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Efficacy of Mindfulness-Based Cognitive Therapy for Self-Esteem, Psychological Well-being, and Happiness in Substance Use Disorder: A Randomized Controlled Trial

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Article

Keywords: Mindfulness-based cognitive therapy, substance use disorder, self-esteem, psychological well-being, happiness, randomized controlled trial

Posted Date: November 3rd, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10814884/v1

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Additional Declarations: No competing interests reported.

Abstract

Substance use disorder (SUD), a major public health concern across the world, and also in India, is commonly associated with low self-esteem, reduced psychological well-being, and diminished happiness. Yet, rigorous trials of psychosocial interventions targeting these outcomes in rehabilitation settings remain scarce. This single-masked randomized controlled trial (RCT) examined the efficacy of an 8-week Mindfulness-Based Cognitive Therapy (MBCT) program, delivered alongside treatment as usual (TAU), in improving self-esteem, psychological well-being, and happiness among adults with SUD. Seventy-one men receiving inpatient rehabilitation at two centers in Bangalore, India, were block-randomized to an MBCT-plus-TAU group (n=36) or a TAU-only group (n=35); 30 participants per group completed all four assessments (baseline, post-intervention, and one- and three-month follow-up). Across the full sample, scores on all three outcomes improved significantly over time (all p<.001). A significant time x group interaction emerged for happiness (F(3,198)=5.51, p=.001, partial eta-squared=.087), with the MBCT group showing greater gains than the TAU group; interactions for psychological well-being and self-esteem were not significant. Mean gain scores indicated significantly greater improvements with MBCT than with TAU for happiness and self-esteem, but not for psychological well-being. These findings support MBCT as a valuable adjunctive intervention for SUD rehabilitation, with the most robust benefit observed for happiness.

Trial registration: Clinical Trials Registry of India, CTRI/2025/09/094309 (Registered on 08/09/2025). Details are available at http://ctri.nic.in.

Introduction

Substance use affects a substantial proportion of the world's population. The World Health Organization (WHO) estimates that the global burden of disease related to drug and alcohol issues is 5.4 percent[1]. The worldwide prevalence of Substance Use Disorders (SUDs) is 2.2 percent, with a higher prevalence of alcohol-use disorders (1.5%) compared to any other drug-use disorders[2]. In the Indian context, a 2019 national survey on "Magnitude of substance use in India" by the Ministry of Social Justice and Empowerment, Government of India, reported that the prevalence of substance use in India was 27.3 percent, which included a higher prevalence of alcohol (14.6%) compared to other substances[3]. Substances in India are most commonly used by people between the ages of 12 and 60 years[4]. A total of 1, 11,877 cases of substance use disorders are reported across the states in Karnataka[5].

The misuse of various licit and illicit substances is associated with numerous health issues and increases the risk of hospitalization, nursing home placement, and death among older adults[6]. SUD can not only cause problems with physical and mental health, but also diminish life satisfaction, damaging personal relationships, hindering work, etc. It can also lead to emotional distress, risky behaviors, legal issues, bodily harm, or even death[7]. Studies show that the prevalence of any substance use was highest among cases with psychotic disorder (77.3%), followed by unipolar depression (62.5%), bipolar affective disorder (41.7%), and anxiety disorders (21.4%)[8].

Several studies have also shown a strong link between substance use and self-esteem, psychological well-being, and happiness. Research has indicated that people with low self-esteem often use substances to feel better about themselves, even if it is only temporarily[9]. Problems associated with substance use get worse if the underlying mental health concerns of the individual go untreated, which then leads to a decrease in overall psychological well-being as well. Increased happiness and overall life satisfaction are positively correlated with the absence of substance use among adults and adolescents. Additionally, recent longitudinal evidence suggests that flourishing mental health may lead to decreased substance use and higher levels of happiness[10,11].

Individuals with SUD require individualized treatments and modalities that address the symptoms and underlying causes of the disease, and the consequences that substance use has on different areas of a person's life. There are different types of rehabilitation, where various therapy programs are utilized, such as detoxification, inpatient/residential rehabilitation, and outpatient rehabilitation. Treatments include behavioral therapy, individual and group therapy, cognitive-behavioral therapy, dialectical behavior therapy, 12-step facilitation, and motivational interviewing[12,13]. Many more new approaches and therapies have also been implemented in recent times. Still, returning to using the substances again (i.e., relapse) post-treatment has become very common, underscoring the need for effective treatments to help individuals maintain long-term abstinence and recovery from SUD.

In response to this need for effective treatments to help individuals maintain long-term abstinence and recovery from substance use, many interventions have been developed as treatment methods, often in conjunction with other traditional therapies[14]. However, existing SUD treatments prioritized abstinence and symptom reduction but failed to simultaneously enhance other critical psychological factors like self-esteem, psychological well-being, and happiness[15]. Mindfulness-Based Interventions (MBIs) have been increasingly developed and evaluated for the treatment of SUD. MBCT is a set of techniques designed to encourage deliberate, non-evaluative contact with events that are “here and now”[16]. MBCT is effective in reducing substance use and relapse management, but as part of the MBRP or with other psychotherapies. In many of these cases, only one or two aspects of MBCT have been used, or it has even been used as an adjunct therapy to support the improvement of relapse prevention. Originally developed as a treatment program to prevent relapse in individuals with depression who have experienced three or more episodes of relapse, MBCT has since been adapted and applied for SUD treatments with emerging evidence supporting and promoting sustained recovery and relapse prevention[17–19].

Research has also shown that MBCT can reduce the severity and cravings for addictive substances, as well as help in a wide range of clinical and non-clinical disorders like depression, anxiety, unhappiness, low mood, negative thoughts and emotions, etc.[20] Studies have also explored the association between dispositional mindfulness and self-esteem, with positive correlations found across studies[21]. Many studies have reported the benefits of MBIs like MBCT, MBSR, and MBRP in improving people's psychological health and well-being, life satisfaction, happiness, quality of life, conscientiousness, vitality, self-esteem, empathy, and also reducing relapse symptoms, recurring depression, absent-mindedness, rumination, stress, etc., that usually trigger relapse to substances among those with SUD[22].

Research on MBCT has generally found positive effects on a range of variables and outcomes related to physical and mental health conditions. However, for the variables considered in this study- self-esteem, psychological well-being, and happiness- it has been explored individually across different populations, rather than within a single design. MBCT has been effective for self-enhancement, an increase in subjective happiness and well-being, and aiding in the recovery of substance use disorders. Most studies have examined the indirect associations between these variables individually in different study settings and only a few specific age groups.

The Mindfulness-to-Meaning Theory emphasizes how mindfulness can transform the positive aspects of the socio-environmental experience into value-driven behavior, ultimately leading to eudaimonic meaning in life[23]. The model describes how day-to-day hedonic experiences fluctuate, while overall well-being remains consistent through hedonic adaptation, and highlights that prioritizing both eudaimonic and hedonic goals enhances overall subjective well-being, resilience, and happiness[24]. In the context of SUDs, MMT suggests that the use of MBIs fosters positive psychological processes, self-awareness, and trauma recovery through the flexible attentional selection of previously unattended contextual information, thereby promoting the ability to see alternative perspectives and derive meaning from life's encounters[23].

Thus, against this theoretical and empirical backdrop, this RCT examined the associations between these variables within a single design and within the SUD population, highlighting the impact each variable has on the others. This study also addresses this critical gap through a rigorous research design, such as an RCT, comparing the MBCT group versus the Treatment as Usual (TAU) group, focused specifically on these interrelated outcomes to determine whether MBCT, when used as the sole intervention method, could improve overall happiness, self-esteem, and psychological well-being among individuals with SUD. Specifically, this study also sought to examine whether the MBCT group receiving the intervention showed significant improvement over time in these outcomes and to test whether changes in these outcome variables over time differed between the TAU and the MBCT group. Harms and adverse events were not pre-specified as study outcomes or objectives.

Methods

Patient and public involvement

No patients, center caretakers, family members, caregivers, or members of the public were involved in the design, conduct, analysis, reporting, or dissemination plans of this trial.

Research design

The research design employed in this study was a true experimental design, specifically an RCT. This was a parallel-group, two-arm, superiority randomized controlled trial. It had a 1:1 allocation ratio, with participants assigned to either of the two treatment conditions using stratified, permuted blocks of varying sizes. RCTs are a scientific method commonly used to test the effectiveness of psychological interventions[25]. It is considered the most rigorous method for determining whether a cause-and-effect

relationship exists between an intervention and its outcome and for evaluating efficacy in a well-defined, controlled setting[26]. This study utilized a single-masked design, in which the participants were unaware of which treatment they received[27].

Design structure

For this study, an MBCT intervention was employed, with two treatment conditions: MBCT plus treatment-as-usual and treatment-as-usual. All participants completed a baseline assessment before the intervention, and three post-intervention evaluations were conducted: immediately after treatment completion and at 1 and 3 months thereafter. No changes to the design, eligibility criteria, trial protocol, outcome measure, and analysis plan were made after the trial commencement.

Participants

Sample size determination

A sample size of 54 participants (27 in each exposed and non-exposed group) was determined using G*Power calculations in the OpenEpi software, an open-source sample size calculator for cross-sectional and clinical studies[28]. However, a total of 79 participants were initially recruited for the baseline assessment, anticipating possible dropouts during the course of the study. A priori sample size estimation (OpenEpi, Fleiss method with continuity correction; two-sided α=.05, power=80%, 1:1 allocation ratio) indicated a minimum requirement of 54 participants (27 per group).

The participants were adults undergoing institutionalized treatment for SUDs at various rehabilitation centers in Bangalore, Karnataka, India. Only those participants who fulfilled the inclusion criteria were considered for the baseline assessment. All participants were between 18 and 40 years and were considered adults[29,30].

Individuals in this age group are known to have the highest rates of substance use and SUDs, and they also make up the highest proportion of treatment seekers[31]. The sampling techniques used in the present study were non-probability sampling, purposive sampling, and stratified block randomization.

Block randomization process

Block randomization is a commonly used technique in RCTs[32]. Seventy-one participants completed the baseline assessment, and stratified block randomization was performed. Participants were divided into blocks of varying sizes based on the primary substance used: alcohol, cannabis, heroin, cocaine, and mixed. The sampling units within each block were then randomly assigned to the MBCT and TAU groups to facilitate balanced sample sizes and minimize biases[33]. The block composition was as follows: alcohol, seven blocks of four and one block of five; cannabis, three blocks of three; cocaine, one block of three and one block of two; heroin, one block of three and one block of two; and mixed substance use, four blocks of four and one block of three. The representation of the block randomization process is given in Figure 1.

Various guidelines for block randomization were followed to ensure that the allocation of sampling units was random and that biases were controlled for[34,35].

The researcher generated the allocation sequence, enrolled participants, and assigned them to both groups. No separate allocation concealment mechanism was used. The study was a single-masked design, and participants were not informed about their group allocation at the time of randomization and baseline assessment; however, blinding could not be maintained after the commencement of the intervention, as the MBCT group became aware that they were receiving the MBCT intervention. The researcher, who was certified in MBCT, served as the intervention facilitator under the supervision of the senior mental health professional and data analyst; therefore, the researcher was not blinded to the group allocation.

Inclusion and Criteria

1. **Age Range:** Participants aged 18 to 40 years, representing young and middle adulthood as identified by Erikson's psychosocial theory[29], were included in the study. This age group corresponds to the peak risk period for SUD[31].

2. **Setting:** Participants were required to be inpatients receiving institutionalized treatment in rehabilitation centers located in Bangalore, Karnataka.

3. **Gender and Diagnosis:** Only adult male participants diagnosed with a SUD according to the DSM-5 criteria were included. This restriction addressed the gender-based attrition and imbalance observed during the random sampling process.

4. **Comorbidities:** Individuals with dual diagnoses or comorbid psychiatric conditions, including major depressive disorder, anxiety disorder, mood disorder, or personality disorder, were included[36].

5. **Consent:** Inclusion required voluntary participation, supported by written informed consent and institutional approval, in recognition of the participants' classification as a vulnerable population[37].

6. **Substance Type:** Participants were included if they were receiving inpatient treatment for alcohol, cannabis, cocaine (stimulants), or heroin (opioids), consistent with DSM-5 classifications.

Exclusion Criteria

7. Participants receiving outpatient treatment were excluded.

8. Participants diagnosed with SUD involving substances other than alcohol, cannabis, cocaine, or heroin were excluded.

MBCT intervention phases and protocol

Intervention Phases

There were three phases in this study: Pre-Intervention, Intervention, and Post-Intervention.

1. The Pre-Intervention Phase

In this pre-intervention phase, after participants completed their detoxification period and mandatory check-ups, the researcher debriefed them about the study. Next, an informed consent sheet was provided to them, and the participants provided their voluntary permission. After their consent was obtained, the baseline assessments were conducted using standardized scales to measure self-esteem, psychological well-being, and happiness.

2. The Intervention Phase

In this phase, the MBCT group intervention was provided to the participants. Each session was monitored by the supervising faculty at the university and the head clinical psychologist of the center. Given the population's vulnerability and for safety reasons, their social work counselor, guards, and a nurse were on standby. Intervention was delivered over 8 weeks to the 36 participants in the MBCT group, in addition to treatment as usual, and each session lasted between 90 and 120 minutes. The TAU group comprised 35 participants who received Treatment as Usual, consisting of standard rehabilitation, including a detox week, pharmacological interventions, individual and group counseling, physiotherapy, nutritional interventions, and other daily activities. The reassessment and evaluation schedule was the same for both the MBCT and TAU groups.

3. The Post-Intervention Phase

After completing the intervention, all participants in both the MBCT and TAU groups were reassessed using the same standardized measures to evaluate changes in the outcome measures at post-intervention, one-month, and three-month follow-ups, to track the long-term sustainability of the treatment effects.

Differential attrition occurred across intervention phases, with higher early dropout among female participants. Further, 6 participants from the MBCT group and 4 from the TAU group dropped out at different phases of the intervention. Reasons for dropout included relapse, early discharge from the rehabilitation center, and personal constraints. This is consistent with SUD clinical trials, which typically report 20--30% dropout rates[38,39].

Intervention Protocol

The MBCT intervention followed the manualized protocol developed by Segal, Williams, and Teasdale (2002)[18], adapted for SUD populations based on clinical recommendations and previous research. Sessions were delivered in group format.

The full session-wise protocol, including objectives, techniques, and materials for each of the eight sessions, is provided in Supplementary Table S1.

Challenges and Reporting of Adverse Events

Implementation challenges included initial participant hesitancy toward mindfulness practices, which was resolved through rapport-building within the first two to three sessions, and logistical constraints in convening participants punctually for sessions. Two clinical incidents occurred during the intervention period (one episode of minor self-harm and one anxiety episode); both were systematically monitored and managed on-site through session pausing, grounding techniques, and risk assessment by the clinical team, with no lasting adverse sequelae. Most participants completed the intervention and provided positive feedback, supporting the feasibility of MBCT for this population.

Outcome variables and measures

The study's pre-specified outcome variables were self-esteem, psychological well-being, and happiness. These outcome variables were assessed using standardized psychological measures. Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES), Psychological well-being was assessed using the Mental Health Continuum Short Form (MHC-SF), and Happiness was assessed using the Oxford Happiness Questionnaire (OHQ). The outcome variables were administered to the participants at baseline (pre-intervention), post-intervention, and at one-and three-month follow-ups. Each assessment and reassessment point was used for both the MBCT and TAU groups to evaluate the interrelationships among the three variables and to analyze treatment effects within the MBCT group and between the MBCT and TAU groups. The analyses were conducted using the total scores and sub-scale scores of the respective tools. The study did not have any secondary outcome variables.

Tools of data collection

A research tool or instrument may be defined as "anything that becomes a means of collecting information for your study"[40]. For example, observation forms, interview schedules, questionnaires, and interview guides are all types of research tools used in the field. For this study, self-report questionnaires comprising standardized scales were used to collect data from participants.

Socio-demographics and Clinical Information Sheet

A comprehensive information sheet was developed to collect demographic characteristics, including age, gender, marital status, education, occupation, income, religion, and place of residence. The demographic sheet also included clinical characteristics such as primary substance, comorbid conditions, age of first use, duration of use, and duration in rehabilitation.

Oxford Happiness Questionnaire (OHQ)

The Oxford Happiness Questionnaire was developed by psychologists Peter Hills and Michael Argyle at the University of Oxford. The scale consists of 29 items. The OHQ has demonstrated high internal reliability, with values ranging from 0.91 to 0.92, and inter-item correlations between 0.4 and 0.65[41,42].

The Mental Health Continuum Short Form (MHC-SF)

Corey L. Keyes developed the Mental Health Continuum-Short Form. It consists of 14 items selected to represent three facets of well-being: three emotional well-being items (reflecting hedonic well-being), six psychological well-being items, and five social well-being items (when combined, these items reflect eudaimonic well-being). The MHC-SF demonstrated high internal consistency, with the Cronbach's alpha coefficients being higher than 0.80. The test-retest reliability of the MHC-SF over three successive 3-month periods averaged 0.68, and the 9-month test-retest average was 0.65[43-45].

Rosenberg's Self-Esteem Scale (RSES)

The 10-item scale, developed by sociologist Morris Rosenberg, measures global self-worth by assessing both positive and negative self-perceptions[46]. All items are answered using a 4-point Likert scale format ranging from 'Strongly agree' to 'Strongly disagree'. The scale generally exhibits high reliability, with test-retest correlations typically ranging from 0.82 to 0.88 and internal consistency coefficients across samples ranging from 0.77 to 0.88[47].

Ethical consideration

The study protocol was reviewed and approved by the Institutional Review Board of the University of both authors (IRB Ref. No. RCEC/00473/08/23). It was prospectively registered with the Clinical Trials Registry of India (CTRI/2025/09/094309) on 08/09/2025. All procedures were performed in accordance with relevant institutional and national guidelines and regulations, and written informed consent was obtained from all participants before enrolment. This trial is reported in accordance with the CONSORT 2025 reporting guidelines, and the completed CONSORT 2025 checklist is provided as a supplementary file (Supplementary Material 1).

The data were used strictly for research and academic purposes. The researcher took appropriate steps to ensure that no form of bias was shown towards the participants, regardless of their caste, creed, sex, sexual orientation, marital status, employment, geography, culture, language, or ethnicity. Any doubts from the participants' side were clarified. An emergency risk management team was on standby during the intervention sessions to ensure participant safety, given the vulnerable population.

The participants were informed about the purpose, procedures, potential risks, and benefits before they agreed to participate, and the questionnaires were distributed. Any information obtained during this study, including personal information, was protected and not disclosed without their permission to maintain confidentiality. The data collected were stored in password-protected files to ensure participants' confidentiality. The participants could choose whether to participate in this study. If they voluntarily agreed to participate in the study, they still retained the right to withdraw at any time without consequences. If the participant expressed a desire to know their results or the study's overall outcomes, the researcher would provide them with the necessary information.

Data analysis

The Shapiro-Wilk test of normality, along with skewness and kurtosis values, was calculated for the data on the three scales to assess normality. Descriptive statistics were calculated to describe and compare both groups.

Inferential statistical analysis included Pearson's product-moment correlation, chi-square tests for categorical variables, independent-samples t-tests for group comparisons, repeated-measures ANOVA to examine within-group change over time in the MBCT group, and mixed-design (2 x 4) analysis of variance to examine the interaction between treatment condition (MBCT vs. TAU) and time (pre-test, post-test, one-month follow-up, and three-month follow-up) on happiness, self-esteem, and psychological well-being. Harms and adverse events were not pre-specified as study outcomes and, therefore, were not included in the statistical analysis plan.

Analyses were conducted for both the MBCT and the TAU group. The number of participants in the analyses is mentioned in the results section. Participants with missing outcome data were excluded from the analyses. No subgroup or sensitivity analyses were conducted. No additional statistical analyses were performed beyond those described above. Data were coded in MS Excel, stored on a password-protected drive, and analyzed using JAMOVI (version 2.3.28). No interim analyses were conducted, and no predefined stopping guidelines were specified for the trial.

Results

The study examined the interrelationships among self-esteem, psychological well-being, and happiness. It evaluated the efficacy of MBCT compared with TAU for these three outcomes among adults with SUD undergoing inpatient rehabilitation.

Recruitment, Participant Flow, and Retention

Following approval from the Clinical Trials Registry of India (CTRI), recruitment commenced in September 2025 and was completed by the end of the month. The intervention began by October 2025, with the study follow-up periods continuing through March 2026. Of 79 individuals assessed for baseline eligibility, 71 completed the baseline assessment and were stratified and block-randomized by primary substance to the MBCT plus TAU group (n=36) or the TAU-only group (n=35). Differential attrition occurred across the follow-up phases, as shown in Figure 1. In the MBCT group, 2 participants dropped out at post-intervention, 1 at the 1-month follow-up, and 3 at the 3-month follow-up (total = 6), while in the TAU group, 1 participant discontinued at post-intervention, 1 at the 1-month follow-up, and 2 at the 3-month follow-up (total = 4). 30 participants in the MBCT group and 31 in the TAU group completed all four assessments. To preserve balanced group sizes for analysis, one TAU participant was randomly excluded, yielding a final analytic sample of 30 per group. Reasons for attrition included relapse, early discharge, and personal constraints, consistent with the 20 to 30 percent dropout rates typically reported in SUD trials[38,39].

Figure 1:CONSORT flow diagram showing participant recruitment, allocation, follow-ups, and analyses

…… Please insert Figure 1 here……

Intervention delivery and Concomitant care

The intervention was delivered by the researcher, under the regular supervision of the senior mental health professional, to participants allocated to the MBCT group over 8 weeks, with each session lasting 90-120 minutes. The intervention was delivered according to the manual. Participants in the TAU group received the standardized treatment provided by the rehabilitation centers through their respective clinical teams. Homework and practice were reviewed during subsequent sessions.

Descriptive statistics and baseline equivalence

The socio-demographic and clinical characteristics of the two groups are summarized in Table 1. Chi-square tests indicated no significant baseline differences between groups on age, marital status, education, income, substance type, comorbidity, age of first use, or recommended duration of rehabilitation (all $p>.05$), apart from religion ($p<.001$), which reflected the recruitment sites' catchment populations rather than the randomization procedure. This baseline equivalence supports the internal validity of the subsequent group comparisons, consistent with the CONSORT recommendations [48].

…… Please insert Table 1 here……

Table 2 presents descriptive statistics for the three outcome variables across the four testing points for the full sample. Across all three measures, scores rose from pre-test to post-test and were largely maintained or further improved at the one- and three-month follow-ups.

…… Please insert Table 2 here……

Hypothesis 1: interrelationship of self-esteem, psychological well-being, and happiness

Pearson correlations (Supplementary Table S2) confirmed that happiness, psychological well-being, and self-esteem were significantly and positively interrelated at all four testing points ($r=.28$-$.69$, all $p<.05$), supporting Hypothesis 1 and indicating that these constructs form an interrelated cluster of psychological functioning within this population.

Hypothesis 2: within-group change in the MBCT group over time

A series of repeated-measures ANOVAs examined change across the four time points within the MBCT group (Table 3, Panel A). Significant main effects of time were found for happiness ($F(3,87)=39.6$, $p<.001$, partial eta-squared=.577), psychological well-being ($F(3,87)=26.0$, $p<.001$, partial eta-squared=.472), and self-esteem ($F(3,87)=33.2$, $p<.001$, partial eta-squared=.533), with large effect sizes for all three outcomes. Bonferroni-corrected post hoc comparisons (Table 4, Panel A) showed that post-test scores exceeded pre-test scores on all three outcomes (all $p<.01$); happiness and self-esteem scores at the three-month follow-up were also significantly higher than at the one-month follow-up (both $p<.05$). These results support Hypothesis 2: the MBCT group improved significantly over time on all three outcomes.

Hypothesis 3: differential change between the MBCT and TAU groups

A series of 2 (Group) x 4 (Time) mixed-design ANOVAs was conducted for each outcome to test whether change over time differed between the MBCT and TAU groups (Table 3, Panel B; Figure 2). For happiness, a significant main effect of time emerged ($F(3,174)=47.06$, $p<.001$, partial eta-squared=.448), with no significant main effect of group ($F(1,58)=0.03$, $p=.874$), but a significant Time x Group interaction ($F(3,198)=5.51$, $p=.001$, partial eta-squared=.087): the MBCT group showed a steeper increase in happiness, with higher scores than TAU at post-intervention and three-month follow-up (Figure 2a). For psychological well-being, both a significant main effect of time ($F(3,174)=54.51$, $p<.001$, partial eta-squared=.484) and a significant main effect of group ($F(1,58)=4.63$, $p=.036$, partial eta-squared=.074, favoring TAU) emerged. Still, the Time x Group interaction was not significant ($F(3,174)=0.99$, $p=.392$), indicating a parallel rate of improvement in both groups (Figure 2b). For self-esteem, a significant main effect of time emerged ($F(3,174)=42.52$, $p<.001$, partial eta-squared=.423), but neither the main effect of group ($F(1,58)=0.42$, $p=.520$) nor the Time x Group interaction ($F(3,174)=1.91$, $p=.140$) was significant (Figure 2c).

Figure 2:Mean scores on happiness, psychological well-being, and self-esteem for the MBCT and TAU groups across the four testing periods

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Independent-samples t-tests at each time point (Table 4, Panel B) showed that the MBCT group scored significantly higher than TAU on happiness at post-intervention ($t=2.27$, $p=.027$, $d=.585$) and three-month follow-up ($t=2.25$, $p=.028$, $d=.582$). In contrast, TAU scored higher at the one-month follow-up ($t = -2.35$, $p = .022$, $d = -0.607$). TAU scored higher than MBCT on psychological well-being at the one-month follow-up only ($t = -2.59$, $p = .012$, $d = -0.669$). MBCT scored higher than TAU on self-esteem at the three-month follow-up only ($t=2.20$, $p=.032$, $d=.569$). No other between-group differences were significant.

…… Please insert Tables 3 and 4 here.

Mean gain scores (delta) from pre-intervention to three-month follow-up (Table 5, Figure 3) were significantly larger for MBCT than TAU for happiness ($\Delta=27.77$ vs. 17.23, $t=2.30$, $p=.025$, $d=.594$) and self-esteem ($\Delta=7.80$ vs. 5.07, $t=2.17$, $p=.034$, $d=.561$), but not for psychological well-being ($\Delta=8.17$ vs. 7.10, $t=0.77$, $p=.442$, $d=.200$).

Figure 3:Mean gain scores (Δ) from pre-intervention to 3-month follow-up for happiness, psychological well-being, and self-esteem in the MBCT and TAU groups.

…… Please insert Figure 3 here……

Taken together, these results support Hypothesis 3 for happiness but not for psychological well-being or self-esteem. Only happiness showed a significant Time x Group interaction, indicating an intervention-specific advantage for MBCT, while the other two outcomes improved comparably across both groups.

Discussion

This randomized controlled trial examined the efficacy of MBCT for self-esteem, psychological well-being, and happiness among adults with SUD undergoing inpatient rehabilitation. The findings reveal both the specific strengths and the complexity of psychological recovery from addiction.

Chi-square tests confirmed no significant baseline differences between groups in clinical or socio-demographic characteristics, supporting the internal validity of the trial and consistent with CONSORT recommendations for baseline equivalence[48]. The strong, positive correlations among self-esteem, psychological well-being, and happiness (Hypothesis 1) indicate that these constructs form a synergistic cluster in this population: impairment in one domain, such as the low self-esteem commonly reported among adults with SUD[21,49], may perpetuate diminished well-being and unhappiness, while interventions that improve one construct may produce beneficial effects across the others. This pattern is consistent with theories that position happiness as an affective expression of deeper psychological well-being, both of which are underpinned by a stable sense of self-worth[50].

The central finding of this trial is the differential efficacy of MBCT across outcomes. Within the MBCT group (Hypothesis 2), all three outcomes improved significantly over time, consistent with prior evidence that mindfulness-based relapse prevention produces durable gains[15], and that mindfulness therapies enhance psychological well-being[51]. Mindfulness meditation is associated with greater self-compassion and self-worth[22], a pattern especially relevant to SUD, where negative self-perception is linked to relapse risk[52]. The pattern of initial gains in happiness, followed by further improvement, is consistent with the Mindfulness-to-Meaning Theory (MMT)[23,24] and with evidence of the delayed emergence of positive affect following mindfulness training[53].

Between groups (Hypothesis 3), only happiness showed a significant Time x Group interaction, indicating that MBCT conferred a unique advantage over TAU on this outcome. This is consistent with MMT, which proposes that mindfulness promotes metacognitive awareness that supports positive reappraisal of adverse circumstances and the savoring of positive experiences[23]. For individuals with SUD, whose lives are often dominated by craving and negative affect, MBCT may interrupt this cycle by fostering non-judgmental, present-moment awareness, creating room for affective states such as calmness, contentment, and joy to emerge[54]. This direct effect on affect may explain why happiness, a comparatively state-like and malleable variable, responded more strongly to an eight-week intervention than the more trait-like constructs of psychological well-being and self-esteem.

Ryff's multidimensional model of psychological well-being encompasses facets such as environmental mastery, purpose in life, and personal growth that typically require sustained behavioral change and identity reconstruction extending beyond an eight-week program[55]. Similarly, while MBCT encourages self-acceptance, the chronic negative self-schemas associated with SUD may require more targeted or prolonged therapeutic work to restructure[56], consistent with prior findings that MBCT does not always significantly affect self-esteem in specific populations[57]; gains in self-esteem may instead be more closely tied to long-term recovery stability and identity reformulation[58,59]. The improvement observed in both

groups over time underscores the value of standard rehabilitation. It highlights the need for more targeted interventions to meaningfully elevate self-esteem and well-being beyond standard care.

Theoretically, these findings extend MMT and Fredrickson's Broaden-and-Build Theory[60]: MBCT may initiate an upward spiral by first boosting positive affect, which over a longer period could broaden cognition and build the personal resources needed for sustained gains in self-esteem and well-being. Self-Determination Theory[61] similarly suggests that well-being and happiness depend on satisfaction of autonomy, competence, and relatedness needs; self-esteem maps onto competence and self-acceptance but does not fully account for happiness, consistent with interventions such as MBCT contributing directly to happiness even when self-esteem gains are modest.

Clinically, these findings support the integration of MBCT as a supplementary intervention in SUD rehabilitation. Its specific efficacy for happiness is not a minor outcome: positive affect is a protective factor against stress and craving that may reduce relapse risk[62], with implications for reduced cravings and increased treatment engagement. The non-significant findings for self-esteem and psychological well-being suggest a need for more comprehensive intervention designs, such as pairing MBCT with cognitive-behavioral techniques targeting maladaptive self-schemas or supplementing it with self-compassion training. The group format also offers the benefit of peer support, a key component of recovery[63]. In the Indian context, MBCT represents a cost-effective, group-based intervention that aligns with indigenous contemplative practices such as yoga and meditation, enhancing its cultural acceptability and potential for wider implementation.

This study has several limitations: an all-male sample, short-term follow-up, reliance on self-report measures, a modest sample size, and the absence of a no-treatment control group. Without a true no-treatment arm, improvements cannot be attributed solely to MBCT, since other elements of institutional treatment or external factors may have contributed. The sample size, while adequate for the planned analyses, may limit generalizability; nonetheless, effect sizes for the significant findings were mostly moderate to large, indicating that the observed differences were meaningful and likely to have real-world relevance[64]. Because the sample comprised only adult men, findings cannot be generalized to women, adolescents, or other SUD populations. Attrition across assessment phases, while consistent with rates typical of SUD trials[38,39], may still have introduced bias. The one- and three-month follow-ups, while longer than many trials in this area, remain short-term and do not establish the long-term sustainability of treatment effects. Reliance on self-report measures also raises the possibility of response and recall bias, and repeated use of the same measures across four time points may have introduced practice effects.

Future studies should examine hybrid models that combine MBCT with other mindfulness-based interventions or with approaches specifically targeting self-esteem, such as self-compassion training or cognitive restructuring[56], using larger and more diverse samples, longer follow-up periods, and more rigorous designs, including active and no-treatment control conditions. Incorporating objective outcomes such as relapse rates and biological markers, alongside qualitative or mixed-methods components, would strengthen future evaluations.

In conclusion, this randomized controlled trial demonstrates that MBCT is an effective adjunctive intervention for enhancing happiness among adults with SUD, with gains sustained over three months. Both groups improved significantly across all three outcomes over time. Still, MBCT conferred a specific advantage over TAU only for happiness and, to a lesser degree, self-esteem, and not for psychological well-being, within this timeframe. The strong interrelationships among these variables highlight the interconnected nature of psychological recovery. These findings support the formal inclusion of MBCT in SUD rehabilitation programs to promote positive emotional states and support long-term recovery.

Declarations

Acknowledgements

The authors sincerely thank all participants for their time, commitment, and active participation throughout the intervention, assessments, and follow-up. We are grateful to the directors, clinical heads, psychologists, and staff of the participating rehabilitation centers for their support in facilitating the intervention and ensuring participant safety, and to the outreach and follow-up teams for their assistance in coordinating participant follow-up assessments.

Author contributions

P.B. was responsible for the conceptualization, methodology, investigation, literature search, data collection, formal analysis, interpretation of results, and writing the original draft as well as reviewing and editing the manuscript. T.A. contributed to the conceptualization, methodology, supervision, analysis, visualizations, interpretation of results, and provided critical revisions of the manuscript. Both authors approved the final version of the manuscript and agreed to take responsibility for all aspects of the work.

Data availability

The datasets generated and/or analyzed during the current study are not publicly available due to ethical and confidentiality considerations. However, de-identified participant data may be obtained from the corresponding author upon reasonable request, subject to applicable ethical approvals and data protection regulations.

Additional information

Competing interests

The authors declare no competing interests.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics declarations

The study protocol was reviewed and approved by the Institutional Review Board of CHRIST (Deemed to be University) (IRB Ref No. RCEC/00473/08/23). It was registered prospectively with the Clinical Trials Registry of India (CTRI/2025/09/094309) on 08/09/2025. All procedures were performed in accordance with relevant institutional and national guidelines and regulations. Written informed consent was obtained from all participants prior to enrolment; no identifying information about participants is included in this article.

Use of large language models

The authors used Grammarly (version 2026.1) during preparation of this manuscript to assist with grammar, punctuation, language consistency, and clarity. All edits and decisions were made by the authors, who take full responsibility for the content of this article.

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Tables

Table 1 *Socio-demographic and clinical characteristics of the MBCT (n=30) and TAU (n=30) groups*

Variable	MBCT (n=30)	TAU (n=30)	Total (N=60)	p
Age range				.216
18–24 years	8 (26.7%)	2 (6.7%)	10 (16.7%)	
25–31 years	10 (33.3%)	12 (40.0%)	22 (36.7%)	
32–38 years	6 (20.0%)	9 (30.0%)	15 (25.0%)	
39–41 years	6 (20.0%)	7 (23.3%)	13 (21.7%)	
Marital status				1.00
Unmarried	18 (60.0%)	18 (60.0%)	36 (60.0%)	
Married	11 (36.7%)	11 (36.7%)	22 (36.7%)	
Divorced/separated	1 (3.3%)	1 (3.3%)	2 (3.3%)	
Highest education level				.089
High school (10th)	5 (16.7%)	0 (0%)	5 (8.3%)	
PUC (11–12th)	6 (20.0%)	4 (13.3%)	10 (16.7%)	
Undergraduate	15 (50.0%)	20 (66.7%)	35 (58.3%)	
Postgraduate	4 (13.3%)	6 (20.0%)	10 (16.7%)	
Income range				.224
Unemployed	15 (50.0%)	14 (46.7%)	29 (48.3%)	
Between 1–6 lakhs	10 (33.3%)	8 (26.7%)	18 (30.0%)	
Between 7–13 lakhs	5 (16.7%)	4 (13.3%)	9 (15.0%)	
Above 13 lakhs	0 (0%)	4 (13.3%)	4 (6.7%)	
Religion				<.001
Hindu	14 (46.7%)	25 (83.3%)	38 (65.0%)	
Muslim	10 (33.3%)	0 (0%)	10 (16.7%)	
Christian	6 (20.0%)	2 (6.7%)	8 (13.7%)	
Other	0 (0%)	3 (10.0%)	3 (5.0%)	
Type of addiction				.964
Alcohol	14 (46.7%)	13 (43.3%)	27 (45.0%)	
Cannabis	3 (10.0%)	5 (16.7%)	8 (13.3%)	
Cocaine	2 (6.7%)	2 (6.7%)	4 (6.7%)	

Heroin	2 (6.7%)	2 (6.7%)	4 (6.7%)	
Mixed	9 (30.0%)	8 (26.7%)	17 (28.3%)	
Comorbid mental health condition				.642
None	13 (43.3%)	13 (43.3%)	26 (43.3%)	
Depression	6 (20.0%)	6 (20.0%)	12 (20.0%)	
Anxiety	5 (16.7%)	2 (6.7%)	7 (11.7%)	
Mood disorder	0 (0%)	2 (6.7%)	2 (3.3%)	
Mixed	6 (20.0%)	7 (23.3%)	13 (21.7%)	
Age of first substance use				.355
Before 18 years	4 (13.3%)	6 (20.0%)	10 (16.7%)	
18–24 years	19 (63.3%)	18 (60.0%)	37 (61.7%)	
25–30 years	7 (23.3%)	4 (13.3%)	11 (18.3%)	
Above 30 years	0 (0%)	2 (6.7%)	2 (3.3%)	
Recommended duration in rehabilitation				.304
2–3 months	28 (93.3%)	23 (76.7%)	51 (85.0%)	
4–6 months	2 (6.7%)	7 (23.3%)	9 (15.0%)	

Note: Values are n (%). Group comparisons by Pearson's chi-square test. MBCT: Mindfulness-based Cognitive Therapy; TAU: Treatment-as-usual.

Table 2 *Descriptive statistics for happiness, psychological well-being, and self-esteem across the four testing points (N=60)*

Variable	Condition	Mean	Median	SD	Skewness	Kurtosis	Shapiro-Wilk (p)	α
Happiness	Pre-test	104.65	101	15.20	-.26	.59	.049	.844
	Post-test	127.17	126	10.73	.15	-.87	.156	.800
	1-month follow-up	124.67	122	14.71	.46	-.46	.098	.843
	3-month follow-up	127.15	125	10.61	1.21	2.16	.001	.594
Psychological well-being	Pre-test	15.22	15	4.33	.33	.20	.414	.821
	Post-test	21.43	21	3.83	.03	-.07	.789	.801
	1-month follow-up	22.30	22	3.34	-.23	.46	.228	.795
	3-month follow-up	22.85	23	3.37	-.35	-.03	.485	.703
Self-esteem	Pre-test	27.20	27	4.25	-.37	1.57	.036	.744
	Post-test	31.12	32	3.36	-.63	-.72	.001	.657
	1-month follow-up	32.17	32	3.17	-.19	-.13	.390	.596
	3-month follow-up	33.63	34	2.30	-1.26	4.09	.001	.536

Note: N=60 (pooled across MBCT and TAU groups). SD: standard deviation; α: Cronbach's alpha.

Table 3 *Repeated-measures and mixed-design ANOVA results for happiness, psychological well-being, and self-esteem*

Panel A. Repeated-measures ANOVA within the MBCT group (n=30), main effect of time				
Outcome	**df**	**F**	**p**	**Partial η²**
Happiness	3, 87	39.6	<.001	.577
Psychological well-being	3, 87	26.0	<.001	.472
Self-esteem	3, 87	33.2	<.001	.533
Panel B. Mixed-design (2 Group x 4 Time) ANOVA, both groups (N=60)				
Outcome / Effect	**df**	**F**	**p**	**Partial η²**
Happiness – Time	3, 174	47.06	<.001	.448
Happiness – Group	1, 58	0.03	.874	.001
Happiness – Time x Group	3, 198	5.51	.001	.087
Psychological well-being – Time	3, 174	54.51	<.001	.484
Psychological well-being – Group	1, 58	4.63	.036	.074
Psychological well-being – Time x Group	3, 174	0.99	.392	.017
Self-esteem – Time	3, 174	42.52	<.001	.423
Self-esteem – Group	1, 58	0.42	.520	.007
Self-esteem – Time x Group	3, 174	1.91	.140	.032

Note: Panel A tests within-group change over time in the MBCT group only (Hypothesis 2). Panel B tests the Time, Group, and Time x Group effects across both groups (Hypothesis 3). MBCT: Mindfulness-based Cognitive Therapy; TAU: Treatment-as-usual.

Table 4 *Post hoc and between-group comparisons for happiness, psychological well-being, and self-esteem*

Panel A. Bonferroni post hoc pairwise comparisons within the MBCT group				
Comparison / Outcome	**Mean diff.**	**p**		
Happiness: Pre vs Post	-27.83	<.001		
Happiness: Post vs. 1-month	9.83	.002		
Happiness: 1-month vs. 3-month	-9.77	.042		
Psychological well-being: Pre vs. Post	-6.03	<.001		
Psychological well-being: Post vs. 1-month	-0.43	1.00		
Psychological well-being: 1-month vs. 3-month	-1.70	.701		
Self-esteem: Pre vs. Post	-4.57	<.001		
Self-esteem: Post vs. 1-month	-0.73	1.00		
Self-esteem: 1-month vs. 3-month	-2.50	.002		
Panel B. Independent-samples t-tests, MBCT vs. TAU at each time point				
Outcome / Time point	**t**	**df**	**p**	**d**
Happiness: Pre-test	-1.17	58	.248	-.301
Happiness: Post-test	2.27	58	.027	.585
Happiness: 1-month follow-up	-2.35	58	.022	-.607
Happiness: 3-month follow-up	2.25	58	.028	.582
Psychological well-being: Pre-test	-0.80	58	.426	-.207
Psychological well-being: Post-test	-1.29	58	.203	-.333
Psychological well-being: 1-month follow-up	-2.59	58	.012	-.669
Psychological well-being: 3-month follow-up	-0.19	58	.850	.049
Self-esteem: Pre-test	-1.35	58	.184	-.347
Self-esteem: Post-test	-0.19	58	.849	-.049
Self-esteem: 1-month follow-up	-0.98	58	.332	-.252
Self-esteem: 3-month follow-up	2.20	58	.032	.569

Note: Panel A: Bonferroni-corrected pairwise comparisons within the MBCT group (df=3,87). Panel B: independent-samples t-tests comparing MBCT and TAU at each time point (df=58). MBCT: Mindfulness-based Cognitive Therapy; TAU: Treatment-as-usual.

Table 5 *Mean gain scores (Δ) from pre-intervention to 3-month follow-up, MBCT vs. TAU*

Variable	MBCT mean gain (Δ)	TAU mean gain (Δ)	t	p	d
Happiness	+27.77	+17.23	2.30	.025*	.594
Psychological well-being	+8.17	+7.10	0.77	.442	.200
Self-esteem	+7.80	+5.07	2.17	.034*	.561

Note: *p<.05. MBCT: Mindfulness-based Cognitive Therapy (n=30); TAU: Treatment-as-usual (n=30).

Figures

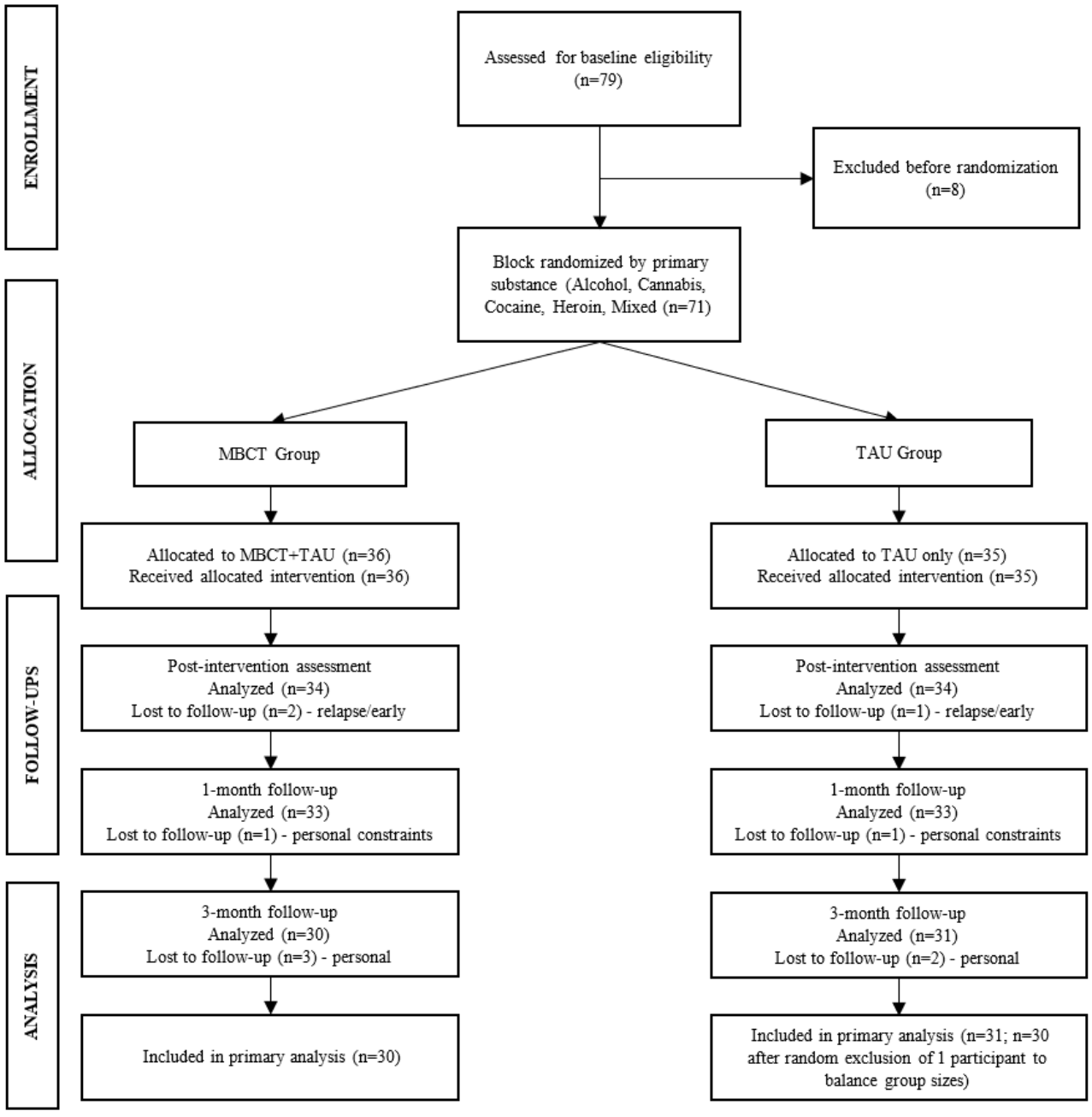


Figure 1

CONSORT flow diagram of participant enrolment, block randomization, and follow-up.

Note: The Figure illustrates participant flow from baseline eligibility assessment through block randomization, allocation to the MBCT plus TAU and TAU-only groups, completion of post-intervention and follow-up assessments, attrition, and inclusion in the final analytic sample.

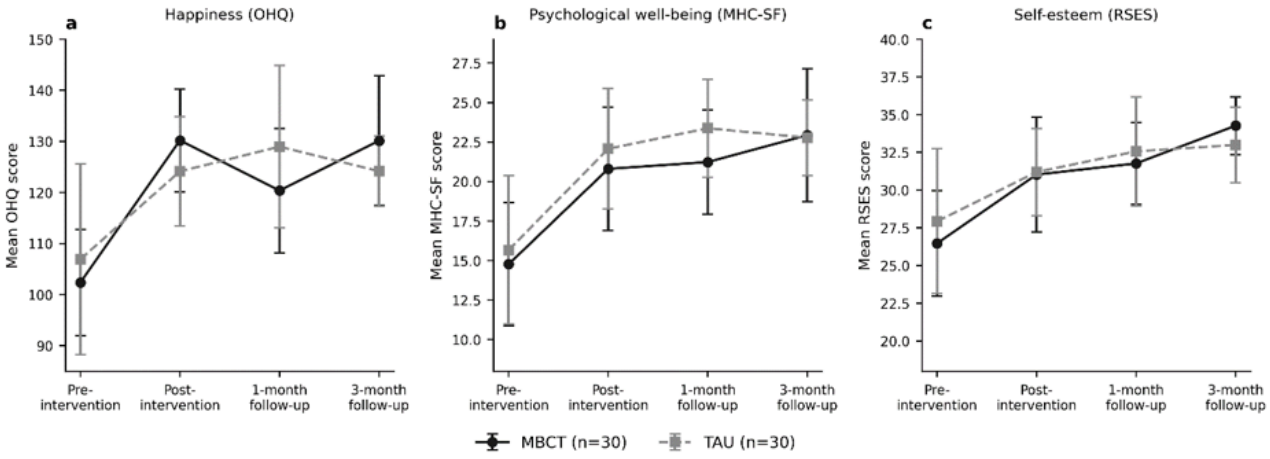


Figure 2

Mean scores on happiness, psychological well-being, and self-esteem for the MBCT and TAU groups across the four testing periods.

Note: The figure illustrates the (a) Happiness (Oxford Happiness Questionnaire); (b) psychological well-being (Mental Health Continuum-Short Form); (c) self-esteem (Rosenberg Self-Esteem Scale) group means at pre-intervention, post-intervention, 1-month follow-up, and 3-month follow-up; error bars show standard deviations. MBCT: Mindfulness-based Cognitive Therapy (n=30); TAU: Treatment-as-usual (n=30).

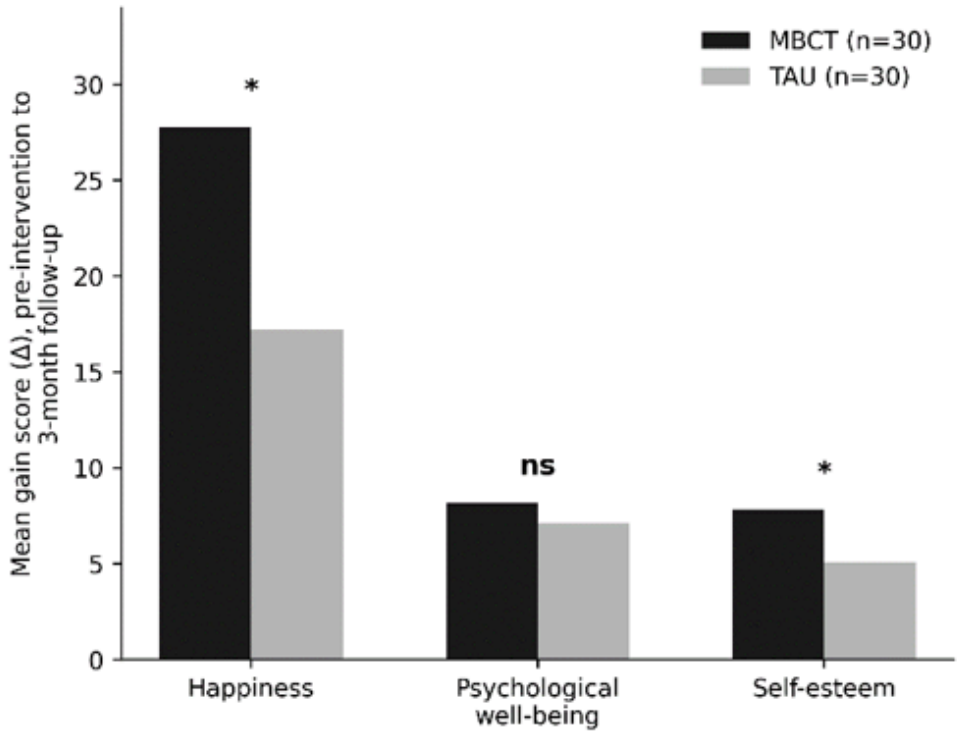


Figure 3

Mean gain scores (Δ) from pre-intervention to 3-month follow-up for happiness, psychological well-being, and self-esteem in the MBCT and TAU groups.

Note: The bar diagram shows mean gain scores for happiness, psychological well-being, and self-esteem. * denotes a significant between-group difference in gain score (independent-samples t-test, $p<.05$); ns denotes a non-significant difference. MBCT: Mindfulness-based Cognitive Therapy (n=30); TAU: Treatment-as-usual (n=30).

Supplementary Files

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

- SupplementaryInformation.docx