Research report

Culturally attuned Internet treatment for depression amongst Chinese Australians: A randomised controlled trial


A School of Psychology, University of Sydney, Sydney, Australia
B Centre for Emotional Health, Department of Psychology, Macquarie University, Australia
C Core Pathology and Clinical Chemistry, ICPMR Pathology West, NSW Health, Australia
D School of Psychiatry, University of New South Wales, Sydney, Australia

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Abstract

Introduction: Although depression can be treated effectively with Cognitive Behaviour Therapy (CBT), only a small percentage of Chinese Australians access evidence-based treatment due to practical and cultural barriers. The present study examined the efficacy and acceptability of an Internet delivered CBT (iCBT) program to treat Chinese Australians with depression.

Methods: The Chinese depression iCBT program (the Brighten Your Mood Program) is a culturally adapted version of the clinically efficacious Sadness iCBT Program. Fifty-five Chinese Australians with depression were randomly allocated to either an immediate treatment group or to a waitlist control group. Treatment consisted of an 8 week program with 6 CBT online educational lessons, homework assignments, additional resources presented in Chinese and English, and weekly telephone support with Mandarin/Cantonese-speaking support personnel. An intention-to-treat model was used for data analyses.

Results: Seventeen of twenty-five (68%) treatment group participants completed all lessons within the timeframe. Compared to controls, treatment group participants reported significantly reduced symptoms of depression on the Chinese versions of the Beck Depression Inventory (CBDI) and Patient Health Questionnaire-9 item (CB-PHQ-9). The within- and between-group effect sizes (Cohen's $d$) were 1.41 and 0.93 on the CBDI, and 0.90 and 0.50 on the CB-PHQ-9, respectively. Participants rated the procedure as acceptable, and gains were sustained at three-month follow-up.

Limitations: The study included several subclinical participants and some measures that have not been previously validated with Chinese Australians.

Conclusions: Results provide preliminary support for the efficacy and acceptability of an iCBT program at reducing symptoms of depression in Chinese Australians.

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1. Introduction

Major depressive disorder is highly prevalent (Kessler et al., 2009), and without proper treatment leads to considerable disability and impaired quality of life (Andrews and Titov, 2007). High rates of depression have been found across various cultural groups (Kessler et al., 2009) including the Chinese, the largest ethnic group in the world. Epidemiological studies in North America suggest high rates of depression amongst Chinese immigrants with estimates ranging from 3% to 10% (González et al., 2010; Takeuchi et al., 1998; Tiwari and Wang, 2008), and up to 19% in primary care (Yeung et al., 2004). Similar findings have been reported in Australia, where 3% of Australians identify themselves as of Chinese ancestry (Australian Bureau of Statistics, 2008). Whilst no epidemiological study has been...
conducted amongst Chinese Australians, primary care studies report comparable state depression rates between Chinese and non-Chinese patients in Australia (Parker et al., 2005), with a recent study reporting that up to 30% Chinese Australian patients were at elevated risk of depression on the Kessler Psychological Distress Scale (Tang et al., 2009).

Cognitive behaviour therapy (CBT) is an effective psychological treatment for depression (Butler et al., 2006) and, with appropriate modifications, is highly compatible with Chinese cultural values (Hodges and Oei, 2007). Although there is growing evidence for CBT as an efficacious treatment for Chinese people residing in Hong Kong and Canada (Shen et al., 2006; Wong, 2008a, 2008b), many Chinese people under-utilise mental health services. Even amongst those with a mental disorder, Chinese immigrants are significantly less likely than their non-Chinese counterparts to seek help (Abe-Kim et al., 2007). Chinese Australians with depression were less likely to have consulted their primary physician or psychiatrist or to have received antidepressant medication compared to non-Chinese Australians (Parker et al., 2005). These lower rates of treatment seeking amongst Chinese people appear to be due to practical and cultural barriers (Kung, 2004), some of which are common to other immigrant groups. Common barriers include stigma and “loss of face” (Kung and Tseng, 2006), the tendency to use traditional passive coping strategies such as withdrawal and “accepting fate” (Wong, 2010), somatisation of symptoms (Parker et al., 2001), lack of knowledge about mental disorders and treatment (Kung, 2004), lack of culturally responsive mental health services (Blignault et al., 2008), language and communication difficulties (Kung, 2004), and the cost of treatment and transport to access treatment (Ho et al., 2008).

Given the high unmet need to treatment in Chinese Australians with depression, Internet delivered CBT (iCBT) has the potential to overcome many barriers for Chinese people to accessing effective care such as stigma, language and communication difficulties, and the lack of culturally appropriate services. iCBT delivers structured CBT via the Internet often with remote therapist support via email or telephone (Titov, 2011). Meta-analyses provide strong support for the efficacy of iCBT in treating depression and anxiety disorders (Andersson and Cuijpers, 2009; Andrews et al., 2010). Furthermore, recent studies of iCBT programs for depression (Titov et al., 2010a), generalised anxiety disorder (Robinson et al., 2010), and social phobia (Titov et al., 2009) indicate that iCBT programs can be safely and effectively administered by non-clinicians when being supervised by clinicians. If clinically effective and acceptable to consumers, this approach could be utilised as another strategy for providing treatment to Chinese and other immigrant groups, who often face considerable challenges accessing appropriate services. To date, however, there has been limited exploration of translation of efficacious iCBT programs for other cultures (Nordgreena et al., 2010; Seol, 2011).

As such, the present study sought to examine the efficacy and acceptability of iCBT for Chinese people with depression living in Australia by modifying an iCBT program for depression that had been demonstrated as efficacious with a general Australian population (Perini et al., 2009; Titov et al., 2010a) for use by a Chinese population. The program was then tested using a randomised controlled design comparing an immediate Treatment group with a waitlist Control group. It was hypothesised that Treatment group participants would show (1) significant improvements on measures of depression and disability relative to Controls; (2) that the gains would be maintained at three-month follow-up; and (3) that participants would rate the intervention as acceptable and culturally appropriate.

2. Method

2.1. Design

A Consolidated Standards of Reporting Trials (CONSORT) compliant design (Moher et al., 2010) compared an immediate Treatment group with a delayed waitlist-Control group from pre to post treatment. The Treatment group was followed-up three-month after the program whereas the Control group received treatment after the Treatment group completed treatment. Power calculations indicated that a sample size of 26 participants in each group was sufficient to detect a between-groups effect size (ES) of 0.7 with power of 80%, and alpha of 0.05, which was the minimum expected based on similar studies (Perini et al., 2009; Titov et al., 2010a).

2.2. Participants, randomisation, and recruitment

Applicants applied online after reading details about the study and about inclusion and exclusion criteria in the mass media. Details of participant flow are in Fig. 1. During the 16 weeks of recruitment, 167 individuals applied for this program, of which 109 met the initial screening criteria and completed a 32-item questionnaire enquiring about demographic details and treatment history. The 109 applicants were contacted for a telephone interview to confirm that they met DSM-IV criteria (American Psychiatric Association, 2000) for a major depressive episode using the Chinese-Bilingual Structured Diagnostic Interview Schedule (CB-SCID-I/P) (So et al., 2003). A total of 59 participants met the following inclusion criteria: (i) Resident of Australia, but self-identified as of Chinese origin; (ii) at least 18 years of age; (iii) spoke fluent Cantonese and/or Mandarin, and read Chinese or English fluently; (iv) had access to a computer, the Internet, and use of a printer; (v) not currently participating in CBT; (vi) not using illicit drugs or consuming more than three standard drinks/day; (vii) not currently experiencing a psychotic mental illness or severe symptoms of depression (defined as a total score > 19 or responding > 1 to Question 9) (suicidal ideation) on the Chinese version of the Patient Health Questionnaire-9 Item (CB-PHQ-9; Yeung et al. 2008); (viii) if taking medication, had been taking the same dose for at least one month and did not intend to change that dose during the course of the program; and (ix) met DSM-IV diagnostic criteria for a diagnosis of current major depressive episode. Four additional participants with subclinical depressive symptoms were included in the study after being assessed on an individual basis by the clinical team as likely to benefit from the pro-

Fig. 1. Brighten your mood study flow chart. CB-PHQ-9, Chinese patient health questionnaire-9 Item; CB-SCID-I/P, Chinese-bilingual structured clinical interview for DSM-IV (axis I, patient version).
167 individuals applied for the Brighten Your Mood Program within timeframe (28/06/10 - 18/10/2010)

Unsuccessful Application (n=58)
- Severe depressive symptoms on CB-PHQ-9 (n = 12)
- Did not complete the application (n = 12)
- Failed exclusion criteria (n= 2)
- Not Chinese (n=2)
- Substance/alcohol use (n=2)
- Non Australian Resident (n = 4)
- 18 years or below (n= 2)
- Suicidal (n=16)
- Psychotic (n = 3)
- Low CB-PHQ-9 (total score < 4) (n=3)

109 individuals met inclusion criteria

Did Not Complete Telephone Interview (n = 9)
- Could not return contact (n = 7)
- Withdraw before telephone interview (n = 2)

100 individuals completed telephone interview with CB-SCID-I/P

Unsuccessful Telephone Interview (n=37)
- Subclinical (n = 32)
- Currently undergoing CBT (n = 3)
- Psychotic (n=2)

63 participants met all inclusion criteria and were randomized into Immediate Treatment Group or Control Group

Treatment Group (n = 32)

Did not complete Pre-Treatment Questionnaires (n = 4)
- Did not respond (n = 2)
- Withdrew before sent out (n = 2)

Completed Pre-Treatment Questionnaires (n = 28)
- Did not start (n = 3)

Eligible for analysis (started lesson 1) (n = 25)
17 participants completed all lessons within timeframe
(4 terminated at lesson 5, 4 at lesson 6)

Did not complete Post-Treatment Questionnaires (n =2)

Completed Post-Treatment Questionnaires (n= 23 )
- Did not complete 3-month follow up questionnaires (n=4)
- Unable to contact (n = 2)

Completed 3-month Follow up Questionnaires (n= 21)
Re-administered CB-SCID-I/P (n=23)

Control Group (n = 31)

Did not complete Pre-Treatment Questionnaires (n = 1)
- Withdrew before sent out (n = 1)

Completed Pre-Treatment Questionnaires (n = 30)

Eligible for analysis (n = 30)

Did not complete Post-Treatment Questionnaires (n = 2)

Completed Post-Treatment Questionnaires (n= 28)
gram. Applicants who did not meet inclusion criteria were provided with information about how to access other culturally appropriate mental health services.

A total of 63 applicants who met study criteria were randomised via a true randomisation process (www.random.org), generated by an independent person, to either the Treatment (n=32) or Control (n=31) groups (Table 1). Participants were assigned to the groups by the investigators, who opened the next consecutively sealed envelope which contained the allocation details upon the participant meeting study criteria. Four Treatment group and one Control group participants withdrew before beginning the program and three Treatment group participants did not start the program, resulting in 25 Treatment and 30 Control group participants being eligible for analysis.

The study was approved by the Human Research Ethics Committee (HREC) of St Vincent’s Hospital (Sydney, Australia), the HREC of the University of Sydney, and the HREC of the University of New South Wales. The trial was registered as ACTRN12610000570088.

### Table 1

Demographic characteristics of the treatment and control groups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment group</th>
<th>Control group</th>
<th>Totals</th>
<th>Significance statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>12%</td>
<td>8</td>
<td>27%</td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>88%</td>
<td>22</td>
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<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>40.6 (10.3)</td>
<td>37.8 (12.8)</td>
<td>39.0</td>
<td>11.7</td>
</tr>
<tr>
<td>Range</td>
<td>22 to 68</td>
<td></td>
<td>21 to 65</td>
<td>21 to 68</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single/never married</td>
<td>4</td>
<td>16%</td>
<td>11</td>
<td>36%</td>
</tr>
<tr>
<td>Married/de facto</td>
<td>15</td>
<td>60%</td>
<td>16</td>
<td>53%</td>
</tr>
<tr>
<td>Separated/divorced/widowed</td>
<td>6</td>
<td>24%</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>High school</td>
<td>9</td>
<td>36%</td>
<td>5</td>
<td>17%</td>
</tr>
<tr>
<td>Tertiary</td>
<td>16</td>
<td>64%</td>
<td>18</td>
<td>60%</td>
</tr>
<tr>
<td>Other certificate</td>
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<td>0%</td>
<td>4</td>
<td>13%</td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Employment</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-time or student</td>
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<td>8%</td>
<td>11</td>
<td>37%</td>
</tr>
<tr>
<td>Full-time</td>
<td>13</td>
<td>52%</td>
<td>10</td>
<td>30%</td>
</tr>
<tr>
<td>Unemployed, retired or disabled</td>
<td>4</td>
<td>16%</td>
<td>4</td>
<td>13%</td>
</tr>
<tr>
<td>At home parent</td>
<td>6</td>
<td>24%</td>
<td>3</td>
<td>10%</td>
</tr>
<tr>
<td>Previous Mental Health Treatment</td>
<td>16</td>
<td>64%</td>
<td>18</td>
<td>60%</td>
</tr>
<tr>
<td>Taking Medication</td>
<td>6</td>
<td>24%</td>
<td>4</td>
<td>13%</td>
</tr>
<tr>
<td>Hours of internet use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 10 per week</td>
<td>12</td>
<td>48%</td>
<td>11</td>
<td>36%</td>
</tr>
<tr>
<td>11+ per week</td>
<td>10</td>
<td>40%</td>
<td>16</td>
<td>53%</td>
</tr>
</tbody>
</table>

Note. Standard deviations are shown in parentheses. There were two missing data for the control group for marital status, education, and employment; and three missing data for both groups on hours of Internet use.

2.3. Measures

2.3.1. Diagnostic measure

#### 2.3.1.1. Chinese-bilingual structured clinical interview for DSM-IV (Axis I, patient version) (CB-SCID-I/P) (So et al., 2003)

The CB-SCID-I/P is a translated version of the Structured Clinical Interview for the DSM (SCID), a semi-structured interview for obtaining reliable DSM-IV diagnoses. Psychometric evaluations indicate the CB-SCID-I/P has good inter-rater reliability of 1.00 and 0.91 and a kappa of 0.76 for mood disorders (So et al., 2003). For the purposes of this study, only module A (current major depressive episode) of the CB-SCID-I/P was used to determine the presence of current major depression. All participants were administered the CB-SCID-I/P at pre-treatment, and Treatment group participants were re-administered the CB-SCID-I/P at three-month follow-up. The diagnostic assessments were conducted by the authors (IC and JZ), who are both native Chinese-speakers (Cantonese and Mandarin). The authors received training on the diagnostic assessment in a workshop format from two senior clinical psychologists. The interviewers were not blind to participants’ condition. Each diagnosis was reviewed by the clinical team to ensure reliability of diagnosis. There was no measure of inter-rater reliability.

#### 2.3.2. Acculturation measure

#### 2.3.2.1. The Suinn–Lew Asian self-identity acculturation scale (SL-ASIA) (Suinn et al., 1987)

The SL-ASIA is a 26-item self-report scale that measures the extent of acculturation of ethnic minority persons. The SL-ASIA taps several social domains in Asian Americans and produces scores from 1 to 5, with 5 reflecting high acculturation. The modified Chinese Australian version of the SL-ASIA (Parker et al., 2005) was administered to both groups at pre-treatment. The internal consistency of the SL-ASIA in the current study was Cronbach’s $\alpha = .77$.

2.3.3. Primary outcome measures

#### 2.3.3.1. Chinese version of the Beck depression inventory-I (CBDI) (Zheng et al., 1988)

The BDI is a widely used self-report scale...
for measuring depression. Psychometric evaluations revealed that the CBDI has good internal reliability (Cronbach’s $\alpha = .84$) (Zheng et al., 1988). The CBDI demonstrates high sensitivity (.79) and specificity (.91) when used with overseas Chinese immigrants with DSM-III-R major depression using the SCID (Yeung et al., 2002). The internal consistency of CBDI in the current study was good (Cronbach’s $\alpha = .83$).

2.3.3.2. Chinese bilingual version of the patient health questionnaire (CB-PHQ-9) (Yeung et al., 2008). The PHQ-9 (Kroenke et al., 2001) is a self-administered screening questionnaire for depression based on the nine DSM-IV criteria for a major depressive episode. The CB-PHQ-9 demonstrated high sensitivity (.81) and specificity (.98) for a Chinese American sample (Yeung et al., 2008). Cronbach’s $\alpha$ in the current study was .74.

2.3.4. Secondary outcome measures

2.3.4.1. Chinese version of the depression anxiety stress scales-21 item (C-DASS-21) (Taouk et al., 2001). The DASS is a measure of severity of symptoms of depression, anxiety, and stress (Lovibond and Lovibond, 1995). The C-DASS-21 has comparable factor loadings in an Australian Chinese-speaking sample to English-speaking Australian and Hong Kong Chinese-speaking samples, indicating appropriate translation and adaptation of items for Chinese immigrants in Australia (Taouk et al., 2001). Cronbach’s $\alpha$ in the current study was $\alpha = .84$.

2.3.4.2. Chinese version of the Kessler 10 psychological distress scale (C-K-10). The Kessler 10 psychological distress scale (K-10) (Kessler et al., 2002) is a 10 item measure of psychological distress, with strong evidence supporting the relationship between the K-10 and a diagnosis of anxiety and depressive disorders (Andrews and Slade, 2001). The K-10 has been reported as having excellent internal consistency with ethnically diverse populations ($\alpha = .93$, Fassaert et al., 2009). The publically available Chinese translation of the K10 was used. The internal consistency of the C-K-10 in the current study was $\alpha = .86$.

2.3.4.3. Chinese version of the Sheehan disability scales (C-SDS). The Sheehan disability scales (SDS) (Sheehan, 1983) comprises 3 items measuring impairment in psychosocial functioning with high internal consistency ($\alpha = .89$; Leon et al., 1997). The SDS was translated into Chinese and back translated into English by accredited translators at the National Australian Authority for Translators and Interpreters, and was independently checked and proofread for use in this study. Cronbach’s $\alpha$ of the C-SDS in the current study was high ($\alpha = .89$).

All participants completed the outcome measures (CBDI, CB-PHQ-9, C-DASS-21, C-K-10, and C-SDS) at pre-treatment and at one-week post-treatment, and Treatment group participants also completed these at three-month follow-up. Control group participants did not complete the questionnaires at the three-month follow-up time-point as they had begun treatment. At post-treatment, Treatment group participants also completed a 7-item treatment satisfaction questionnaire enquiring about the acceptability of the modified Chinese depression treatment protocol based on the Credibility/Expectancy Questionnaire (Devilly and Borkovec, 2000). With the exception of the C-K-10 and C-SDS, all of these measures are considered reliable, valid, and appropriate for clinical research purposes with Chinese-speaking populations. All outcome measures were administered via the Internet, which results in reliable responses equivalent to paper-and-pencil versions of self-report questionnaires (Donker et al., 2010; Garb, 2007).

2.4. Intervention

The Chinese depression iCBT program (The Brighten Your Mood Program) is a modified version of the clinically efficacious Sadness iCBT Program (Perini et al., 2009; Titov et al., 2010a). The name, Brighten Your Mood Program, was selected as a culturally appropriate descriptor for improving one’s mood in order to avoid the negative connotations related to depression in Chinese culture.

Several steps were involved in modifying the original program to make the Brighten Your Mood program culturally appropriate, based on adaptations suggested by previous studies (Shen et al., 2006; Wong, 2008a). These will be detailed in a subsequent publication, but, in summary, included the following steps: 1) translating the written words included in the lessons, homework, and additional resources, and including both English and Chinese words on each page; 2) redrawing all illustrations to reflect people with Asian features; 3) modifying phrases, concepts, and descriptions to be more consistent with Chinese-cultural values and terminology, including terms such as low mood and “closed heart” to describe depression; 4) placing a stronger emphasis on addressing myths about depression and its treatment; 5) reframing skills such as assertiveness in a form that promoted cultural values of respect and interpersonal harmony, rather than individual autonomy; 6) arranging reviews of all materials with Chinese health professionals and consumers, and subsequently editing the materials.

The program comprised the following components: Six online lessons; a homework assignment for each lesson; regular automatic reminder and notification emails; weekly telephone contact and secure email with Chinese-speaking support personnel (IC and JZ). The six online lessons represent best practice principles used in CBT programs for depression including behavioural activation, cognitive restructuring, problem solving, and assertiveness skills. Part of the content of each lesson is presented in the form of an illustrated story about a woman with depression who, with the help of a clinical psychologist, learns to gain mastery over her symptoms. Participants were encouraged to complete one lesson each week, to complete the recommended homework, and to complete the six lessons within eight weeks. Participants had access to additional written resources about communication skills, health anxiety, strategies for improving sleep, and answers to frequently asked questions about the application of skills described in the lessons, and summaries. Participants were also provided with access to the Stories from the Frontline, a large collection of forum posts written by participants in previous iCBT depression programs that were translated into Chinese, covering topics relevant to each of the six lessons. All materials were available in both Chinese and English.
2.5. Chinese-speaking support personnel

Two clinicians (IC and JZ) provided all contacts with participants via weekly telephone calls or emails. JZ is a Clinical Psychologist, and IC was, at the time of the study, in her second year of doctoral training in clinical psychology, and both were supervised by NT and BD. Every contact with each participant was recorded as the total support personnel time spent per participant. Support personnel were encouraged to actively engage with participants in treatment, but advised to limit weekly contact time to approximately 10 min per participant, except if more time was clinically indicated. They aimed to provide the following four components in each interaction with participants: reinforcement of progress; a summary of the key skills described in the Lesson for that week; normalising difficulties with treatment; and encouragement to continue with the program.

2.6. Statistical methods

Group differences in demographic data and pre-treatment measures were analysed with one-way ANOVAs and chi-square tests. All post-treatment analyses involved an intention-to-treat (ITT) design where missing data was addressed by carrying forward the first available data (i.e. baseline-observation-carried-forward model; BOCF). Pre- to post-treatment changes in questionnaire scores were analysed using univariate analyses of covariance (ANCOVAs), controlling for pre-treatment scores (Vickers, 2005a, 2005b). Changes in Treatment group scores between post-treatment and follow-up were examined with paired-sample t-tests. Effect sizes (Cohen’s d) were calculated for within- and between-group changes, based on the pooled standard deviation. All analyses were performed in PASW version 18.0 (SPSS, Inc., Chicago, IL).

Three criteria of clinical significance were employed. First, pre-treatment, post-treatment, and follow-up CBPI scores were compared with clinical cut-offs to provide an index of remission, defined as the proportion of participants who initially scored at or above, and subsequently below the cutoff of a CBPI total score $\geq 16$ (Yeung et al., 2002). An estimate of recovery was made by identifying the proportion of participants in each group who demonstrated a significant reduction in their symptoms (defined here, as a reduction of 50% of pre-treatment CBPI scores), as described in recent dissemination studies (Richards and Suckling, 2009). Third, changes in the prevalence of depression in the Treatment group were calculated based on the results of the diagnostic interviews administered at pre-treatment and at three-month follow-up.

3. Results

3.1. Baseline data

The mean age of participants was 39.04 years (SD = 11.68), and 44 (80%) were women. The principal countries of birth for the participants were mainland China (67%), Hong Kong (16%), Taiwan (5%), Australia (4%), Vietnam (4%), Malaysia (2%) and America (2%). Fifty-six percent of participants spoke English, 80% spoke Mandarin, and 55% spoke Cantonese. The mean time spent in Australia was 12.60 years (SD = 7.93), and the mean SL-ASIA score was 2.29 (SD = .35). Additional demographic details are included in Table 1. Chi-squared tests found a significant difference between groups on marital status ($\chi^2 = 8.49, p = .037$). No differences were observed between groups on any other demographic characteristics (all $p$s > .05). However, one way ANOVAs of pre-treatment scores indicated Treatment group participants endorsed significantly higher CBPI ($F_{1, 51} = 14.54, p = .027$) and marginally higher CB-PHQ-9 ($F_{1, 51} = 3.83, p = .053$) scores than Controls.

3.2. Adherence and attrition

Seventeen (68%) Treatment group participants completed all six lessons within the eight weeks of the program. One additional participant completed the remaining lesson within two days of the program ending. Three Treatment group participants commenced medication after beginning the Program, but they were not excluded from the analyses. Post-treatment data were collected from 23/25 (92%) Treatment and 28/30 (93%) Control group participants. Three-month follow-up data were collected from 21/25 (84%) Treatment group participants. The average number of completed Lessons was 5.56 (SD = .77). Sixteen of 23 (70%) participants read the Chinese content all of the time/most of the time, and 7/23 (30%) read it some of the time/a little of the time, whilst 6/23 (26%) participants did not read the English content. Further details of adherence and attrition are shown in Fig. 1.

3.3. Primary outcome measures

Univariate ANCOVAs on post-treatment CBPI and CB-PHQ-9 scores (Table 2), controlling for pre-treatment scores, revealed that the Treatment group had significantly lower post-treatment scores than the Control group, ($F_{1, 52} = 30.69, p < .001$), ($F_{1, 52} = 5.28, p = .026$), respectively. Paired sample t-tests for the Treatment group between post-treatment and follow-up revealed no change in scores on the CBPI ($t_{24} = -2.07, p > .05$), and a significant reduction in scores on the CB-PHQ-9 ($t_{24} = -5.91, p < .005$). Using a Bonferroni-corrected level of 0.01 for the paired sample t-test, no change was observed on the CBPI and CB-PHQ-9 for the Treatment group between post-treatment and follow-up.

3.4. Secondary outcome measures

Univariate ANCOVAs (Table 2), controlling for pre-treatment scores, revealed that the Treatment group had significantly lower post-treatment scores than the Control group on the C-DASS-21 ($F_{1, 52} = 5.71, p = .020$) and C-SDS ($F_{1, 52} = 5.05, p = .029$). No significant difference between the Treatment and Control group was found on the C-K-10 ($F_{1, 52} = 2.69, p > .05$). Paired sample t-tests for the Treatment group revealed a significant reduction in scores on the C-DASS-21 ($t_{24} = 2.10-10.70, p < .005$), the C-K-10 ($t_{24} = 1.14-6.22, p = .006$) and the C-SDS ($t_{24} = 1.14-6.22, p = .006$) between post-treatment and follow-up. Using a Bonferroni-corrected level of 0.01 for the paired sample t-tests, a significant reduction in scores was observed on the C-DASS-21 and the C-SDS, and no change was found on the C-K-10.
3.5. Effect sizes

Within- and between-group effect sizes for the outcome measures are included in Table 2. From pre- to post-treatment, positive (≥8.8) within-group effect sizes were found for the Treatment group on the CBDI and CB-PHQ-9. Large between-group effect sizes were found on the CB-DASS-21 (93, CI 95% = −4.57 to 1.88), and moderate between-group effect sizes were found on the CB-PHQ-9 (50, CI 95% = −2.37 to 0.81).

3.6. Clinical significance

Chi-squared analyses indicated significant differences between groups at post-treatment for both remission ($\chi^2 = 11.0, p = .001$) and recovery ($\chi^2 = 18.42, p < .001$) on the CBDI, which were maintained in the Treatment group at follow-up (Table 3). At 3-month follow-up, 21.25 (84%) Treatment group participants no longer met diagnostic criteria for major depressive episode on the CB-SCID-I/P compared to 0% of Treatment group participants at pre-treatment.

3.7. Treatment satisfaction

Treatment group participants who completed the post-treatment questionnaires reported a moderate level of satisfaction with the program (Table 4). When asked to provide a rating from 1 to 10, where 10 indicates a high level of agreement, the average Treatment group participant rated the treatment as logical (M = 7.43, SD = 1.90) and reported feeling confident that the treatment would be successful at teaching them techniques for managing their symptoms (M = 6.35, SD = 2.10). They reported they would recommend this program to a friend with depression (M = 7.39, SD = 1.95). Twenty-two of 23 participants (96%) reported it was worth their time doing the program.

3.8. Time spent/contact events per participant

The mean total support personnel time per Treatment group participant was 97.32 min (SD = 60.76 min) including sending and reading emails, and telephoning participants. An additional average 23.24 min per participant (SD = 9.02 min) was

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**Table 2**

Means, standard deviations and effect sizes (Cohen’s d) for the two groups for the primary and secondary measures.

<table>
<thead>
<tr>
<th>Measure and group</th>
<th>Pre-treatment mean</th>
<th>Post-treatment mean</th>
<th>3-month follow-up mean</th>
<th>Pre to post within group effect size</th>
<th>Pre to follow-up within group effect size</th>
<th>Post-treatment between group effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBSI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>25.76 (8.53)</td>
<td>13.48 (9.28)</td>
<td>11.56 (13.02)</td>
<td>1.41 (−1.94 to 5.04)</td>
<td>1.32 (−2.03 to 6.42)</td>
<td>.93 (−4.57 to 1.88)</td>
</tr>
<tr>
<td>Control</td>
<td>20.83 (7.58)</td>
<td>21.27 (7.86)</td>
<td>−</td>
<td>−.06 (−2.77 to 2.75)</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>CB-PHQ-9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>12.28 (5.00)</td>
<td>7.96 (4.76)</td>
<td>5.68 (5.39)</td>
<td>.90 (−1.06 to 2.77)</td>
<td>1.30 (−.66 to 3.41)</td>
<td>.50 (−2.37 to 0.81)</td>
</tr>
<tr>
<td>Control</td>
<td>9.93 (3.79)</td>
<td>10.03 (3.66)</td>
<td>−</td>
<td>−.03 (−1.38 to 1.28)</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td><strong>Secondary measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-DASS-21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>26.56 (9.21)</td>
<td>20.04 (11.81)</td>
<td>13.64 (12.28)</td>
<td>.63 (−2.98 to 5.26)</td>
<td>1.21 (−2.40 to 6.03)</td>
<td>.46 (−5.09 to 2.99)</td>
</tr>
<tr>
<td>Control</td>
<td>23.60 (9.66)</td>
<td>24.90 (9.66)</td>
<td>−</td>
<td>−.14 (−3.59 to 3.32)</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>C-K-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>28.40 (7.49)</td>
<td>22.60 (7.15)</td>
<td>18.84 (9.33)</td>
<td>.81 (−2.13 to 3.61)</td>
<td>1.15 (−1.78 to 4.81)</td>
<td>.29 (−3.09 to 2.02)</td>
</tr>
<tr>
<td>Control</td>
<td>24.90 (6.51)</td>
<td>24.50 (6.44)</td>
<td>−</td>
<td>.06 (−2.27 to 2.37)</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>C-SDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>13.96 (8.18)</td>
<td>9.96 (7.31)</td>
<td>6.28 (7.39)</td>
<td>.53 (−2.68 to 3.39)</td>
<td>1.01 (−2.20 to 3.90)</td>
<td>.52 (−3.39 to 2.54)</td>
</tr>
<tr>
<td>Control</td>
<td>12.97 (9.36)</td>
<td>14.07 (8.57)</td>
<td>−</td>
<td>−.12 (−3.47 to 2.94)</td>
<td>−</td>
<td>−</td>
</tr>
</tbody>
</table>

Note. The standard deviations of the means and the confidence intervals of effect sizes are shown in parentheses. A baseline-observation carried forward model was used where post-treatment and follow-up data was not available.

**Table 3**

Proportion of participants above and below cut-off scores of clinical significance (Remission) and proportion demonstrating at least 50% reduction in pre-treatment scores (Recovery).

<table>
<thead>
<tr>
<th>Measure</th>
<th>Treatment group</th>
<th>Control group</th>
<th>Chi square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td><strong>CBDI</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-treatment score ≥ 16</td>
<td>24</td>
<td>96%</td>
<td>23</td>
</tr>
<tr>
<td>Pre-treatment score &lt; 16</td>
<td>1</td>
<td>4%</td>
<td>7</td>
</tr>
<tr>
<td>Post-treatment score ≥ 16 (non-remission)</td>
<td>9</td>
<td>36%</td>
<td>24</td>
</tr>
<tr>
<td>Post-treatment score &lt; 16 (remission)</td>
<td>16</td>
<td>64%</td>
<td>6</td>
</tr>
<tr>
<td>Post-treatment score ≤ 50% pre-treatment (recovery)</td>
<td>12</td>
<td>48%</td>
<td>0</td>
</tr>
<tr>
<td>Follow-up score ≥ 16 (Non-remission)</td>
<td>6</td>
<td>24%</td>
<td></td>
</tr>
<tr>
<td>Follow-up score &lt; 16 (remission)</td>
<td>19</td>
<td>76%</td>
<td></td>
</tr>
<tr>
<td>Follow-up score ≤ 50% pre-treatment (recovery)</td>
<td>16</td>
<td>64%</td>
<td></td>
</tr>
</tbody>
</table>

A baseline-observation carried forward model was used where post-treatment and follow-up data was not available.
required for administration, including the diagnostic telephone interviews. During the program, Treatment group participants received a mean of 18.56 automatic emails per participant (SD = 2.31), in addition to a mean of 2.48 (SD = 2.12) personal emails per participant. Support personnel made a total of 276 telephone calls (M = 10.96 per participant; SD = 3.63).

4. Discussion

This trial examined the efficacy of the Brighten Your Mood program, a modified iCBT program with telephone support to treat depression in Chinese Australians. At intake 93% of participants met full DSM-IV diagnostic criteria for major depressive episode. At post-treatment, outcomes for the Treatment group were superior to the Control group on the primary and secondary outcome measures, except on the C-K-10. Large between-group effect sizes were obtained on the CBDI, which was comparable to that reported on the BDI-II in previous iCBT programs for depression (Perini et al., 2009; Titov et al., 2010a), and higher than that reported in face-to-face group CBT for Chinese people (Wong, 2008a, 2008b). Moderate between-group effect sizes were obtained on the CB-PHQ-9, which is less than that reported on the PHQ-9 in previous programs (Perini et al., 2009; Titov et al., 2010a), possibly due to differences in the psychometric properties of the Chinese and English versions. Nevertheless, despite the conservative BOCF model of addressing missing data, the magnitude of the overall improvements in the present trial were consistent with those reported in meta-analyses of iCBT programs for depression (Andrews et al., 2010). Using the CBDI, significantly more Treatment group participants were classified as in remission and as recovered than Controls, providing further evidence of clinical efficacy. Furthermore, completion rates were comparable to that reported in previous iCBT depression programs (Perini et al., 2009; Titov et al., 2010a).

At follow-up, conservative analyses revealed that scores on the CBDI and CB-PHQ-9 were sustained for the Treatment group, and 84% of Treatment group participants no longer met diagnostic criteria for major depression. These results were obtained with less than 100 min of total staff time per participant, considerably less than typically required in face-to-face treatment. The savings in time were achieved by using the online lessons and other resources to present many of the skills and information usually taught by the therapist. Support personnel were thus able to support each participant to begin to apply, practise and consolidate the key skills. Importantly, the program was rated as acceptable and culturally appropriate for Chinese Australian participants. Overall, the results support the three hypotheses and provide preliminary evidence of efficacy and acceptability of this treatment protocol for depression for Chinese Australians.

Interestingly, a large proportion of applicants to the Brighten Your Mood Program failed to meet full DSM-IV criteria for major depression on the CB-SCID-I/P (31%; 32/104) compared to previous Australian iCBT program samples (Titov et al., 2010a). Although the CB-PHQ-9 has been demonstrated as a valid screening tool for depression amongst Chinese Americans (Yeung et al., 2008), it may not have been a sensitive screening tool in our sample. It is also possible that Asian people have higher DSM-IV threshold for reporting depression due to differences in the cultural expression of symptoms (Chang et al., 2008). The higher rates of subclinical cases may reflect lower mental health literacy in the Chinese Australian sample in identifying symptoms and seeking appropriate services.

4.1. Advantages of iCBT for Chinese Australians and other culturally and linguistically diverse (CALD) populations

People from CALD backgrounds face many potential barriers in seeking effective treatment (Scheppers et al., 2006). iCBT provides several advantages to overcome these barriers. On the patient level, the anonymous nature of iCBT appeals to people who feel embarrassed or ashamed of seeking treatment by more traditional means, and to those who prefer self-help in dealing with problems (Titov, 2007). People with stigmatised illnesses are more likely to utilise the Internet for health information and to communicate with clinicians about their condition using the Internet (Berger et al., 2005). This is especially relevant to Chinese people as the shame and “loss of face” extends beyond the individual to the entire family (Kung, 2003). iCBT programs can also overcome communication barriers for people who lack local language skills which prohibit the use of mental health services and lead to ineffective treatment (Scheppers et al., 2006). iCBT can improve access for Chinese people who experience language barriers in help-seeking in the absence of Chinese-speaking clinicians and interpreter services (Bignall et al., 2008). Furthermore, iCBT can provide a treatment opportunity for people without transportation, or who are unable to attend therapy during usual clinic hours, which is a common barrier for Chinese people (Ho et al., 2008).

On the provider level, iCBT programs that are sensitive to cultural models and beliefs provides considerable potential in delivering culturally attuned evidence-based treatments to a mass audience with fidelity. The Brighten Your Mood program incorporated cultural expressions and beliefs to make the

Table 4
Treatment satisfaction of Treatment group participants at post-treatment.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Very satisfied</th>
<th>Neutral/somewhat satisfied</th>
<th>Somewhat dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall satisfaction with the program</td>
<td>17 74%</td>
<td>5 22%</td>
<td>1 4%</td>
</tr>
<tr>
<td>Satisfaction with the quality of the treatment modules</td>
<td>17 74%</td>
<td>4 17%</td>
<td>2 9%</td>
</tr>
<tr>
<td>Satisfaction with the quality of internet correspondence with the support staff</td>
<td>21 91%</td>
<td>2 9%</td>
<td>0 0%</td>
</tr>
</tbody>
</table>
program acceptable and relevant to Chinese people, which is likely to improve engagement in treatment and promote adaptive coping skills. The Brighten Your Mood program has the potential to educate Chinese Australians about depression and CBT, and encourage patients to seek further face-to-face treatment if needed. Although iCBT may not be able to overcome all the barriers to mental health services for Chinese Australians, it has the potential to improve access and build treatment capacity for CALD patients by introducing shorter treatment delays and guarantee delivery of effective treatment on a system level (Titov, 2007). Given the encouraging outcomes of the Brighten Your Mood program and the cost-effectiveness of iCBT depression programs (Gerards et al., 2010), it is suggested that government-funded and community based organisations that service CALD populations consider incorporating iCBT into future models of service delivery.

4.2. Limitations

One limitation of this study is the inclusion of four participants who did not meet the full diagnostic criteria for current major depressive episode. Despite pre-treatment differences between Treatment and Control groups on the CBIDI, this was controlled for through the use of ANCOVAs, and the large between group effect size on the CBIDI still indicated that the Brighten Your Mood program was associated with significant reductions in symptoms of depression.

An additional limitation concerns the selection of measures. To allow comparisons between the Brighten Your Mood program and previous iCBT programs for depression (Perini et al., 2009; Titov et al., 2010a), measures used in previous trials were favoured. However, a limitation of using translated measures is that symptoms may not be culturally appropriate to different ethnic groups. Whilst most of the measures chosen have been extensively studied with Chinese people, we acknowledge that some have not been previously validated for use with the Chinese Australian population. Important questions therefore remain regarding whether to use existing instruments that have been translated or to develop culture-specific rating scales in cross-cultural psychiatric research (Yeung et al., 2002). Another limitation was the lack of blinding for diagnostic interviews and the lack of follow-up interviews with the Control group. This may have biased the results to under-rate diagnostic symptoms in the Treatment group at follow-up. Regrettably, blind assessment was prevented by resource constraints and, for ethical and pragmatic reasons, the Control group was not required to wait an additional three months before beginning treatment.

Another important limitation concerns the generalisability of these findings given participants were recruited via the Internet. Whilst a recent study reported that an Internet clinic sample had disorders as severe as those attending an outpatient clinic but with demographic characteristics more consistent with the national sample (Titov et al., 2010b), it is unclear whether the Chinese participants in this study are representative of those who need treatment. About 40% of our participants had not previously sought treatment for their condition, which was higher than that found in previous iCBT depression programs (Perini et al., 2009; Titov et al., 2010a), suggesting iCBT may particularly appeal to Chinese Australians who require treatment but have not sought help through traditional means. Future research concerning iCBT for this or other CALD groups could examine the demographic and help-seeking characteristics of applicants to determine whether iCBT appeals to people who would not have sought treatment otherwise. Importantly, future research should explore ways in which iCBT can be integrated into current practice to help address unmet need in CALD groups.

5. Conclusions

These findings provide preliminary support for the efficacy of the Brighten Your Mood program in the treatment of depression for Chinese Australians. Overall outcomes in the Treatment group were superior to those in the Control group, satisfaction with the protocol was adequate, and a modest amount of therapist time was required. Importantly, results were comparable to previous iCBT programs for depression and to face-to-face treatment for depression for Chinese people. Notwithstanding some limitations, the current study highlights the potential of iCBT as a way to reduce some of the barriers experienced by Chinese Australians and CALD groups to culturally appropriate mental health services.

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Conflict of interest

All authors declare that they have no conflicts of interest.

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References


