



Comparing the Effectiveness of Stress Inoculation Training and Mindfulness Skills Training on Appearance Anxiety and Self-Criticism in Adolescents with Body Dysmorphic Disorder

Fatemeh Asadollah Salmanpoor¹ , Fatemeh Sadat Marashian^{1*} , Sahar Safarzadeh¹ , Fariba Hafezi¹

1. Department of Psychology, Ahv.C., Islamic Azad University, Ahvaz, Iran

*Corresponding author:

Fatemeh Sadat Marashian, Department of Psychology, Ahv.C., Islamic Azad University, Ahvaz, Iran
Tel: +986133348420
Email: fsmarashian@iau.ac.ir

Received: June 09, 2026
Accepted: July 04, 2026
ePublished: July 19, 2026



Abstract

Background and Objective: Body dysmorphic disorder (BDD) severely impairs psychological well-being. The present study aimed to compare the effectiveness of Stress Inoculation Training (SIT) and mindfulness training on appearance anxiety and self-criticism in female adolescents with BDD.

Materials and Methods: A quasi-experimental pretest-posttest design with a two-month follow-up and a control group was utilized. Using purposive sampling, 45 female adolescents (aged 15–17) with BDD were selected from psychological centers in Ahvaz, Iran, in 2025, and randomly assigned to SIT (n=15), mindfulness skills training (n=15), or control (n=15) groups. The SIT group received nine 90-minute sessions, and the mindfulness group received eight 90-minute sessions. Data were collected using the Appearance Anxiety Inventory and the Levels of Self-Criticism Scale and analyzed via repeated-measures analysis of variance (ANOVA).

Results: Both SIT and mindfulness training significantly decreased appearance anxiety and self-criticism compared to the control group ($P<0.001$), with gains maintained at follow-up. No significant difference was observed between the two active interventions.

Conclusions: The SIT and mindfulness skills training are equally effective interventions for reducing appearance anxiety and self-criticism in female adolescents with BDD. These findings highlight the value of both cognitive-behavioral and acceptance-based approaches and provide clinicians with flexible, evidence-based options tailored to individual needs.

Keywords: Anxiety, Body dysmorphic disorders, Cognitive behavioral therapy, Mindfulness, Self-concept

Background

Adolescence is a pivotal developmental stage marked by profound psychosocial transformations, rendering individuals highly vulnerable to sociocultural pressures and media-driven beauty standards [1]. For some female adolescents, these concerns escalate into Body Dysmorphic Disorder (BDD), a severe psychiatric condition defined by an obsessive preoccupation with perceived, yet unnoticeable, physical flaws [2]. Affected individuals endure overwhelming distress, impaired functioning, and compulsions, such as mirror checking to alleviate discomfort [3]. The pressure to conform to unrealistic aesthetic ideals severely compounds their psychological burden and increases the risk of comorbidities, highlighting an urgent need for targeted clinical interventions [4]. A primary psychological complication of BDD is appearance anxiety, characterized by intense apprehension regarding physical appearance and fear of negative social evaluation [5]. In adolescent

females, this anxiety is predominantly triggered by perceived discrepancies between their actual bodies and internalized societal ideals [6]. Consequently, it drives maladaptive coping strategies, including social withdrawal and excessive camouflaging [7]. Chronic appearance anxiety not only sustains the cycle of dysmorphic obsessions but also substantially diminishes overall quality of life, acting as a critical maintaining factor in body image psychopathology that requires direct therapeutic attention [8].

Furthermore, self-criticism represents a profound psychological vulnerability in this demographic. Conceptualized as a destructive cognitive style, self-criticism involves harsh self-scrutiny, punitive evaluation, and a chronic sense of unworthiness [9]. Female adolescents with BDD frequently internalize negative societal feedback, converting it into a relentless inner dialogue that attacks their self-worth based on physical appearance [10]. This self-

directed hostility exacerbates depressive symptoms, impedes emotional regulation, and reinforces entrenched dysmorphic beliefs [11]. Ultimately, high levels of self-criticism act as a robust psychological barrier preventing the internalization of self-compassion, necessitating targeted deconstruction to achieve meaningful therapeutic progress [12].

To address these core symptoms, two theoretically distinct interventions have demonstrated potential: Stress Inoculation Training (SIT) and Mindfulness Skills Training. The SIT, rooted in cognitive-behavioral principles, enhances psychological resilience through a structured three-phase approach (conceptualization, skill acquisition, and application) that equips individuals with proactive coping strategies, cognitive restructuring, relaxation techniques, and gradual exposure to stressors [13, 14]. This active modification of maladaptive cognitions and physiological arousal directly targets the catastrophic interpretations and avoidance patterns central to appearance anxiety and self-criticism in BDD [15, 16]. In contrast, Mindfulness Skills Training cultivates non-judgmental, present-moment awareness and cognitive defusion, encouraging individuals to observe appearance-related thoughts and self-critical narratives as transient mental events rather than absolute truths [17, 18]. By fostering acceptance and decentering, mindfulness disrupts the repetitive cycle of rumination and emotional reactivity that maintains BDD symptoms [19, 20].

Despite the established benefits of both approaches in broader anxiety and body image literatures, a significant empirical gap persists regarding their comparative effectiveness specifically for appearance anxiety and self-criticism among female adolescents with BDD. Clarifying the relative strengths of an active, skills-based cognitive-behavioral intervention (i.e., SIT) versus an acceptance-oriented mindfulness approach is essential for mechanism-informed treatment selection and optimal resource allocation in clinical practice [8]. Therefore, the present study aimed to compare the effectiveness of SIT and Mindfulness Skills Training on appearance anxiety and self-criticism in female adolescents with BDD.

Objectives

The present study aimed to compare the effectiveness of SIT and Mindfulness Skills Training on appearance anxiety and self-criticism in female adolescents with BDD.

Materials and Methods

Design

The current research employed a quasi-

experimental, pretest-posttest design featuring a two-month follow-up phase and a control group.

Participants

The statistical population comprised female adolescents referring to psychological clinics in Ahvaz, Iran, during 2025. A sample of 45 eligible individuals was selected using purposive sampling and subsequently randomized into two experimental groups (Stress Inoculation Training and Mindfulness Skills Training) and one control group, with 15 participants allocated to each group ($n=15$). Inclusion criteria were obtaining informed written consent, being aged 15 to 17 years, receiving a definitive diagnosis of BDD based on clinical diagnostic interviews and DSM-5-TR criteria, lacking concurrent severe clinical disorders (defined as major psychiatric conditions, such as psychosis, bipolar I disorder, severe major depressive disorder with active suicidal ideation or recent suicide attempt, substance use disorders requiring medical detoxification, or any other condition that would interfere with participation or require immediate intensive intervention), and having no history of alcohol or substance dependence.

Conversely, participants were excluded if they missed two or more intervention sessions, voluntarily withdrew from the study, failed to complete the research questionnaires, developed medical or psychological conditions precluding continued participation, or demonstrated non-compliance with therapeutic instructions. Ethical guidelines were strictly upheld throughout the study; institutional ethical approval was obtained (Ethics Code: IR.IAU.AHVZ.REC.1404.634), and the study was registered as a clinical trial (IRCT20260202068746N1).

Procedure

Data collection involved administering the psychological inventories across three distinct phases: baseline (pretest), immediately following the intervention period (posttest), and after a two-month interval to evaluate the persistence of therapeutic outcomes (follow-up). The experimental groups received structured psychological interventions, while the control group received no active treatment during the study timeframe. The first experimental group underwent SIT based on Meichenbaum's standard protocol [21]. This cognitive-behavioral intervention was delivered by a trained clinical therapist over nine weekly sessions, each lasting 90 minutes. A session-by-session summary is presented in Table 1. The second experimental group participated in Mindfulness Skills Training, adapted from the standard protocol by Bowen et al. [22]. This program comprised eight weekly 90-minute sessions, facilitated by a

specialized therapist. The outline of the mindfulness

intervention is detailed in Table 2.

Table 1. Summary of SIT sessions.

Session	Objective and Content
First	Introduction to the rationale of SIT, establishing therapeutic rapport, and psychoeducation regarding the nature of stress and appearance anxiety.
Second	Cognitive conceptualization; helping participants identify and monitor automatic negative thoughts and their physiological reactions.
Third	Skill acquisition phase: introducing progressive muscle relaxation (PMR) and controlled breathing exercises to manage physiological arousal.
Fourth	Cognitive restructuring techniques: teaching participants to challenge maladaptive, self-critical beliefs and replace them with rational coping statements.
Fifth	Developing problem-solving skills; identifying manageable components of appearance-related distress and exploring actionable coping strategies.
Sixth	Application phase: utilizing role-playing, behavioral rehearsal, and guided imagery to practice coping skills against imagined triggers.
Seventh	<i>In vivo</i> exposure: applying learned relaxation and cognitive skills to mild, real-life stressors related to body image and social evaluation.
Eighth	Advanced application: employing learned skills to navigate high-risk, severe appearance-related stressors and managing potential setbacks.
Ninth	Reviewing acquired skills, consolidating therapeutic gains, discussing relapse prevention strategies, and officially terminating the intervention.

Table 2. Summary of Mindfulness Skills Training sessions.

Session	Objective and Content
First	Introduction to mindfulness concepts, understanding “autopilot” mode, and practicing basic mindful awareness (e.g., mindful eating).
Second	Identifying psychological barriers and triggers; practicing the body scan meditation to cultivate non-judgmental physical awareness.
Third	Focusing on mindful breathing, anchoring awareness in the present moment, and observing appearance-related thoughts without attachment.
Fourth	Recognizing the limits of emotional reactivity; practicing mindful walking and decentering from harsh self-critical narratives.
Fifth	Cultivating an attitude of acceptance; allowing uncomfortable emotions and appearance anxiety to exist without attempting to suppress them.
Sixth	Cognitive defusion (“thoughts are not facts”); learning to observe the critical inner voice objectively and disengaging from rumination.
Seventh	Promoting self-care and self-compassion; developing daily action plans to integrate mindful awareness into routine activities.
Eighth	Reviewing progress, establishing a sustainable long-term mindfulness practice, addressing relapse prevention, and study closure.

Instruments

Levels of Self-Criticism Scale (LOSC): To measure self-critical traits, this study employed the LOSC, developed by Thompson and Zuroff [23]. This 22-item questionnaire captures two main factors, including comparative and internalized self-criticism. Participants respond on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). Total scores range from 22 to 154, with higher scores reflecting more severe self-judgment. The scale’s original creators reported an internal consistency of $\alpha=0.81$ [23]. For Iranian populations, Khanjani et al. [24] validated the tool, confirming its cultural appropriateness, factorial structure, reliability, and validity for use with Persian-speaking adolescents and clinical samples (alpha coefficients of 0.87 for the internalized dimension, 0.85 for the comparative dimension, and 0.83 for the total score). In the present study, Cronbach’s alpha was 0.81.

Appearance Anxiety Inventory: Physical appearance concerns were assessed using the 10-item questionnaire developed by Veale et al. [25]. Designed for those with body image issues, it measures the severity and frequency of appearance-related distress. Items are rated on a 5-point Likert scale from 0 (never/not at all) to 4 (always), yielding total scores ranging from 0 to 40; higher scores indicate greater appearance anxiety. Veale et al. [25] established strong reliability, noting an internal consistency of $\alpha=0.91$ and a test-retest reliability of 0.87. Rajabi et al. [26] confirmed its validity in Iran, demonstrating adequate content validity, construct validity, and reliability in Iranian individuals with body image concerns (content validity index of 0.88 and Cronbach’s alpha of 0.81). For the present work, the scale indicated high internal consistency

with a Cronbach’s alpha of 0.87.

Data Analysis

Data analysis was conducted using the SPSS software. Descriptive statistics summarized the demographic variables, while a repeated-measures analysis of variance (ANOVA) was used to evaluate the main and interaction effects of the interventions across the three time points.

Results

The demographic analysis indicated that participants were homogeneous across groups. The mean age and standard deviation were 16.74 ± 1.13 , 16.81 ± 1.07 , and 16.20 ± 1.69 years in the SIT, Mindfulness Skills Training, and control groups, respectively. Regarding educational level, the distribution was comparable across groups: in the SIT group, 33.3%, 40%, and 26.7% of participants were in 10th, 11th, and 12th grades, in respective order. Similar patterns were observed in the Mindfulness group (26.7%, 46.7%, and 26.7%, respectively) and the control group (33.3%, 40%, and 26.7%, respectively).

As demonstrated in Table 3, baseline (pretest) scores for appearance anxiety and both dimensions of self-criticism were comparable across the three groups, confirming successful randomization. Following the interventions, both experimental groups exhibited substantial reductions in mean scores on all outcome measures at posttest, with these improvements largely maintained at the two-month follow-up. In contrast, the control group showed minimal change across time points. The standard deviations remained relatively stable, suggesting consistent variability within groups.

Table 3. Means and standard deviations of appearance anxiety and self-criticism scores across groups and measurement times.

Variable	Stage	SIT Group	Mindfulness Group	Control Group
		Mean±SD	Mean±SD	Mean±SD
Appearance Anxiety	Pretest	22.86±3.50	23.66±3.06	23.16±3.05
	Posttest	17.33±4.32	17.93±3.69	23.20±3.02
	Follow-up	16.93±4.43	18.00±3.42	22.66±3.01
Internalized Self-criticism	Pretest	43.33±3.55	42.40±3.58	43.13±3.81
	Posttest	32.00±4.55	32.06±4.39	42.86±3.87
	Follow-up	32.13±4.70	33.60±4.06	42.68±4.59
Comparative Self-criticism	Pretest	46.40±3.26	47.93±3.55	48.73±4.06
	Posttest	35.06±4.02	37.93±4.47	47.86±3.71
	Follow-up	35.33±3.84	38.66±4.16	47.80±4.05

Before conducting the primary analyses, the statistical assumptions for the repeated-measures ANOVA were rigorously evaluated. The Shapiro-Wilk test confirmed the normality of data distribution across all variables and time points ($P>0.05$). Mauchly's test of sphericity was satisfied (with Greenhouse-Geisser correction applied where appropriate), and Levene's test established the homogeneity of variances. Therefore, the data met all criteria for parametric testing.

The repeated-measures ANOVA revealed

significant main effects of time for appearance anxiety, internalized self-criticism, and comparative self-criticism ($P<0.001$), with large effect sizes ($\eta^2=0.76-0.83$). Crucially, the time×group interactions were highly significant across all measures ($P<0.001$, $\eta^2=0.65-0.75$), indicating differential changes over time between the intervention and control groups. Significant main effects of group were also observed ($P<0.001$), underscoring the overall effect of the interventions (Table 4).

Table 4. Results of repeated-measures ANOVA for the effects of time, group, and group×time interaction

Variable	Source	SS	df	MS	F	P	η^2
Appearance Anxiety	Time	463.39	1.66	278.05	464.37	0.001	0.81
	Group×Time	194.69	3.33	58.41	97.55	0.001	0.72
	Group	401.61	2	200.80	15.48	0.001	0.32
Internalized Self-criticism	Time	1415.64	1.27	1111.74	266.70	0.001	0.76
	Group×Time	678.75	2.56	266.52	63.93	0.001	0.65
	Group	1420.93	2	710.46	15.49	0.001	0.33
Comparative Self-criticism	Time	1576.63	1.78	879.45	647.79	0.001	0.83
	Group×Time	618.47	3.58	172.49	127.05	0.001	0.75
	Group	2027.08	2	1013.54	23.16	0.001	0.42

Follow-up pairwise comparisons using the Bonferroni correction indicated that both the SIT and Mindfulness groups demonstrated statistically significant improvements from pretest to posttest ($P<0.001$). These therapeutic gains were maintained

at the two-month follow-up, with no significant deterioration observed ($P>0.05$). The control group exhibited no significant spontaneous improvement across any assessment phase (Table 5).

Table 5. Within-group pairwise comparisons of outcome measures across time points.

Variable	Time	SIT Group		Mindfulness Group		Control Group	
		MD	P	MD	P	MD	P
Appearance Anxiety	Posttest and Pretest	5.53	0.001	5.73	0.001	0.07	0.999
	Follow-up and Pretest	5.93	0.001	5.66	0.001	0.60	0.172
	Follow-up and Posttest	0.40	0.202	0.06	0.999	0.53	0.240
Internalized Self-criticism	Posttest and Pretest	11.33	0.001	9.33	0.001	0.26	0.999
	Follow-up and Pretest	11.20	0.001	8.80	0.001	0.26	0.999
	Follow-up and Posttest	0.13	0.999	0.53	0.273	0.10	0.999
Comparative self-criticism	Posttest and Pretest	11.33	0.001	10	0.001	0.86	0.124
	Follow-up and Pretest	11.06	0.001	9.27	0.001	0.93	0.143
	Follow-up and Posttest	0.27	0.999	0.73	0.114	0.07	0.999

Between-group analyses confirmed baseline equivalence. At both the posttest and follow-up, participants in the SIT and Mindfulness conditions reported significantly lower scores on appearance anxiety and both dimensions of self-criticism than

the control group ($P<0.001$). Importantly, no statistically significant differences emerged between the two active interventions at any time point, indicating comparable efficacy of SIT and Mindfulness Skills Training ($P>0.05$). (Table 6).

Table 6. Between-group pairwise comparisons of outcome measures at each time point

Variable	Group	Pretest		Posttest		Follow-up	
		MD	P	MD	P	MD	P
Appearance Anxiety	SIT and Mindfulness	0.80	0.999	0.60	0.999	1.06	0.999

Internalized Self-criticism	SIT and Control	0.40	0.999	5.87	0.001	5.73	0.001
	Mindfulness and Control	0.41	0.999	5.27	0.001	4.66	0.004
	SIT and Mindfulness	0.93	0.999	1.06	0.999	1.46	0.999
	SIT and Control	0.20	0.999	10.86	0.001	10.73	0.001
Comparative Self-criticism	Mindfulness and Control	0.73	0.999	9.80	0.001	9.26	0.001
	SIT and Mindfulness	1.53	0.761	2.86	0.194	3.33	0.092
	SIT and Control	2.33	0.263	12.80	0.001	12.46	0.001
	Mindfulness and Control	0.80	0.999	9.93	0.001	9.13	0.001

Discussion

The primary objective of the present study was to evaluate and compare the efficacy of SIT and Mindfulness Skills Training in mitigating appearance anxiety and self-criticism among female adolescents with BDD. The findings indicated that both therapeutic modalities significantly ameliorated the targeted psychological symptoms, with therapeutic gains maintained at the 2-month follow-up. Notably, the analyses revealed no significant superiority of one intervention over the other, suggesting that active cognitive restructuring and non-judgmental awareness serve as equally viable pathways for clinical improvement in this demographic [8].

The efficacy of SIT in reducing appearance anxiety and internalized self-criticism can be attributed to its comprehensive cognitive-behavioral framework. BDD is fundamentally characterized by rigid cognitive distortions regarding physical appearance, which precipitate profound anxiety and self-depreciation [3]. The SIT operates by systematically immunizing individuals against these stressors. Through its conceptualization, skill acquisition, and application phases, the training equips adolescents with a robust repertoire of coping mechanisms, including progressive muscle relaxation, cognitive restructuring, and gradual exposure [13]. By identifying maladaptive thought patterns and replacing them with constructive self-dialogue, participants build psychological resilience. Gradual exposure to manageable appearance-related stressors in a safe environment allows them to dismantle the paralyzing anxiety triggered by perceived physical flaws. These mechanisms align with broader evidence supporting structured cognitive-behavioral stress management approaches in reducing appearance-related rumination and self-evaluative distress in youth with body image concerns [27].

Conversely, Mindfulness Skills Training addresses BDD pathology through a distinct yet equally effective mechanism. Rather than actively disputing distorted thoughts, mindfulness fosters a state of cognitive “decentering.” This approach allows adolescents to observe their self-critical thoughts and body image concerns as transient mental events rather than absolute truths [17]. By cultivating non-judgmental, present-moment awareness,

mindfulness disrupts the automatic cycle of comparative self-criticism and appearance anxiety. It empowers patients to detach from the relentless pursuit of physical perfection, thereby reducing emotional reactivity and promoting self-compassion [20]. These results are consistent with emerging research demonstrating that mindfulness-based interventions effectively alleviate self-criticism, enhance body image flexibility, and improve emotion regulation in individuals with BDD.

The absence of a significant divergence between the two experimental conditions highlights a compelling therapeutic equivalence. While SIT actively modifies the content of maladaptive cognitions to foster a sense of mastery, mindfulness alters the individual’s relationship with those cognitions to promote psychological flexibility. Both interventions ultimately converge on disrupting the core maintaining factors of BDD: cognitive fusion with perceived defects and the ensuing emotional dysregulation. Consequently, clinicians may select either modality based on the patient’s individual preferences, cognitive profile, or available therapeutic resources, confident in the sustained efficacy of both approaches [19].

Several practical limitations warrant consideration. The sample was restricted to female adolescents from a specific geographical region in Iran, limiting the generalizability of these findings to males, other cultural contexts, or broader adult populations. Additionally, reliance on self-report measures may inherently introduce response biases, though the use of validated instruments helps mitigate this concern. Future research should incorporate larger, more diverse samples, objective behavioral measures, longer follow-up periods, and direct head-to-head comparisons with other established treatments such as specialized cognitive-behavioral therapy for BDD to further validate and extend these promising outcomes.

Conclusion

In conclusion, the present study demonstrates that both SIT and Mindfulness Skills Training are highly effective, evidence-based interventions for alleviating appearance anxiety and self-criticism in female adolescents with BDD. The findings reveal significant and sustained improvements in both active treatment groups, with no superiority of one

approach over the other. These results highlight that both active cognitive restructuring (via SIT) and non-judgmental awareness and acceptance (via mindfulness) serve as potent mechanisms for psychological change in this population. Consequently, mental health professionals can confidently incorporate either or both interventions into clinical practice, tailoring their choice to individual patient profiles, preferences, and therapeutic contexts. Ultimately, integrating these approaches into standard care for adolescent BDD offers a promising pathway to reduce profound distress and promote healthier self-evaluative frameworks during this critical developmental period.

Ethical Considerations

This study received ethical approval under the code IR.IAU.AHVAZ.REC.1404.634.

Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Acknowledgements

The authors would like to thank the participants and staff at the psychological centers in Ahvaz, Iran, for their valuable contribution to this study.

Author Contributions

Fatemeh Asadollah Salmanpoor: Conceptualization, Methodology, Investigation, Writing – Original Draft, Supervision. Fatemeh Sadat Marashian: Data Curation, Formal Analysis, Writing – Review & Editing. Sahar Safarzadeh: Project Administration, Resources, Visualization.

Fariba Hafezi: Validation, Funding Acquisition, Writing – Review & Editing.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflicts of interest.

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