2008; Shelton, 2009), which suggests that CBT may be applicable to the Chinese population. On the other hand, the Chinese Mind–Body intervention demonstrated a similar effect on alleviating severity level of depression, which implies that this intervention can be considered as an alternative choice of treatment for depression.

In addition, DMBI has demonstrated more robust effect than CBT on some other dimensions. First, more patients have reduced dosage of antidepressants after receiving 10 weeks of DMBI as compared to CBT. These results were more prominent on patients with more severe level of depression. It should be stressed that the antidepressants were prescribed by psychiatrists who were not co-investigators and were blinded to the research rationale and experimental design of the present study. They followed up the patients individually at the out-patient clinic on regular basis. Second, patients with depression demonstrated significant improvement on their ability to concentrate on task after receiving DMBI, whereas those receiving CBT or on waitlist did not show such improvement. Third, patients in the DMBI group, but not the CBT or waitlist group, showed significantly improved sleep problems. Fourth, patients receiving DMBI showed significantly improved gastrointestinal health. In contrast, individuals receiving CBT, alike their waitlist counterparts, did not show significant improvement in their gastrointestinal problems. In sum, the present findings suggested that the DMBI have similar effect as the CBT on reducing the overall depressive syndrome of patients with depression. However, the DMBI has additional effects, which were not observed in the CBT, on improving specific somatic and cognitive conditions of patients with depression.

One hypothesis for such additional effect of DMBI is that it was developed upon the Mind–Body model. The traditional Chinese health concept has emphasized on the interaction between the mind and the body, as well as the relation between emotional and physical conditions, for over thousands of years. For instance, long-term sadness will affect the function of the lung; overloaded cognitive processing will affect the function of the digestive system. The DMBI emphasized on concurrently training the body as well as the mind so as to enhance both physical and psychological health. Thus, the components of DMBI including Mind–Body exercises, thought processing education and diet modification were developed for this purpose. It is therefore, as anticipated, the results of present study evidenced the positive effects of DMBI on the mind and the body.

One advantage of the DMBI is that it is less restrictive as compared to some other intervention methods. According to the principle of the DMBI model, there are no strict regulations on diet modification and duration for practicing the Mind–Body exercises. The participants were only recommended to reduce intake of certain foods according to their own lifestyles and plans, and to practice the exercises in response to their bodily signals. This sort of “doing it naturally” approach may be more well-accepted by patients with depression who are usually less motivated in effortful tasks, as compared to some techniques of the CBT, such as the progressive muscular relaxation which requires about 20–30 min of practice each time. Therefore, the DMBI may be particularly suitable for individuals who cannot comply with the CBT method.

Given the encouraging results, the DMBI may have potential as a complementary intervention for patients with depression because of its cost-effectiveness and easiness to comprehend and practice. Despite the encouraging findings, the present study has several limitations. The present study has provided evidence for the short-term effect of a 10-week DMBI training, yet its long-term effect remains unknown. Furthermore, it is a pilot study on clinical population, future studies with larger sample size are needed to further validate the effects of DMBI. In addition, given that patients with comorbid psychiatric illnesses or reporting strong suicidal ideation were excluded from the present study, whether DMBI is clinically applicable and generalizable to those population warrants further investigation. Finally, the present study was conducted on Chinese population; whether this intervention has similar effect on Caucasian population will need to be evaluated.

Role of funding source

This study was supported partly by a donation from Mr. Sau Hung Li to The Chinese University of Hong Kong, and partly by the Niche Areas Funding (J-BB65) and the Internal Competitive Research Grant (A-PD1M) from The Hong Kong Polytechnic University.

Conflict of interest

The authors declare no conflict of interest.
Acknowledgments

The authors would like to specially thank Venerable Master Dejian of the Sanhuangzhai Monastery for his effort in developing and generosity in sharing the Chinese Chun-based Mind–Body intervention. Appreciation is also extended to Lan He, Man-ying Mo, Maggie Ng and Nicolson Yat-fan Siu for their effort in data collection and data management.

References