Enhancing Adolescent Self-Esteem: A Pilot Randomized Controlled Trial of the Online Mindfulness-Based Intervention Program (MBSI Online)

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ABSTRACT

Objective: This study aimed to develop and assess the effectiveness of the MBSI online program in enhancing self-esteem, mindfulness, and resilience among adolescents, while also evaluating its feasibility and participant satisfaction.

Materials and Methods: The MBSI online program is an adapted form of mindfulness-based interventions (MBIs), developed by integrating specific aspects of mindfulness that are related to self-esteem and the core processes of Acceptance and Commitment Therapy (ACT), following consultations with mindfulness experts and program trials. The study enrolled 70 adolescents aged 15 to 18 years with low to moderate self-esteem, from diverse Thai regions. Participants were randomly assigned and equally allocated to intervention and waiting-list control groups. The intervention group underwent an 8-week MBSI online program. Self-esteem, mindfulness, and resilience were assessed at baseline, week 4, week 8, 1 month, and 3 months post-intervention.

Results: The self-esteem, mindfulness, and resilience scores within the intervention group have significantly increased over time compared to baseline on week 4, week 8, 1 month, and 3 months post-intervention ($p < 0.001$). Furthermore, between-group comparisons revealed statistically significant improvements in self-esteem, mindfulness, and resilience ($p < 0.05$) at corresponding intervals, with medium to large effect sizes. The dropout rate was 25.7%, while participant satisfaction with the MBSI online program was remarkably high, averaging 4.73 out of 5, with 76.9% expressing the highest level of satisfaction.

Conclusion: The MBSI online program significantly improved self-esteem, mindfulness, and resilience in adolescents, achieving high participant satisfaction. This program presents a valuable intervention for adolescents with low self-esteem, aiming to prevent psychological issues stemming from diminished self-esteem.

Keywords: Adolescent; mindfulness; online group therapy; self-esteem; resilience (Siriraj Med J 2024; 76: 40-51)

INTRODUCTION

In recent years, there has been increasing attention directed toward the mental health and well-being of adolescents due to the intricate challenges encountered in the contemporary world. Self-esteem, defined as an individual's comprehensive positive self,[1] plays a pivotal role in influencing emotional resilience, academic achievement, and interpersonal relationships during the transformative phase of adolescence.[2,3]

Low self-esteem is strongly correlated with internalizing symptoms such as depressive mood, somatic complaints, and anxiety. In serious cases, it can lead to various problems, including delinquency, self-inflicted injuries, and even suicide.[4,5] Previous studies have found that one-third to

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one-half of adolescents struggle with low self-esteem.[6] During the COVID-19 pandemic, research in Thailand revealed that adolescents experienced a lower level of self-esteem, with 51.9% reporting reduced self-esteem.[7]

Mindfulness-based interventions (MBIs) have demonstrated their effectiveness in enhancing subjective well-being, reducing stress, anxiety,[8] and depression,[9] as well as improving emotion regulation, self-control, and enhancing executive, behavioral, and socio-emotional competences.[10-12] However, in the realm of enhancing self-esteem among adolescents, the outcomes remain inconclusive.[13]

Previous studies on MBIs in adolescents have been limited by factors such as a lack of randomization,[14] absence of a control group,[15] short-term follow-up,[15,16] small-to-medium effect sizes,[17] and feasibility assessments.[18] Some adapted online MBIs did not demonstrate significant changes in improving self-esteem.[19,20] Furthermore, within the context of Thailand, there has been no study on the effectiveness of online MBIs in enhancing self-esteem among adolescents.

The recognition of MBIs has significantly grown with the advent of mindfulness-based stress reduction (MBSR)[21] and mindfulness-based cognitive therapy (MBCT).[22] MBIs have continued to evolve, including approaches like dialectical behavior therapy (DBT)[23] and acceptance and commitment therapy (ACT).[24] Various platforms now offer MBIs, ranging from traditional in-person groups to online programs accessible via computers, laptops, or mobile phones.

However, traditional MBIs often rely on formal therapeutic procedures delivered by psychiatrists or psychologists, heavily emphasizing meditation techniques that may not fully engage adolescents. Explicit references to depression, anxiety, or other mental health conditions can be limited by stigma within participants' cultural contexts. In Thailand, adolescents face challenges accessing MBIs due to barriers such as limited mental health services, time constraints, confidentiality concerns, social stigma, high private healthcare costs, and geographical barriers in rural areas.

To bridge these gaps, we have developed an online mindfulness-based intervention for self-esteem improvement group program (MBSI online). It integrates mindfulness aspects related to self-esteem[25] and core principles of Acceptance and Commitment Therapy (ACT) that pertain to self-esteem.[26] We have employed creative and adolescent-friendly strategies while preserving the essential MBI concepts, informed by consultations with mindfulness experts and program trials.

This program is designed to target primary outcomes related to self-esteem and secondary outcomes linked to mindfulness and resilience, with a specific emphasis on secondary prevention of psychological illnesses. The choice of the program's name is aimed at promoting a positive direction and addressing social stigma concerns within the participants' context. Additionally, the group intervention for adolescents provides them with the opportunity to share their personal experiences and perspectives, contributing to heightened self-awareness.[27,28] The online platform enhances accessibility, especially in remote areas, saving time and costs,[29] while also addressing concerns related to confidentiality and social stigma.

In the present study, we conducted a pilot randomized controlled trial. The primary objective was to develop and assess the efficacy of the MBSI online program in improving self-esteem in adolescents. The secondary objectives included: 1) investigating the effectiveness of the MBSI online program in enhancing mindfulness and resilience in adolescents, and 2) assessing the feasibility and satisfaction of the MBSI online program.

MATERIALS AND METHODS

The pilot study involved a randomized controlled trial conducted in Thailand, encompassing participant recruitment, interventions, and data collection spanning from June 2022 to March 2023. Approval for the study was granted by the Siriraj Institutional Review Board (SIRB), with the assigned COA number Si 369/2022. The study has been reviewed and approved by the Thai Clinical Trial Registry (TCTR) committee. The TCTR identification number is TCTR20230201004.

Participant recruitment

The research team utilized diverse online platforms, including Line and Facebook, for participant recruitment. Interested adolescents accessed informative documents online, providing study details. Following this, informed consent and contact information were collected, and participants completed an online questionnaire evaluating self-esteem levels using the Revised Rosenberg Self-Esteem Scale (RSES-R).[30]

Eligibility criteria included age (15-18 years), RSES-R score ≤30, proficiency in Thai, and internet accessibility. Exclusions encompassed moderate to severe intellectual impairment or severe psychological symptoms. Psychiatric history was assessed via telephone interviews. Withdrawal occurred for those attending fewer than six sessions, with participants informed of their right to withdraw at any time.

Eligible applicants received an online parental consent form, requiring approval. An anonymous list

of participant ID numbers, lacking additional data, was generated using nQuery Advisor Software. Random sequences allocated participants equally to Group A or B. Participants were then informed of their assigned group, given a unique five-digit identification code, and provided links for online questionnaire completion.

Data collection

Both groups of participants completed a baseline questionnaire, which included demographic characteristics, RSES-R, Philadelphia Mindfulness Scale in Thai Version (PHLMS_TH), and Resilience Inventory-9 (RI-9) before the commencement of the intervention program (T0). Following the initiation of the intervention program, both groups were required to complete the RSES-R, PHLMS_TH, and RI-9 at specific time points: at week 4 (T1), immediately after the intervention in week 8 (T2), at a 1-month follow-up (T3), and at a 3-month follow-up (T4). Data collection of the waitlist group aligned with the intervention group's timeline. Participants who prematurely discontinued the program or were lost to follow-up before week 4, leading to data insufficiency at the T1 time point, were excluded from the modified intention-to-treat analysis (mITT). Additionally, participants in the intervention group were asked to provide feedback on the program immediately upon its completion. To recognize their participation within the program, each participant received a compensation of 100 baht (approximately 3 USD) for every questionnaire completed.

MBSI online program

The MBSI online program is an adapted MBI, that incorporates five specific aspects of mindfulness related to self-esteem: describing, acting with awareness, non-judging of inner experiences, nonreactivity to inner experiences, and being present.[25] Additionally, it includes an element of ACT that involves the exploration of values and committed action to enhance self-esteem,[26] as illustrated in Fig 1.

The MBSI online intervention consisted of eight sessions, with each session lasting 120 minutes. An outline of the eight sessions, detailing the activities and main components of the MBSI, is presented in Fig 2.

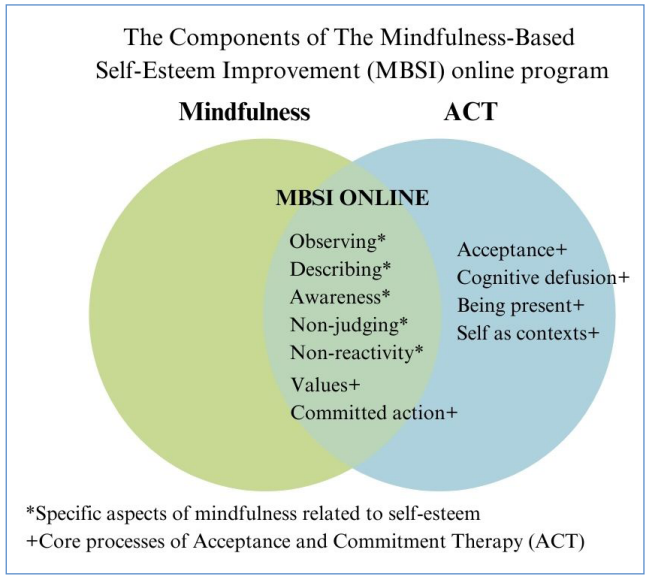

Fig 1. Components of the MBSI Online Program.

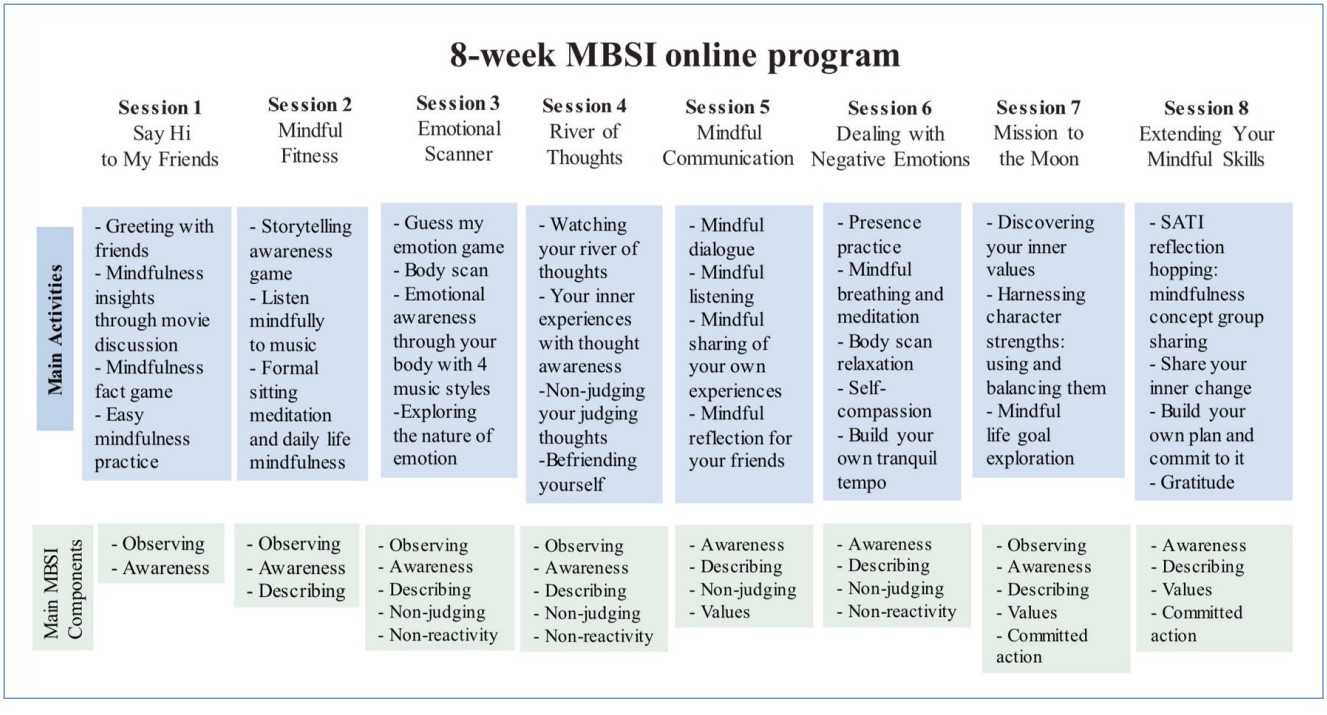

Fig 2. An outline of the eight sessions of the MBSI online program.

The MBSI online program was designed with the aim of seamlessly integrating into participants' daily lives. It incorporated group-based activities that encouraged sharing of experiences from diverse perspectives, thereby promoting interpersonal skills. Mindfulness exercises were a key component of each session, conducted in both the whole group and small groups comprising 6-7 participants. During each session, participants were encouraged to practice a 10-minute homework assignment every day (mindfulness in daily activities) and to share their practicing experiences with their group at the beginning of the next session.

In the MBSI online program, facilitators possessed advanced expertise in mindfulness practice, supervised by two advisory professors specializing in mindfulness training. The primary facilitator, boasting four years of mindfulness experience, completed courses in Thailand, including the Human Work Course. This course introduced a meditation technique involving hand movements or walking while attentively observing body movements, thoughts, or emotions with kindness and a nonjudgmental attitude. The facilitator also participated in various workshops such as Tender Heart Meditation, Maitri Meditation, Buddhist Psychotherapy, and training sessions for enhancing participatory learning processes like Semsikkhalai's Training of the Trainer. Notably, the main facilitators did not undergo formal training in any mindfulness-based approaches. Additionally, the MBSI online intervention featured a meticulously organized "MBSI online program manual", ensuring consistency across subgroups.

Procedure

In the intervention group, participants received an 8-week MBSI online program via the Zoom platform. Conversely, individuals in the control group were assigned to a waiting list and received the intervention only after completing a 3-month follow-up questionnaire. It is noteworthy that blinding was not implemented; both participants and therapists were aware of the interventions.

Outcomes

Primary outcome

The Thai Version of the Revised Rosenberg Self-Esteem Assessment (RSES-R)[30] is a 10-item self-report questionnaire designed to assess self-esteem within the Thai cultural context. This version is a translation derived from Morris Rosenberg's original Rosenberg Self-Esteem Scale (RSES).[1] Responses are rated on a scale from 'Strongly Agree' to 'Strongly Disagree,' with positively phrased items scored from 4 to 1 and negatively phrased items from 1 to 4. Scores on this assessment range from 10 to 40, categorizing self-esteem levels as High (31 - 40 points), Moderate (21 - 30 points), and Low (10 - 20 points). The assessment demonstrates good internal consistency, with a Cronbach's alpha coefficient of 0.84.

Secondary outcome

The Philadelphia Mindfulness Scale in Thai Version (PHLMS_TH)[31] is a 20-item self-report tool with 5 response options. It assesses mindfulness, having been translated into Thai from the original PHLMS. The internal consistency, evaluated by Cronbach's alpha coefficients, is 0.87 for awareness and 0.88 for acceptance.

The Resilience Inventory-9 (RI-9),[32] is a 9-item self-report questionnaire with 5 response categories, assessing resilience. It yields scores ranging from 9 to 45, where higher scores signify increased resilience and adaptability. The assessment demonstrates strong internal consistency (Cronbach's alpha = 0.86).

Feasibility evaluation was conducted through the development of a program feedback questionnaire. The assessment encompassed five dimensions of program satisfaction: usefulness of the intervention, user-friendliness, homework satisfaction, facilitator satisfaction, and online platform satisfaction. These dimensions were measured using a 5-point Likert scale, ranging from 1 (very dissatisfied) to 5 (very satisfied).

Statistical Analysis

The sample size estimation is based on the rules of thumb for pilot trial sample sizes,[33] suggesting a range of 10-75 participants per arm. Anticipating 25 participants per arm and accounting for a 30% dropout rate,[34] we plan to divide the study population into small groups, each comprising 6-7 participants. Therefore, we have estimated a total sample size of 70 participants, with randomization resulting in an equal distribution of 35 participants per arm.

Baseline characteristics were compared between groups using appropriate statistical tests, including Pearson's chi-square test, Fisher's exact test, or Linear-by-Linear Association for categorical variables. The independent t-test was utilized for normally distributed continuous variables, while the Mann-Whitney U test was applied to non-normally distributed continuous variables.

For the within-group analyses, we employed repeated-measures ANOVA to examine differences in mean scores of RSES-R, PHLMS_TH, and RI-9 across time within each group. Analyses were conducted at five time points (T0–T4) for both group A and B. The Group x Time

interaction for RSES-R, PHLMS_TH, and RI-9 mean scores was explored between groups A and B during T0–T4.

We conducted a modified intention-to-treat analysis (mITT),[35] excluding participants with insufficient data at the T1 time point. The mITT analysis was performed for both within-group and between-group comparisons of mean scores on the RSES-R, PHLMS_TH, and RI-9. Between-group analyses were conducted at various time points: T1, T2, T3, and T4 for the intervention and waiting list control groups. To address missing data in follow-up assessments, we applied Last Observation Carried Forward (LOCF)[36] in this study. Statistical significance was set at a p-value threshold of < 0.05. Cohen's d statistic[37] was employed to calculate the effect size, with interpretation categorizing effect sizes as small ($d = 0.2$), medium ($d = 0.5$), and large ($d = 0.8$), respectively.

RESULTS

A total of 329 individuals from diverse regions of Thailand underwent initial eligibility assessment as depicted in Fig 2.

Among them, 259 were excluded for reasons including failure to meet inclusion criteria due to high RSES-R score (n=238), participation refusal (n=9), and severe psychological illness (n=12). The remaining 70 participants were randomly assigned to either the intervention group (n=35) or the waiting list control group (n=35).

However, six participants from the intervention group and one participant from the control group, who prematurely discontinued the program exhibiting data insufficiency at the T1 time point, were excluded. As a result, a final analyzed cohort comprised 29 participants in the intervention group and 34 participants in the control group for the modified intention-to-treat (mITT) analysis.

A comparative analysis between intervention and waiting list control groups revealed no significant differences in baseline self-esteem, mindfulness, resilience, and characteristics including age, gender, religion, chronic illness, substance use, family household, socioeconomic status, relational support, and prior meditation experience, as depicted in Table 1.

The dropout rate was 25.7% in the intervention group according to prematurely discontinued intervention due to meet withdrawal criteria before 4th session (n=4), unable to contact (n=4), Internet problem (n=1), as illustrated in Fig 3.

Primary outcome

The self-esteem was compared within-group and between-group using mITT analysis. For the within-group analysis in the intervention group, self-esteem (RSES-R) scores significantly improved over time ($p < 0.001$). A significant change from baseline was observed from week 4 to the 3-month follow-up. In contrast, the control group demonstrated no statistically significant within-group improvement in self-esteem scores.

The between-group analysis for the intervention group compared to the control group revealed notable changes in self-esteem (RSES-R) scores, indicated by statistically significant differences at week 8 ($p < 0.001$), the 1-month follow-up ($p < 0.001$), and the 3-month follow-up ($p < 0.001$), with large effect sizes for all three time points ($d = 1.00, 0.96, 0.96$, respectively). There were differences in the outcomes between the two groups at T1, T2, T3, and T4 for the direction and size of outcome differences; see Table 2 and Fig 4.

Secondary outcomes

In the intervention group, there were significant improvements over time in mindfulness (PHLMS_TH) and resilience (RI-9) scores ($p = 0.001$ and $p < 0.001$, respectively) during the within-group analysis. Notably, a significant change from baseline was evident starting from week 4 and persisted through the 3-month follow-up. Conversely, the control group exhibited no statistically significant within-group enhancements in overall mindfulness and resilience scores.

The analysis comparing the intervention group to the control group unveiled significant alterations in mindfulness (PHLMS_TH) and resilience (RI-9) scores. These changes were evident at week 8, the 1-month follow-up, and the 3-month follow-up, demonstrating medium to large effect sizes. Noteworthy differences between the two groups were observed at T1, T2, T3, and T4 in terms of the direction and magnitude of outcome variances; see Table 2 and Fig 4.

Program feedback

The feedback scores for the MBSI online program are summarized in Table 3. Facilitator satisfaction was notably high, with a mean score of 4.92, and a substantial majority (92.3%) of participants expressing complete satisfaction (score 5). Similarly, satisfaction with the online platform and overall program satisfaction garnered mean scores of 4.73, with 76.9% of participants indicating the highest level of satisfaction.

DISCUSSION

The present study aimed to develop and evaluate the efficacy of the 8-week MBSI online program in enhancing

TABLE 1. Baseline demographic and characteristics of participants.

Baseline Characteristics	Intervention Group (n=29) Mean ± SD n (%)	Waiting List Control Group (n=34) Mean ± SD n (%)	p
Age, year	16.48 ± 0.91	16.12 ± 0.73	0.082
Range	15-18	15-18	
Female	19 (65.5)	22 (64.7)	0.946
Religion			0.327
Buddhist	24 (82.8)	32 (90.9)	
Christian	1 (3.4)	0 (0)	
Islamic	2 (6.9)	0 (0)	
Other/None	2 (6.8)	5 (8.1)	
Chronic Illness			0.339
None	16 (59.3)	23 (69.7)	
Physical Illness	6 (22.2)	8 (24.2)	
Mental Illness	5 (18.5)	2 (6.1)	
Substance Use			0.453
Never Used	24 (82.8)	31 (91.2)	
Used Before	5 (17.2)	3 (8.8)	
Family Member			1.000
Both Parents	16 (55.2)	20 (58.8)	
Either Parent	7 (24.1)	8 (23.5)	
Other Relatives	6 (20.7)	6 (17.6)	
Socioeconomic Status			0.534
<550 US/month	7 (24.1)	2 (5.9)	
550-850 US/month	8 (27.6)	18 (52.9)	
>850 US/month	14 (48.3)	14 (41.2)	
Relational support			0.741
No	4 (13.8)	6 (17.6)	
Yes	25 (86.2)	28 (82.4)	
Prior Meditation Experience			0.299
Never	25 (86.2)	25 (75.8)	
Yes	4 (13.8)	8 (24.2)	
Baseline Outcome Scores			
RSES-R	23.7 ± 4.2	25.3 ± 4.1	0.118
PHLMS_TH	55.0 ± 6.7	57.2 ± 5.4	0.136
RI-9	28.3 ± 5.2	28.2 ± 7.2	0.946

Abbreviations: RSES-R, Thai Version of the Revised Rosenberg Self-Esteem Assessment; PHLMS_TH, Philadelphia Mindfulness Scale in Thai Version; RI-9, Resilience Inventory-9.

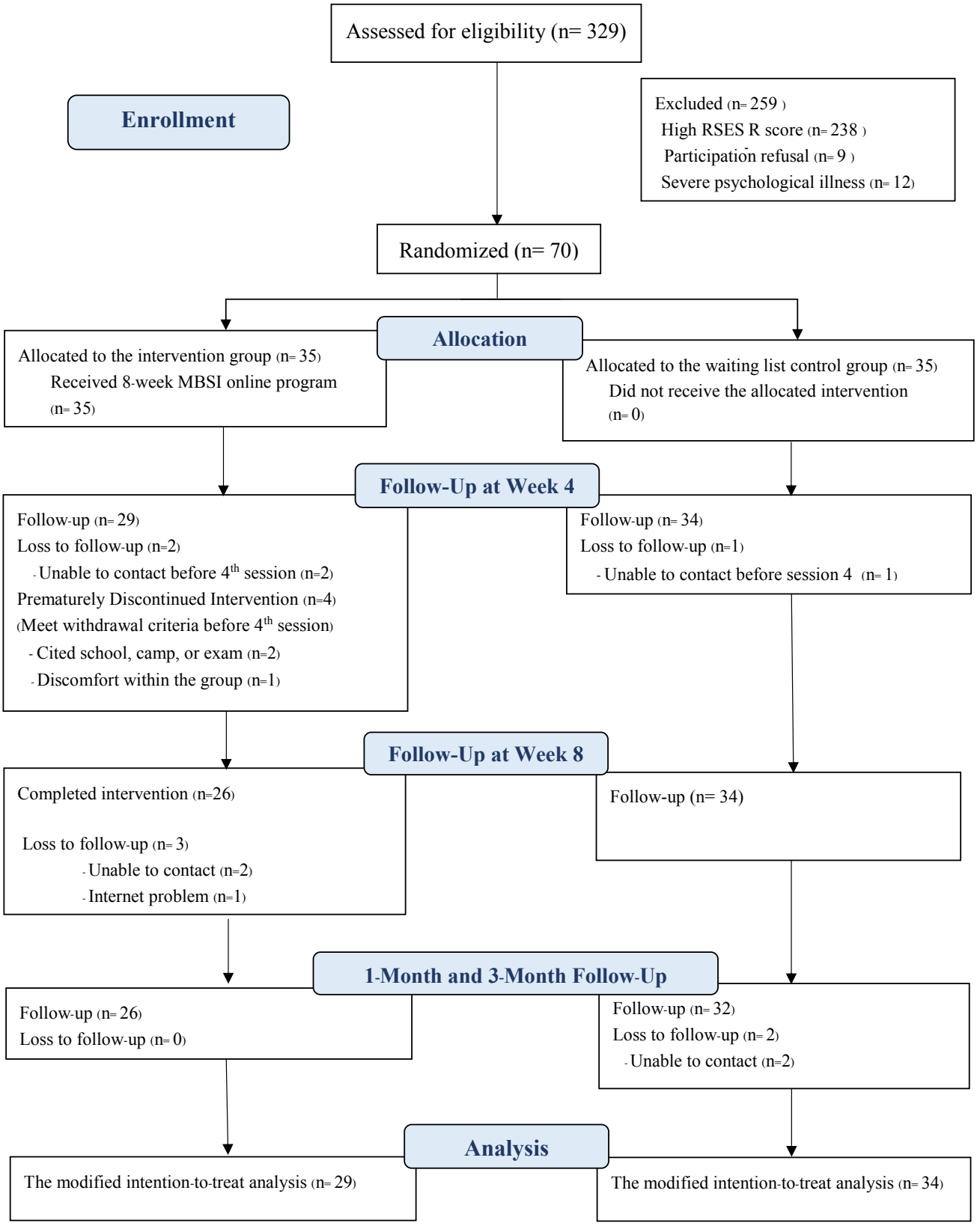

Fig 3. CONSORT flow diagram.

TABLE 2. Within-Group and Between-Group Outcomes at Baseline (T0), Week 4 (T1), Week 8 (T2), 1-Month Follow-Up (T3), and 3-Month Follow-Up (T4).

Outcomes	Time point	Intervention group (n=29) Mean ± SD	Waiting list control group (n=34) Mean ± SD	p	d
RSES-R	Time x Group			<0.001	
	Baseline (T0)	23.66 ± 4.24	25.32 ± 4.10	0.118	0.40
	Week 4 (T1)	27.79 ± 4.63 [a]	25.71 ± 4.81	0.086	0.44
	Week 8 (T2)	31.34 ± 4.17 [a]	26.88 ± 4.73	<0.001	1.00
	1-month follow-up (T3)	32.07 ± 4.18 [a]	27.26 ± 5.73	<0.001	0.96
	3-month follow-up (T4)	32.31 ± 4.42 [a]	27.53 ± 5.48	<0.001	0.96
	p (Within-group changes over)	<0.001	0.084		
PHLMS_TH	Time x Group			<0.001	
	Baseline (T0)	54.97 ± 6.71	57.26 ± 5.37	0.136	0.38
	Week 4 (T1)	58.45 ± 8.21 [a]	55.50 ± 7.51	0.142	0.37
	Week 8 (T2)	64.38 ± 10.73 [a]	57.12 ± 7.90	0.003	0.77
	1-month follow-up (T3)	63.93 ± 10.52 [a]	58.65 ± 7.84	0.026	0.57
	3-month follow-up (T4)	65.34 ± 10.31 [a]	57.97 ± 6.87	0.001	0.84
	p (Within-group changes over time)	0.001	0.061		
RI-9	Time x Group			<0.001	
	Baseline (T0)	28.34 ± 5.16	28.24 ± 7.18	0.946	0.02
	Week 4 (T1)	31.97 ± 5.52 [a]	28.85 ± 7.62	0.073	0.47
	Week 8 (T2)	35.21 ± 5.80 [a]	30.06 ± 7.16	0.003	0.79
	1-month follow-up (T3)	36.07 ± 6.63 [a]	29.29 ± 7.80	<0.001	0.94
	3-month follow-up (T4)	36.62 ± 6.04 [a]	29.59 ± 8.63	<0.001	0.94
	p (Within-group changes over time)	<0.001	0.522		

Note. a significant change from baseline P < 0.05

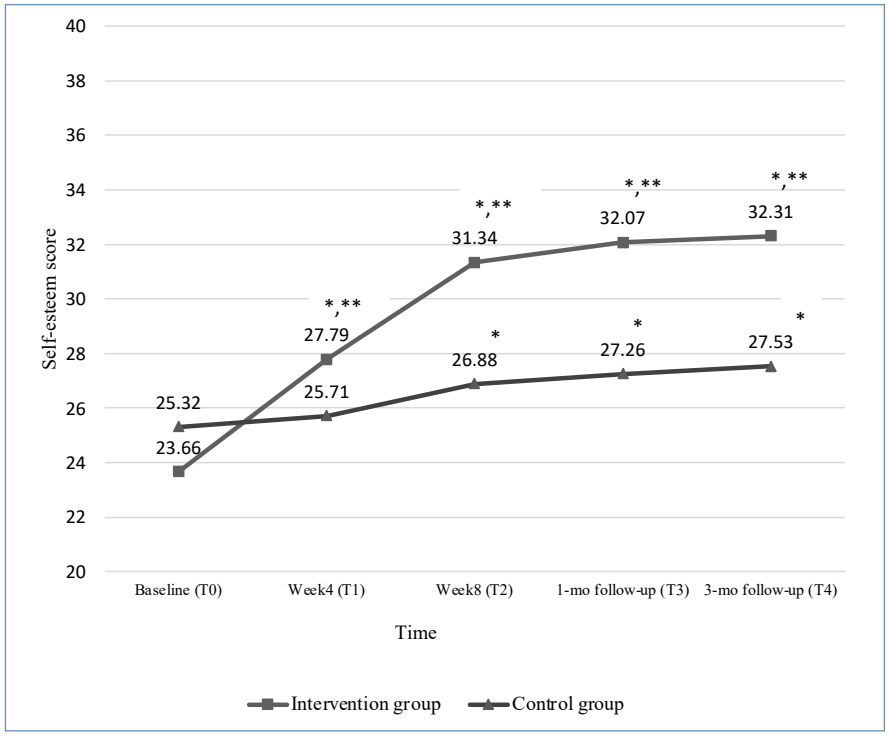

Fig 4. Within-group changes over time and between-group outcomes of self-esteem.
Note. * P<0.05 (within-group analysis), ** P < 0.05 (between group analysis adjusted for baseline characteristic)

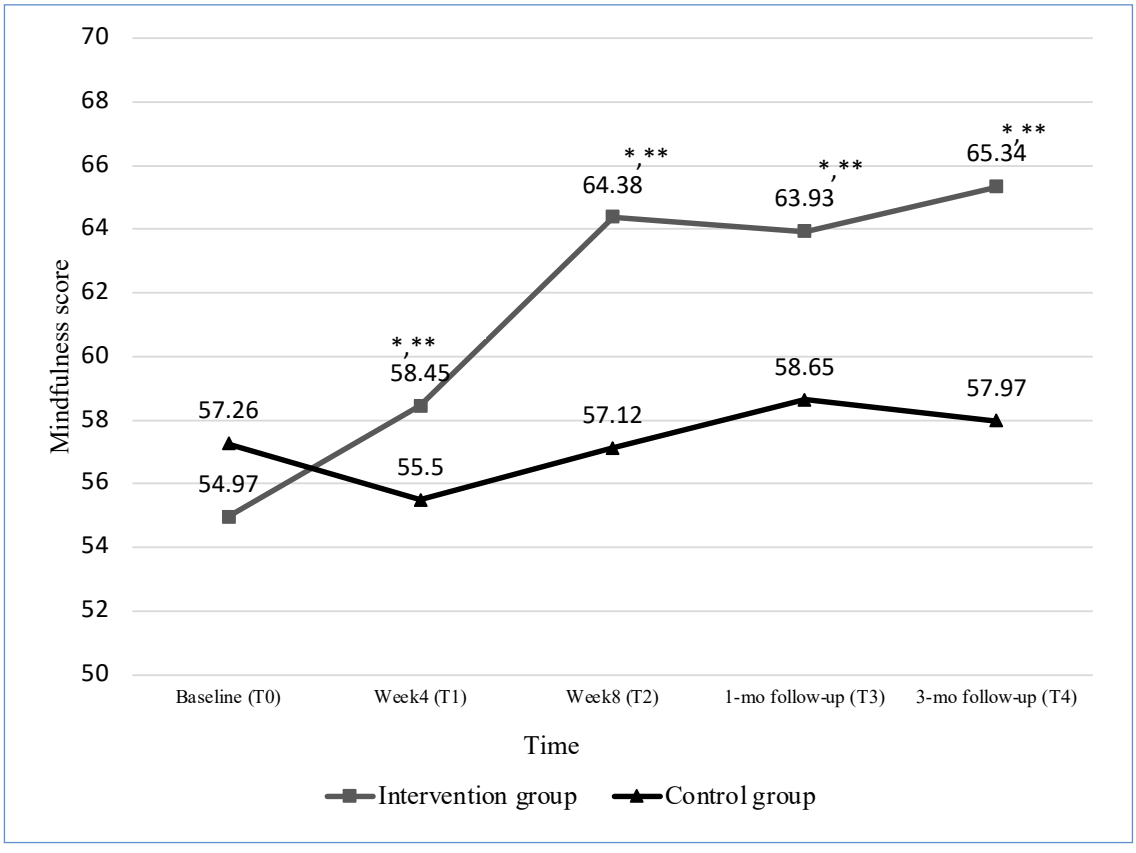

Fig 5. Within-group changes over time and between-group outcomes of mindfulness.
Note. * P<0.05 (within-group analysis), ** P < 0.05 (between group analysis adjusted for baseline characteristic)

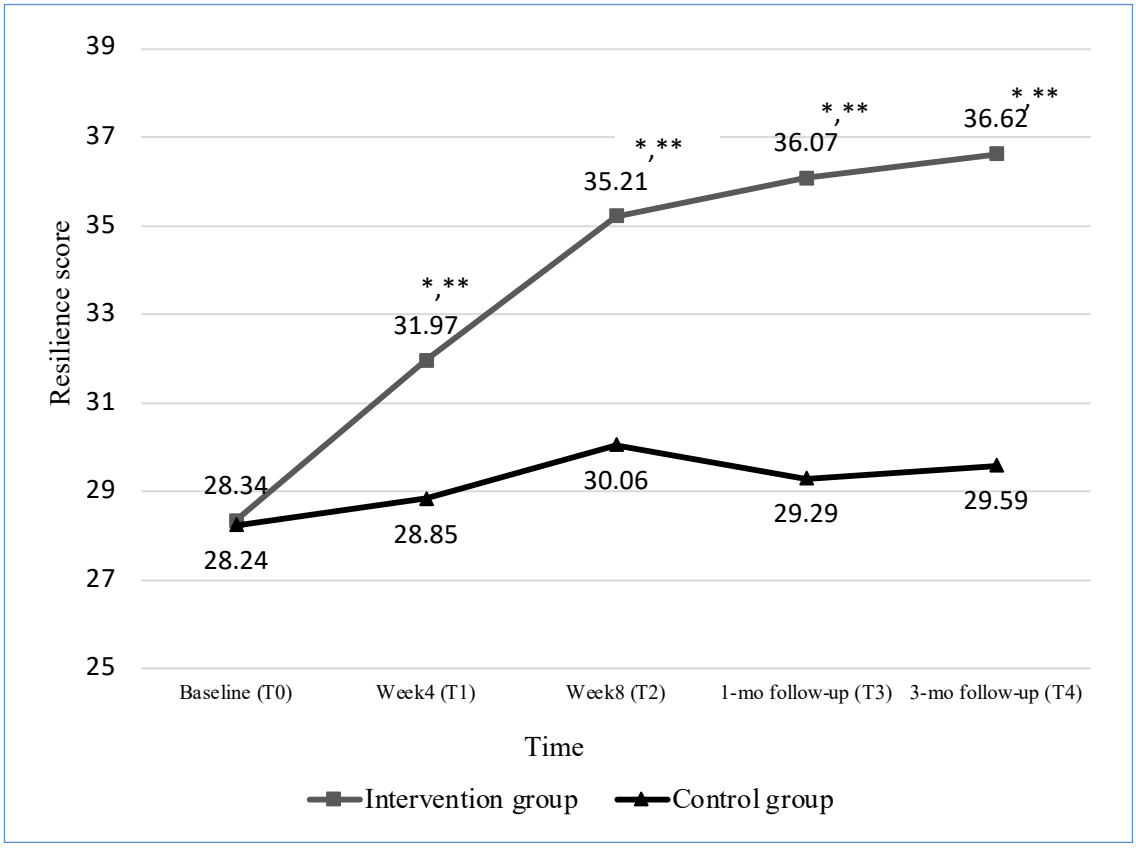

Fig 6. Within-group changes over time and between-group outcomes of resilience.
Note. * P<0.05 (within-group analysis), ** P < 0.05 (between group analysis adjusted for baseline characteristic)

TABLE 3. MBSI online program feedback (N=26).

Aspect	Mean score ± SD	Score 5, n (%)	Score 4, n (%)	Score 3, n (%)	Score 2, n (%)	Score 1, n (%)
Usefulness of program	4.58 ± 0.64	17 (65.4)	7 (26.9)	2 (7.7)	0 (0)	0 (0)
User-friendliness of program	4.73 ± 0.53	20 (76.9)	5 (19.2)	1 (3.8)	0 (0)	0 (0)
Homework satisfaction	4.50 ± 0.65	15 (57.7)	9 (34.6)	2 (7.7)	0 (0)	0 (0)
Facilitator satisfaction	4.92 ± 0.27	24 (92.3)	2 (7.7)	0 (0)	0 (0)	0 (0)
Online platform satisfaction	4.73 ± 0.53	20 (76.9)	5 (19.2)	1 (3.8)	0 (0)	0 (0)
Overall program satisfaction	4.73 ± 0.53	20 (76.9)	5 (19.2)	1 (3.8)	0 (0)	0 (0)

Note: Scores range from 1 (very dissatisfied) to 5 (very satisfied)

self-esteem, mindfulness, and resilience among low-to-moderate self-esteem adolescents, while also assessing the feasibility of the MBSI online program. Key findings revealed significant improvements in self-esteem, mindfulness, and resilience within the intervention group over time. Between-group analysis demonstrated notable changes at week 8, 1-month follow-up, and 3-month follow-up, with medium to large effect sizes post-intervention and sustained effects at the 3-month follow-up. Differences in outcomes between groups were observed at T1, T2, T3, and T4 regarding the direction and size of outcome differences.

Our findings were congruent with prior research that demonstrated the effectiveness of mindfulness-based interventions in enhancing various psychological aspects including subjective well-being, self-esteem and perceived stress levels among adolescents.[10,38] A previous systematic review[13] of 17 studies showed the majority of studies investigating the impact of MBIs on self-esteem in adolescents reported significant increases in self-esteem.

Multiple strengths of present study were identified adding up to current MBIs research field. First, the study population targeted low to moderate self-esteem adolescents. Since adolescents struggling with diminished self-esteem are at heightened risk for internalizing symptoms like depressive mood, somatic complaints, and anxiety, the MBSI online program was designed to find effective strategies for preventing negative consequences.

Second, the efficacy of the MBSI online program in improving self-esteem demonstrated large effect size with long term effect to the 3-month follow-up. This program enabling practical integration into adolescents' daily lives and the activities were designed specifically for adolescents appeared to resonate well with adolescents' lifestyles, leading to increased program efficacy. When compared to previous studies,[19,20] it was found that the MBSI online program has better efficacy than other online interventions. In MBSI online, group-based training with the use of consistent subgroups encouraged participants to openly share and maintain group dynamics throughout the training. Co-facilitators within these subgroups ensured precise guidance and consistent practice for each participant. Third, in relation to the secondary outcomes, the intervention demonstrated a statistically significant enhancement in both mindfulness and resilience among the participants. Developing mindfulness and resilience in adolescents is essential for their well-being. Mindfulness helps individuals become more self-aware, attentive and focused on the present, which can enhance their ability to cope with stress and challenges.[39] Resilience enables adolescents to persevere, adapt, and rise to the occasion when faced with difficult circumstances.[40] Our study revealed substantial and lasting improvements in mindfulness and resilience, with medium to high effect sizes immediately post-intervention and persisting at the 3-month follow-up. These findings underscore the efficacy of the MBSI online program in fostering enduring and positive impacts in these vital domains.

Fourth, the MBSI online was an efficient innovative approach facilitated through an online platform which enabled participants from diverse geographical regions to access the intervention and made it a cost-effective approach.

The feasibility of the current study, as assessed by the dropout rate and satisfaction rate, offers insight into the practicality and acceptability of the intervention. The intervention group exhibited a dropout rate of 25.7% aligning with the range reported in a systematic review,[34]

which indicated dropout rates between 16% and 29% for mindfulness-based interventions (MBIs). However, the observed dropout rate raises concerns about potential bias and underscores the need for strategies that promote adherence, especially within online platforms. In terms of program satisfaction, the MBSI online program received consistently high participant satisfaction, as indicated by positive mean scores (ranging from 4.58 to 4.92) and substantial percentages reporting top-level contentment (ranging from 65.4% to 92.3%). These results affirm participants' favorable perceptions, serving as a testament to the program's success in meeting their needs and fostering a constructive learning environment.

The study's limitations necessitate ongoing scrutiny. Firstly, the relatively small sample size of 70 participants may constrain the generalizability of findings to a broader population, affecting the statistical power of analyses. Secondly, the absence of blinding introduces the possibility of biases in reporting and implementation, potentially influencing participant responses. Thirdly, relying on self-report measures for outcomes like self-esteem, mindfulness, and resilience introduces the potential for social desirability bias and measurement inaccuracies. Fourthly, the mITT analysis may be biased due to missing outcome data. Fifthly, there was no analysis conducted on the homework assignment to determine whether it is a factor influencing the program's effectiveness. Lastly, the study's geographical restriction to Thailand may limit the generalizability of findings to other cultural contexts.

However, this research holds significant implications for medical practice, public health, and research implementation, particularly in the realm of addressing low self-esteem among adolescents. Clinicians working with adolescents experiencing low self-esteem can utilize the MBSI online program as an effective tool to support their mental well-being and proactively prevent psychological illnesses. The program's accessibility through online platforms further enhances its reach and impact. By providing evidence of the positive impact of the MBSI program on self-esteem, mindfulness, and resilience, this research serves as a foundation for future studies and the development of similar programs tailored to specific needs.

Future research endeavors should strive to involve larger and more diverse samples, with efforts focused on reducing attrition rates. Exploring double-blinded and active control groups, incorporating objective measures, conducting cross-cultural validation, monitoring and analyzing the effectiveness of homework assignments, and extending follow-up periods would collectively enhance the comprehensiveness of our understanding regarding the program's efficacy and its potential implications for the well-being of adolescents.

CONCLUSION

The pilot randomized controlled trial demonstrated the efficacy of the MBSI online program in enhancing self-esteem, mindfulness, and resilience among low self-esteem adolescents, with sustained effects at the 1-month and 3-month follow-ups. The program's innovative combination of MBIs and ACT elements included group-based activities facilitated through the online platform and tailored its design specifically for adolescents. The positive program feedback and high satisfaction ratings underscored the feasibility and acceptability of the MBSI online program. To validate these findings and establish its broader efficacy and applicability, future research should include larger, diverse samples, minimize dropouts, explore various control groups, use objective measures, cross-cultural validation, and extend follow-up periods.

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