

Effectiveness of Behavioral Activation and Mindfulness-Based Interventions on Emotional Balance and Cognitive Avoidance in Female Students with Depressive Symptoms

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Abstract

Background: Depression, a prevalent psychological disorder, significantly impacts emotional regulation and cognitive avoidance in the academic and professional performance of students. This study compares two interventions, behavioral activation and mindfulness-based, to improve emotional balance and reduce cognitive avoidance in college students experiencing depression.

Methods: A quasi-experimental pre-test-post-test design with a 60-day follow-up period was used in this study. The target population comprised female students at Isfahan State University, Isfahan, Iran who exhibited depressive symptoms during the 2022-2023 academic year, and were referred to the university's Counseling Center. A convenience sample of 45 participants was selected and randomly assigned to three groups of 15: behavioral activation, mindfulness-based intervention, and a control group. The Scale of Positive and Negative Experience (SPANE) and the Cognitive Avoidance Questionnaire (CAQ) were administered to all participants at three time points. Data were analyzed using repeated-measures ANOVA and Bonferroni post-hoc tests in SPSS version 16.

Results: The study found that both mindfulness-based interventions and behavioral activation significantly improved positive emotions and reduced cognitive avoidance in college students with depressive symptoms. For the mindfulness group, positive emotions increased from 15.20 ± 5.59 to 21.00 ± 5.75 at the post-test and then to 18.00 ± 2.85 at follow-up. Cognitive avoidance decreased from 84.66 ± 8.33 to 67.60 ± 7.93 at post-test and then remained stable at 66.93 ± 6.28 at follow-up. The behavioral activation group showed similar trends, with positive emotions increasing from 16.00 ± 6.49 to 19.20 ± 7.07 at post-test and then decreasing to 18.53 ± 5.05 at follow-up. Cognitive avoidance decreased from 80.26 ± 11.78 to 60.93 ± 7.07 at post-test and then increased slightly to 61.60 ± 7.44 at follow-up ($P=0.027$). While both interventions were effective, behavioral activation had a more lasting impact on positive emotions ($P=0.027$).

Conclusions: The findings of this study suggested that both behavioral activation and mindfulness-based interventions are effective in improving emotional balance and reducing cognitive avoidance in college students with depressive symptoms.

Keywords: Behavior, Mindfulness, Emotions, Cognitive, Depression

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1. Introduction

The transition from adolescence to adulthood during university life often presents a significant source of stress (1). Students face a myriad of challenges, including academic demands, uncertainty about the future, lifestyle changes, disrupted sleep patterns, dormitory living, limited leisure time and resources, parental expectations, and the pressures of exams and assignments (2). This confluence of stressors can contribute to a high prevalence of mental health conditions, including depression, among the student population (3). Depression is a significant issue among Iranian students, with a prevalence of 37.0%. This disparity is more pronounced in female students, with a prevalence of 45%, as compared

with 28.0% in male ones. Furthermore, the severity of depression varies, with 31.0%, 18.0%, and 11.0% of students experiencing mild, moderate, and severe depression, respectively (4). Depression, a prevalent mood disorder, can have detrimental consequences for students, affecting their academic performance, interpersonal relationships, and even healthcare delivery. Individuals with depression often struggle with emotional dysregulation, a condition characterized by difficulty managing emotions effectively (5).

Emotional dysregulation is a common feature in individuals with mood disorders, particularly those experiencing depressive symptoms (6). For individuals with depressive disorders, the capacity

to experience rewards and pleasure is often compromised, leading to disrupted emotional states, difficulties in regulating emotions due to impaired reward processing, decreased social engagement and activity, increased negative thoughts, and diminished emotional balance and motivation. This cycle can perpetuate depressive symptoms. Emotional balance is defined as the physical and psychological ability to exhibit natural reactions to environmental stimuli (7). Watson and Tellegen (8) categorized emotions into two dimensions: positive and negative. Negative emotions, such as anxiety, fear, anger, sadness, depression, and hostility, act as inhibitory behavioral systems, primarily aimed at deterring behaviors that lead to unpleasant consequences. Positive emotions, including interest, pleasure, alertness, and trust, guide the organism towards pleasurable stimuli and facilitate behavior in the individual (9). Research demonstrated that both positive and negative affective factors are associated with diverse classes of variables (10). In essence, attending to positive and negative emotions as indicators of positive and negative action tendencies is highly significant and serves as a predictor of happiness, improved depression, and well-being in students (11). Individuals with depression often engage in cognitive avoidance, a strategy where they attempt to suppress or avoid distressing thoughts or feelings (12).

Cognitive avoidance, a common challenge for individuals with depressive symptoms, involves the deliberate effort to alter the intensity, duration, or context of internal experiences, even at the cost of negative behavioral consequences (13). This tendency arises from the inherent human capacity for linguistic anticipation, evaluation, and avoidance of negative emotions. The natural language processing patterns that underpin cognitive avoidance are further amplified by cultural norms that prioritize positive experiences and minimize pain (14). While avoidance may provide temporary relief from depressive symptoms, it fails to address the underlying issue and can, in the long run, exacerbate problems. This is because avoidance offers temporary relief, making it an appealing coping mechanism (15). Consequently, identifying effective strategies, such as mindfulness-based interventions and behavioral activation therapy, to improve the quality of life for students experiencing depressive symptoms is a crucial endeavor.

Mindfulness-based interventions have emerged

as a promising approach to address the high levels of distress and mental health disorders experienced by university students (16). Mindfulness, a popular psychological intervention with a strong evidence base (17), involves both formal and informal practices that teach individuals to engage mentally in everyday tasks without judgment (18, 19). According to Kriakous and colleagues (20), mindfulness comprises three interconnected mechanisms: intentionality, attention, and attitude, which together lead to a change in perspective, particularly in mood and depressive disorders. Extensive research established the efficacy of mindfulness practices in enhancing mental and physical well-being, alleviating symptoms of depression, anxiety, and stress (21, 22). These findings indicated that mindfulness-based interventions may offer a promising approach to supporting the mental health of university students. Behavioral activation therapy is another effective treatment for reducing depressive symptoms (23). This short-term, solution-focused intervention aims to increase regular activity and engagement with rewarding resources, addressing underlying factors such as avoidance behaviors and ruminative thoughts (24). Nikandish and Sajjadian (25) emphasized the role of decreased rewarding activities and increased avoidance behaviors in the development of depression. Behavioral activation therapy addresses this issue by promoting activity-based strategies over avoidance tactics, encouraging clients to confront problem behaviors and employ structured problem-solving techniques (26).

Despite growing evidence supporting the effectiveness of third-wave therapy interventions for psychological disorders, there remains a significant gap in research directly comparing the efficacy of behavioral activation therapy and mindfulness-based therapy on various dimensions of emotional balance and cognitive avoidance. This study aimed to address this gap by comparing the efficacy of these two interventions in alleviating depressive symptoms and improving emotional balance and cognitive avoidance in university students.

2. Methods

2.1. Study Design

This study used a quasi-experimental pre-test-post-test control group design with a 60-day follow-up period.

2.2. Participants

The target population for this study comprised female undergraduate and graduate students enrolled at Isfahan State University, Isfahan, Iran during the 2022-2023 academic year. A convenience sample of 45 female students exhibiting depressive symptoms was selected based on predetermined inclusion and exclusion criteria. Participants were then randomly assigned to one of the three groups (behavioral activation, mindfulness-based intervention, and control) using a random number table. Participants were numbered from 1 to 45, and then random numbers were generated using a random number table. The first 15 numbers were assigned to the behavioral activation group, the next 15 to the mindfulness-based intervention group, and the remaining 15 to the control group (Figure 1). The sample size was determined using

G*Power software with a significance level of $\alpha=0.05$ and a power of 0.90. Based on previous research (27), the mean and standard deviation of cognitive avoidance at post-test were estimated to be 60.93 ± 7.07 and 75.33 ± 8.67 for the behavioral activation and control groups, respectively. Participants were included in the study if they were students at Isfahan State University, scored above 13 on the Beck Depression Inventory (BDI), were not addicted to substances, did not have chronic physical illnesses, and provided informed consent. Participants were excluded if they missed more than two intervention sessions or were unwilling to continue participating in the study.

2.3. Procedure

In the beginning, the volunteers of both the experimental and control groups completed the

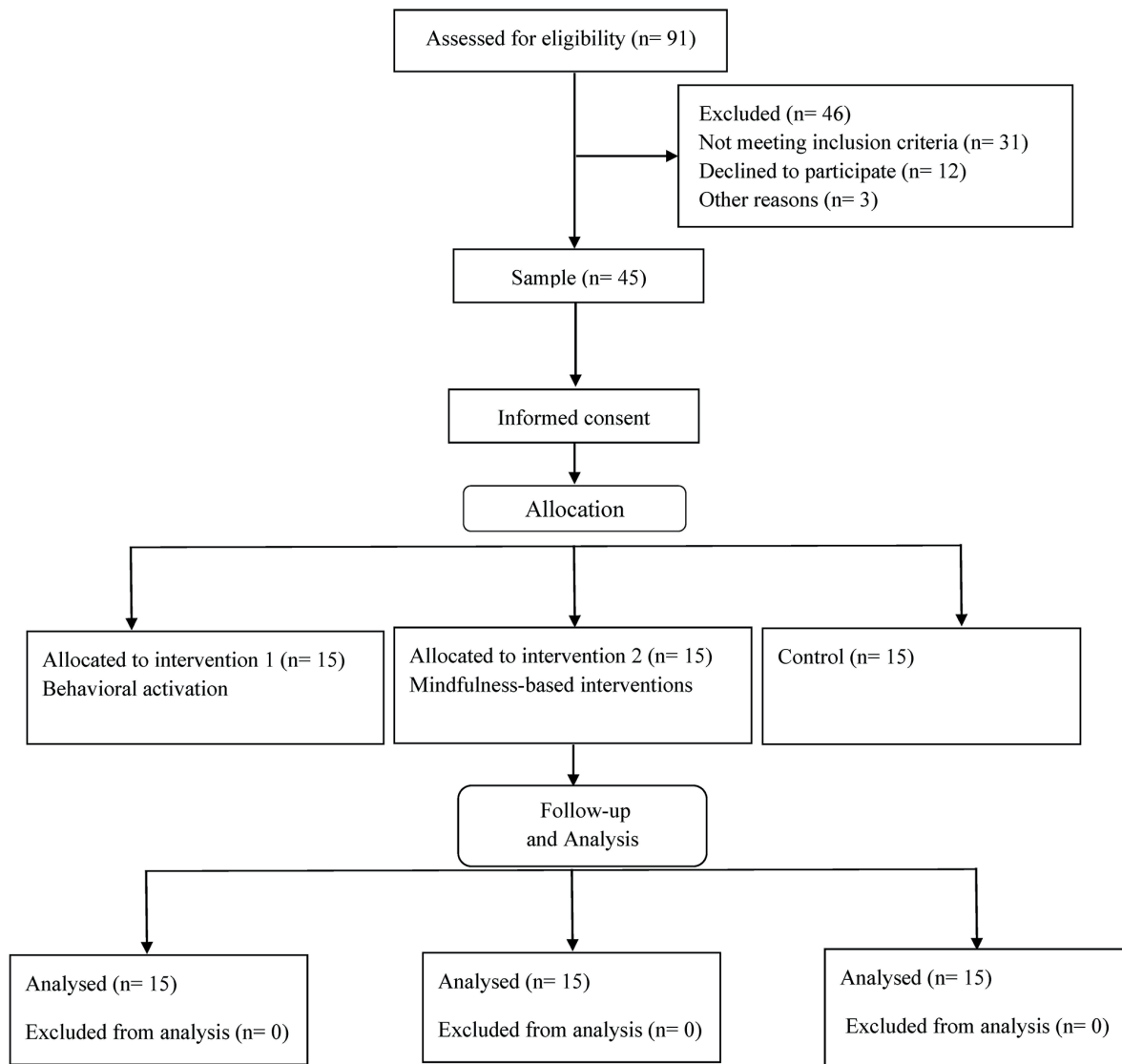


Figure 1: The figure shows the flow diagram of the sampling process.

questionnaires. Then, the participants of the behavioral activation experimental group received the intervention during 9 two-hour sessions (28) (weekly and one session per week for two months) on even days (Saturday, Monday, and Wednesday). The participants of the mindfulness experimental group received the intervention during 8 two-hour sessions (29) (weekly and one session per week for two months) on odd days (Sunday, Tuesday, and Thursday). The control group received no intervention and was placed on a waiting list. After the end of the sessions and after 60 days, the participants were re-tested as a follow-up period. Prior to the commencement of the intervention sessions, a 30-minute briefing session was conducted for both experimental and control groups to outline the general principles, rules, and objectives of the study. Intervention sessions were facilitated by the first author and another qualified psychotherapist at the Porto Mehr Counseling Center in Isfahan,

Iran, between March and May 2023. A summary of the behavioral activation and mindfulness training sessions is presented in Tables 1 and 2.

2.4. Instruments

2.4.1. The Beck Depression Inventory (BDI): BDI is a well-established self-report measure used to assess the severity of depressive symptoms (30). It comprises 21 items rated on a 4-point Likert scale, yielding a total score ranging from 0 to 63. Individuals with BDI scores between 0 and 13 were classified as having no or minimal depression, scores between 14 and 19 were categorized as mild depression, scores between 20 and 28 were considered moderate depression, and scores between 29 and 63 were indicative of severe depression. Previous research has reported the reliability of BDI's with a Cronbach's alpha coefficients of 0.87 (31) and 0.84 in the present study.

Table 1: A summary of behavioral activation therapy sessions

Sessions	Content
1	Goals: Introduction to the framework of the sessions. Content: Introductions and overview of depression, treatment rationale, and the importance of attending sessions
2	Goals: Understanding emotions and their behavioral consequences. Content: Discussion of emotions and feelings
3	Goals: Strengthening coping skills. Content: Creating a supportive atmosphere and discussing coping experiences with depression
4	Goals: Focusing on the five senses and practicing self-care. Content: Teaching self-care techniques and promoting pleasurable activities
5	Goals: Planning and thought fluency. Content: Reviewing assignments, planning activities, and teaching thought fluency
6	Goals: Adopting a healthy lifestyle. Content: Educating about the benefits of a healthy lifestyle
7	Goals: Recognizing achievements and enhancing acquired skills. Content: Recording motivation, feelings, and accomplishments
8	Goals: Effective coping with problems. Content: Applying functional analysis and strengthening coping methods
9	Goals: Bringing behavior under control and post-test. Content: Teaching escape prevention and positive reinforcement

Table 2: A summary of mindfulness-based interventions sessions

Sessions	Content
1	Introduces mindfulness principles, practices mindful eating, and body scan meditation. Assign homework for daily mindfulness practice.
2	Deepens mindfulness with body scan and standing yoga. Review the previous week's exercises and guide a brief mindful sitting meditation. Assign homework for continued practice.
3	Introduces mindful stretching and facilitates mindfulness meditation. Encourages open discussion about challenges and assigns homework for further integration.
4	Gathers participant experiences, conducts mindful sitting meditation, and reviews past exercises. Integrates standing yoga and facilitates discussions on challenging experiences and mindfulness application. Assign homework for daily use.
5	Reflects on personal growth through paired discussions and mindful walking. Conducts a sitting meditation and addresses current practice challenges. Works on assigned homework and assigns new tasks for continued integration.
6	Enhances mindfulness skills with sitting meditation, open discussion, and standing yoga. Introduces a thought-provoking challenge and assigns homework for consistent practice.
7	Prepares for course completion with mindful stretching, meditation, and discussion. Introduces a mindfulness game and assigns homework for continued integration. Encourages forgiveness towards fellow participants for the final session.
8	Acknowledges the final meeting and guides a closing meditation and body scan. Creates space for experience sharing and introduces a mindfulness-related story. Discusses strategies for integrating mindfulness into daily life and concludes with encouragement for continued practice.

The CVI and CVR scores of 0.99 and 0.97, derived from expert evaluations, provide evidence of the strong alignment of the instrument with the target construct (31).

2.4.2. The Scale of Positive and Negative Experience (SPANE): SPANE, developed by Diener and co-workers (32), is a self-report measure consisting of 12 items designed to assess positive and negative affect. Participants rate their emotional experiences on a 5-point Likert scale (1=never, 5=always) across six positive and six negative affect items. Scores for both positive and negative affect range from 6 to 30, with higher scores indicating greater frequency of the respective emotional state. Hasani and Nadi (33) reported good internal consistency ($\alpha=0.87$ for positive affect, $\alpha=0.81$ for negative affect). The strong alignment of the instrument with the target construct was supported by expert evaluations, which resulted in CVI and CVR scores of 0.91 and 0.90, respectively (33). In the present study, SPANE demonstrated similar reliability with a Cronbach's alpha coefficient of 0.82 and 0.83 for positive and negative subscales, respectively.

2.4.3. The Cognitive Avoidance Questionnaire (CAQ): CAQ, a 25-item instrument created and validated by Sexton and Dugas (34), comprises five subscales designed to assess various cognitive avoidance strategies such as rumination of worrying thoughts, avoidance of situations, changing mental images to verbal thoughts, substituting positive thoughts for worrying thoughts, and distractibility. Participants rate each item on a 5-point Likert scale ranging from 1 (completely incorrect) to 5 (completely correct). Mohammadian and colleagues (35) reported a Cronbach's alpha coefficient of 0.79, indicating good internal consistency for the questionnaire. The CVI and CVR scores of 0.96 and 0.95, obtained from expert evaluations, highlight the strong alignment of the instrument with the target construct (35). The Cronbach's alpha coefficient for CAQ in this study was 0.75, indicating a satisfactory level of internal consistency among the items.

2.5. Ethical Consideration

Ethical considerations for this study were: obtaining informed consent, ensuring data confidentiality, minimizing harm while maximizing benefits, ensuring fair participant

selection and treatment, protecting vulnerable populations, maintaining researcher integrity, considering cultural sensitivity, and obtaining Institutional Review Board (IRB) approval (IR. IAU.KHUISF.REC.1402.135).

2.6. Data Analysis

Descriptive statistics, including mean and standard deviations (SDs), were calculated for each variable at each time point (pre-test, post-test, follow-up). T-tests were conducted to compare mean differences between groups, while chi-square tests were used to analyze demographic variables. Levene's test and the Shapiro-Wilk test were employed to assess the homogeneity of variance and normality assumptions, respectively. To address violations of sphericity, as indicated by Mauchly's test, a modified ANOVA with Greenhouse-Geisser correction was used. Repeated-measures ANOVA was used to examine the effects of time and group (experimental vs. control). Bonferroni post-hoc tests were performed to compare mean differences between the experimental and control groups to determine the effectiveness of the two interventions.

3. Results

The mean age of participants in the control group was 21.93 years ($SD=6.36$ years), while the mean age in the mindfulness and behavioral activation groups were 23.33 years ($SD=5.18$ years) and 22.33 years ($SD=6.73$ years), respectively ($P=0.512$). In the control group, 9 (60.0%) participants were undergraduates and 6 (40.0%) were graduate students. In the mindfulness group, 7 (46.66%) participants were undergraduates and 8 (53.33%) were graduate students. In the behavioral activation group, 8 (53.33%) participants were undergraduates and 7 (46.66%) were graduate students ($P=0.765$).

Table 3 presents the mean and standard deviations of the outcome measures. The results of descriptive statistics showed that the mindfulness-based intervention exhibited significant increases in positive emotions from the pre-test to the post-test and follow-up ($P<0.001$). Specifically, mean positive emotion scores in the mindfulness-based intervention group increased from 15.20 ± 5.59 at the pre-test to 21.00 ± 5.75 at the post-test, and then to 18.00 ± 2.85 at the follow-up ($P=0.005$).

Table 3: Descriptive results of the emotional balance and cognitive avoidance

Variables	Phases	Control group	Mindfulness-based interventions group	Behavioral activation group	P (between group)
		Mean±SD	Mean±SD	Mean±SD	
Positive emotions	Pre-test	17.20±3.91	15.20±5.59	16.00±6.49	0.265
	Post-test	17.80±3.34	21.00±5.75	19.20±7.07	0.027
	Follow-up	17.66±3.73	18.00±2.85	18.53±5.05	0.687
P (within group)		0.744	0.005	0.207	-
Negative emotions	Pre-test	19.26±4.66	17.60±6.28	16.46±7.22	0.418
	Post-test	19.60±3.56	14.60±5.66	15.66±7.66	0.59
	Follow-up	20.33±4.59	14.00±4.76	16.26±8.53	0.51
P (within group)		0.824	0.180	0.771	-
Rumination of worrying thoughts	Pre-test	13.40±3.01	19.66±4.40	15.83±4.24	0.081
	Post-test	15.20±3.50	16.06±3.17	11.60±2.41	0.001
	Follow-up	14.86±3.27	15.20±3.91	14.33±2.25	0.663
P (within group)		0.142	0.007	0.002	-
Substituting positive thoughts for worrying thoughts	Pre-test	13.93±3.67	11.86±1.62	12.20±2.36	0.136
	Post-test	14.86±2.53	13.00±3.46	10.80±3.64	0.108
	Follow-up	15.33±2.71	13.20±3.18	11.86±3.64	0.190
P (within group)		0.113	0.258	0.222	-
Distractibility	Pre-test	15.33±3.51	14.33±2.52	14.53±3.44	0.940
	Post-test	14.93±2.43	12.66±3.10	12.66±3.75	0.646
	Follow-up	15.66±3.24	11.80±3.42	12.80±4.22	0.584
P (within group)		0.719	0.117	0.166	-
Avoidance of situations	Pre-test	15.06±3.17	17.60±3.86	17.33±4.92	0.144
	Post-test	15.00±2.90	13.33±2.58	11.06±2.34	0.004
	Follow-up	15.20±2.70	13.73±2.37	12.00±2.77	0.037
P (within group)		0.897	0.001	0.001	-
Changing mental images to verbal thoughts	Pre-test	15.40±3.08	17.20±4.22	17.33±5.80	0.193
	Post-test	15.06±3.21	12.13±3.35	12.13±3.35	0.009
	Follow-up	15.53±3.20	13.73±3.99	10.60±3.62	0.001
P (within group)		0.769	0.001	0.001	-
Cognitive avoidance (total)	Pre-test	79.13±12.29	84.66±8.33	80.26±11.78	0.799
	Post-test	75.33±8.67	67.60±7.93	60.93±7.07	0.001
	Follow-up	76.60±5.57	66.93±6.28	61.60±7.44	0.001
P (within group)		0.336	0.001	0.001	-

The mean scores for the behavioral activation group rose from 16.00±6.49 at the pre-test to 19.20±7.07 at the post-test, and then to 18.53±5.05 at the follow-up. But this change was not significant ($P=0.207$). Moreover, no significant differences were observed in negative emotions. Both groups also demonstrated significant decreases in cognitive avoidance scores from the pre-test to the post-test and follow-up ($P<0.001$). Specifically, the mean cognitive avoidance scores of the mindfulness-based intervention group decreased from 84.66±8.33 at the pre-test to 67.60±7.93 at the post-test, and then to 66.93±6.28 at the follow-up ($P<0.001$). The mean scores in the behavioral activation group declined from 80.26±11.78 at the pre-test to 60.93±7.07 at the post-test, and then to 61.60±7.44 at the follow-up ($P<0.001$). These findings suggested that both interventions were effective in reducing cognitive

avoidance among participants. Furthermore, the experimental groups exhibited significant decreases in rumination of worrying thoughts, avoidance of situations, and changing mental images to verbal thoughts from pre-test to post-test and follow-up ($P<0.001$). However, no significant differences were observed in substituting positive thoughts for worrying thoughts or distractibility (Table 3).

To assess the assumption of homogeneity of variance, Levene's test was employed. The results of Levene's test for the dimensions of emotional balance ($F=0.23$, $P=0.537$) and cognitive avoidance ($F=0.64$, $P=0.423$) confirmed the assumption of homogeneity of variance within and between the participants in the intervention and control groups. The results of the Shapiro-Wilk test for

emotional balance and cognitive avoidance were not significant, suggesting that the data within each group were normally distributed. The results of repeated-measures ANOVA indicated that with time being significant for cognitive avoidance ($F=29.93$, $P=0.001$), rumination of worrying thoughts ($F=5.55$, $P=0.009$), avoidance of situations ($F=15.57$, $P=0.001$), changing mental images to verbal thoughts ($F=18.45$, $P=0.001$), and positive emotions ($F=9.10$, $P=0.001$), the existence of a significant difference between the three measurement occasions was confirmed. Additionally, the interaction effect of time with the group was also significant for cognitive avoidance ($F=29.93$, $P=0.001$), rumination of worrying thoughts ($F=6.63$, $P=0.001$), avoidance of situations ($F=7.45$, $P=0.001$), changing mental images to verbal thoughts ($F=15.48$, $P=0.001$), and positive emotions ($F=3.41$, $P=0.042$).

To assess the effectiveness of the two interventions, Bonferroni post-hoc tests were conducted to compare mean differences between the experimental and control groups. The results,

presented in Table 4, revealed significant differences in cognitive avoidance between the control group and both the mindfulness and behavioral activation groups at both the post-test and follow-up stages ($P=0.001$). Additionally, a significant difference was observed in post-test positive emotions between the control group and the mindfulness intervention group ($P=0.031$). However, behavioral activation did not significantly impact positive emotions. Importantly, no significant differences were found in negative emotions among the three groups.

Bonferroni post-hoc tests revealed significant within-group changes in cognitive avoidance, rumination, situation avoidance, and mental imagery across all three phases (pre-test, post-test, and follow-up) ($P=0.001$). Specifically, scores on these scales decreased significantly from pre-test to post-test and remained relatively stable or continued to decline from post-test to follow-up. Positive emotions, however, showed a significant increase from pre-test to post-test but then decreased slightly from post-test to follow-up (Table 5).

Table 4: Bonferroni post-hoc test for paired comparison of the variables

Variable	Phases	Groups	Mean difference	SE	P
Cognitive avoidance (total)	Post-test	Control - Mindfulness-based interventions	10.11	3.49	0.019
		Control - Behavioral activation	17.19	3.40	0.001
		Mindfulness-based interventions - Behavioral activation	7.08	3.14	0.091
	Follow-up	Control - Mindfulness-based interventions	10.68	2.96	0.003
		Control - Behavioral activation	15.83	2.89	0.001
		Mindfulness-based interventions - Behavioral activation	5.16	2.67	0.184
Rumination of worrying thoughts	Post-test	Control - Mindfulness-based interventions	0.51	1.56	0.999
		Control - Behavioral activation	4.26	1.33	0.009
		Mindfulness-based interventions - Behavioral activation	3.75	1.19	0.010
	Follow-up	Control - Mindfulness-based interventions	0.95	1.37	0.999
		Control - Behavioral activation	3.59	1.17	0.012
		Mindfulness-based interventions - Behavioral activation	2.64	1.05	0.048
Avoidance of situations	Post-test	Control - Mindfulness-based interventions	1.41	1.46	0.999
		Control - Behavioral activation	3.13	1.25	0.050
		Mindfulness-based interventions - Behavioral activation	1.72	1.11	0.395
	Follow-up	Control - Mindfulness-based interventions	4.33	1.68	0.043
		Control - Behavioral activation	4.68	1.44	0.007
		Mindfulness-based interventions - Behavioral activation	0.34	1.29	0.999
Changing mental images to verbal thoughts	Post-test	Control - Mindfulness-based interventions	4.40	1.69	0.040
		Control - Behavioral activation	7.02	1.45	0.001
		Mindfulness-based interventions - Behavioral activation	2.62	1.29	0.149
	Follow-up	Control - Mindfulness-based interventions	0.51	1.56	0.999
		Control - Behavioral activation	4.26	1.33	0.009
		Mindfulness-based interventions - Behavioral activation	3.75	1.19	0.010
Positive emotions	Post-test	Control - Mindfulness-based interventions	-4.77	1.76	0.031
		Control - Behavioral activation	-4.25	1.72	0.055
		Mindfulness-based interventions - Behavioral activation	0.53	1.59	0.999

SE: Standard Error

Table 5: Results of Bonferroni post-hoc test for within-group effects

Scales	Phase A	Phase B	Mean difference (A-B)	SE	P
Cognitive avoidance (total)	Pre-test	Post-test	10.57	1.81	0.001
		Follow-up	9.64	1.80	0.001
	Post-test	Follow-up	-1.31	0.81	0.112
Rumination of worrying thoughts	Pre-test	Post-test	2.02	0.64	0.008
		Follow-up	1.53	0.75	0.141
	Post-test	Follow-up	-0.49	0.49	0.968
Avoidance of situations	Pre-test	Post-test	3.20	0.67	0.001
		Follow-up	2.69	0.72	0.001
	Post-test	Follow-up	-0.51	0.43	0.715
Changing mental images to verbal thoughts	Pre-test	Post-test	2.64	0.62	0.001
		Follow-up	2.82	0.59	0.001
	Post-test	Follow-up	0.18	0.29	0.998
Positive emotions	Pre-test	Post-test	-3.22	0.70	0.001
		Follow-up	-1.93	0.87	0.095
	Post-test	Follow-up	1.29	0.70	0.219

SE: Standard Error

4. Discussion

This study investigated the comparative efficacy of mindfulness and behavioral activation therapy in addressing emotional balance and cognitive avoidance among students with depressive symptoms. The study results indicated that both interventions effectively reduced cognitive avoidance, with the effects persisting over time. However, only mindfulness-based therapy led to a significant improvement in positive emotions, although these gains were not sustained long-term.

The findings of this study aligned with the results of previous research (15, 23). González-Martín and co-workers (15) conducted a systematic review and meta-analysis demonstrating the positive impact of mindfulness-based interventions on various aspects of mental health, including reduced depressive symptoms and improved emotional well-being. Similarly, Soleimani and colleagues (23) compared group behavioral activation and cognitive therapy for subsyndromal anxiety and depressive symptoms, finding both interventions effective in reducing depressive symptoms and highlighting the potential of behavioral activation as a valuable therapeutic approach. The effectiveness of behavioral activation on cognitive avoidance can be explained by its focus on breaking the cycle of immobility and withdrawal by providing individuals with depression with tools and strategies to increase motivation and improve mood (23). By encouraging individuals to engage in activities that they once enjoyed or to

find new interests, behavioral activation appears to help them regain a sense of purpose and meaning in their lives. Additionally, behavioral activation teaches individuals to use adaptive coping patterns, rather than relying on experiential avoidance, which can provide temporary relief but ultimately, reinforces negative patterns (24).

The effectiveness of mindfulness training on cognitive avoidance and positive emotions in students with depressive symptoms can be explained by its ability to increase individuals' tolerance for negative emotional states and equip them with more effective coping strategies (15). Through mindfulness exercises, individuals learn to be aware of their bodily sensations, thoughts, and feelings in the present moment. This awareness allows them to identify maladaptive patterns and learn to accept and let go of these thoughts and feelings rather than suppressing or controlling them (19). This acceptance helps to reduce the negative impact of these experiences and prevents the progression of symptoms. Mindfulness also teaches individuals that negative emotions are a normal part of life and do not define their identity or dictate their life path. This acceptance enables individuals to respond to emotions and triggering events in a more mindful and effective manner, rather than reacting impulsively (20).

The comparative effectiveness of behavioral activation and mindfulness training on emotional balance in students with depressive symptoms can be understood by examining their distinct

mechanisms of action. A core characteristic of depressive disorder is a deficit in the positive emotion system, resulting in diminished enjoyment and interest in activities among individuals with depression (2). Mindfulness, with its non-judgmental and present-moment focus, offers a potential means for individuals with a history of depression to reconnect with positive emotional experiences (21). Mindfulness-based interventions seek to prevent the reactivation of unhelpful, depression-inducing mental patterns when experiencing negative moods. Participants are encouraged to engage in everyday activities mindfully, potentially leading to an increase in positive experiences. By analyzing their experiences during pleasant events (attention to the situation, bodily sensations, mood, thoughts, and evaluative appraisal), individuals can develop a more nuanced understanding of their emotional states. Recent conceptual reports suggest that mindfulness may counteract the prevalent tendency in depression to engage in experiential avoidance, apathy, and inertia (22). By fostering a state of experiential processing (direct, sensory experience of the world unfolding moment by moment), mindfulness can provide access to simple everyday pleasures.

Behavioral activation, on the other hand, targets the motivational deficits and behavioral patterns associated with depression. By encouraging individuals to engage in activities that they once enjoyed or to find new interests, behavioral activation can help to increase motivation, improve mood, and reduce avoidance behaviors. This approach emphasizes the importance of taking action, even when motivation is low (25). By systematically increasing participation in rewarding activities, individuals can cultivate a sense of agency and accomplishment, thereby fostering positive emotions and mitigating negative emotional states.

The comparative effectiveness of behavioral activation and mindfulness training for improving emotional balance in students with depressive symptoms likely stems from their complementary mechanisms of action. Mindfulness training addresses the underlying cognitive and emotional processes contributing to depression, while behavioral activation targets the behavioral and motivational deficits that manifest as symptoms. By targeting both cognitive and behavioral factors, these approaches offer a more holistic and effective

treatment for emotional well-being. Mindfulness, a multifaceted construct encompassing observation, description, awareness-based action, and acceptance, suggests that these components, particularly observation, may be linked to positive affect (15). Observation, a fundamental aspect of mindfulness, involves non-judgmental attention to one's thoughts, feelings, and bodily sensations. This nonjudgmental observation enables individuals to acknowledge and accept their experiences, even negative ones. By cultivating nonjudgmental awareness, individuals can break free from the rumination and negative self-evaluation often associated with depression. As individuals learn to observe their experiences without judgment, they become more open to positive experiences and can begin to appreciate the simple joys of life.

Acceptance, another key component of mindfulness, involves acknowledging and embracing one's experiences, both positive and negative. This acceptance does not imply resignation or passivity; rather, it entails a willingness to experience one's emotions without trying to control or suppress them. For individuals with depression, who often struggle with negative emotions and self-criticism, acceptance can be a powerful tool for promoting positive affect (20). By acknowledging and accepting negative emotions, individuals can release their hold on them, paving the way for more positive experiences. Additionally, acceptance can cultivate self-compassion, a practice of treating oneself with kindness and understanding, even during challenging times. Self-compassion can further elevate positive affect by mitigating feelings of shame and guilt.

The present study found that mindfulness interventions can improve positive affect in students with depressive symptoms, but the effects may not be sustained over time. This could be due to the complex nature of depression, which involves physiological, psychological, and social factors. Achieving lasting changes in positive affect may require ongoing effort and practice. Moreover, treating depression and its associated factors may require a combination of different approaches. Mindfulness techniques alone may not be sufficient, and they may need to be combined with other interventions such as psychotherapy or medication to improve positive affect. Furthermore, the lack of adherence to treatment and intervention guidelines can also diminish the positive effects

of mindfulness. Environmental and social factors can also play a role. For instance, social pressures, time constraints, academic challenges, potential disappointments regarding future career prospects, and lack of social support can all hinder the sustained success of interventions.

The results of this study suggested that behavioral activation did not significantly impact positive affect in students with depressive symptoms. This finding contrasts with the results of Potsch and Rief (36), who found behavioral activation to be effective in enhancing reward sensitivity and alleviating depressive symptoms in a randomized controlled trial. One possible explanation for this discrepancy may be the differences in the study populations and the specific measures used to assess positive affect. Additionally, the duration of the intervention and the intensity of the treatment may have influenced the outcomes. Another potential explanation is that the focus of behavioral activation therapy on behavioral factors may not be sufficient for improving positive affect in all individuals with depression. Depression is a complex condition influenced by various biological, psychological, and social factors, and addressing these factors comprehensively may require a more holistic approach that incorporates other treatment modalities.

In conclusion, while behavioral activation has shown promise in addressing certain aspects of depression, it may not be equally effective for improving positive affect in all individuals. Further research is needed to explore the factors that may influence the effectiveness of behavioral activation in improving positive affect and to identify potential combinations with other treatment modalities that may be more beneficial for certain individuals.

4.1. Limitations

It is important to acknowledge the limitations of the present study. Firstly, the sample was restricted to female university students with depressive symptoms, potentially limiting the generalizability of the findings to other populations. Secondly, the reliance on self-report questionnaires may have introduced biases and limitations in assessing the participants' emotional and cognitive experiences. Additionally, the relatively short duration of the interventions may not have been sufficient to fully evaluate their long-term effects.

Future research could benefit from exploring the effectiveness of these interventions in diverse populations and employing mixed-methods approaches that combine quantitative and qualitative data to gain a deeper understanding of the mechanisms underlying the observed changes. While this study has certain limitations, its strengths lie in applying a three-group design, which allowed for a more comprehensive comparison of the effects of behavioral activation and mindfulness-based interventions. Additionally, the inclusion of a follow-up assessment provided valuable insights into the sustainability of the treatment effects over time. To address these limitations, future research should investigate individuals with depression from diverse populations and consider using in-depth assessment methods, such as interviews, in addition to questionnaires. Moreover, future research may benefit from exploring the effectiveness of these interventions in diverse populations and employing mixed-methods approaches that combine quantitative and qualitative data to gain a deeper understanding of the mechanisms underlying the observed changes.

5. Conclusions

The findings of this study suggested that a combination of behavioral activation training and mindfulness training can be effective in improving emotional balance and cognitive avoidance in students with depressive symptoms. Given that emotional balance and cognitive avoidance are important factors in depression, it is recommended that behavioral activation training and mindfulness training be considered as supplemental treatments for these students by mental health professionals.

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Authors' Contribution

Seydeh Negar Barekat: Substantial contributions to the conception and design of the work; the acquisition, analysis, and interpretation of data for the work, drafting the work. Elham Foroozandeh:

Substantial contributions to the conception and design of the work; the acquisition, analysis, and interpretation of data for the work, drafting the work and reviewing it critically for important intellectual content. Seyed Mostafa Banitaba: Substantial contributions to the design of the work, drafting the work and reviewing it critically for important intellectual content. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work, such that the questions related to the accuracy or integrity of any part of the work.

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Ethical Approval

The research was approved by the ethics Committee of Islamic Azad University-Isfahan (Khorasgan) Branch, Isfahan, Iran with the code of IR.IAU.KHUISF.REC.1402.135. Also, written informed consent was obtained from the participants.

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