

Research Paper



Mindfulness-based Stress Reduction Training for Self-compassion and Attention in Students With Academic Procrastination

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ABSTRACT

Objective: Mindfulness-based stress reduction (MBSR) is a contemporary approach within psychological interventions that helps individuals reduce stress and anxiety by cultivating present-moment awareness. This study aimed to evaluate the effectiveness of MBSR training on self-compassion and attention deficits in students experiencing academic procrastination.**Methods:** This research employed a quasi-experimental design with pre-test, post-test, and follow-up assessments and a control group. The study population comprised all female students enrolled in lower secondary schools in Sanandaj City, Iran, during the 2023–2024 academic year. From this group, 30 participants were selected through purposive sampling and then randomly assigned to an intervention group (n=15) and a control group (n=15). Data were collected using three standardized instruments: The Tuckman procrastination scale (TPS), self-compassion scale–short form (SCS-SF), and Youth self-report (YSR). The data were analyzed using repeated measures multivariate analysis of variance (MANOVA) using SPSS software, version 24.**Results:** The findings indicated that MBSR training significantly increased self-compassion and reduced attention deficits in students with academic procrastination. These effects were sustained in the one-month follow-up for both variables.**Conclusion:** Based on the findings, MBSR may be considered an effective intervention program for students struggling with academic procrastination. This intervention may serve as a practical tool for school counselors working with students exhibiting procrastination behaviors.

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Highlights

- MBSR significantly increased self-compassion in procrastinating students.
- MBSR reduced attention deficits in procrastinating students.
- Effects were sustained at one-month follow-up for both variables.

Plain Language Summary

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Introduction

Procrastination is one of the most common maladaptive behaviors across various domains of life and reflects a failure of self-regulation (Peixoto et al., 2021).

It involves the unnecessary and voluntary delay of crucial tasks despite being aware of potential negative outcomes (Sirois & Pychyl, 2016). Unlike strategic delay, procrastination often leads to distress, guilt, and poor performance (Klingsieck et al., 2013). It is particularly prevalent in academic settings, where between 80% and 90% of students report some degree of procrastination (Haghbin, 2015; Islas, 2018). Academic procrastination is associated with various adverse consequences, such as lower academic achievement, school dropout (Kim & Seo, 2015), and increased risk of depression and anxiety (Klassen et al., 2008).

Recent research suggests that procrastination can be a maladaptive response to stress, particularly among individuals who evaluate themselves harshly and critically. Lower levels of self-compassion are strongly related to higher levels of procrastination (Sirois, 2023). Self-compassion—defined as treating oneself with kindness and understanding during moments of failure rather than engaging in self-criticism (Neff, 2023; Shirvani et al., 2019)—is a key adaptive quality that promotes self-regulation, reduces stress, and protects against negative emotional responses. Evidence shows that positive self-compassion, rather than the mere absence of self-judgment, is more strongly associated with well-being and psychological resilience (Pandey et al., 2021a). Self-compassion also serves as an emotion regulation strat-

egy that buffers against test anxiety and procrastination (Neff, 2023). Individuals who chronically postpone tasks often engage in ruminative self-criticism about their past failures, reinforcing self-blame and distress (Liu et al., 2023).

Attention deficit symptoms are another critical factor associated with procrastination. Students with attention difficulties often experience distractibility, poor concentration, and disorganized behavior (Lahey et al., 1998; Barkley, 2015). They tend to shift attention from important to irrelevant tasks, leading to frequent delays in task initiation and completion (Niermann & Scheres, 2014). Empirical evidence supports a robust association between inattention symptoms of attention-deficits/hyperactivity disorder (ADHD)—not necessarily hyperactivity or impulsivity—and general procrastination behavior (e.g. Peixoto et al., 2021). For example, in one study (Niermann & Scheres, 2014), attention deficits was significantly correlated with procrastination even after controlling for hyperactivity-impulsivity symptoms. Thus, both low self-compassion and attention deficits appear to play central roles in the persistence of procrastinatory behaviors.

Given the academic, emotional, and behavioral consequences of procrastination, it is essential to identify interventions that strengthen self-regulation and reduce these risk factors. Within the framework of positive psychology, interventions that cultivate inner strengths, such as self-compassion, mindfulness, and self-affirmation, have shown promising effects. For instance, self-affirmation and compassion-based interventions enhance well-being and self-esteem even in subclinical popula-

tions (Pandey et al., 2021b; Tiwari et al., 2025). Among these approaches, mindfulness-based interventions, especially mindfulness-based stress reduction (MBSR), have gained increasing empirical support across clinical, social, and educational settings (Kabat-Zinn & Hanh, 2013; Ryan, 2012). MBSR aims to foster awareness of the present moment through non-judgmental attention, thereby promoting calmness, focus, and emotional balance (Creswell, 2017; Gu, 2015). Research demonstrates that mindfulness enhances attention, emotion regulation, and persistence in goal-directed behaviors while reducing stress-related rumination (Mao et al., 2024). Individuals with higher levels of mindfulness levels tend to report greater self-compassion (Schutte & Malouff, 2025).

MBSR has been widely recognized as an effective approach for enhancing mental health and managing stress, not only among clinical populations but also in healthy individuals (Marchand, 2012). In recent years, mindfulness-based programs have been increasingly implemented in educational contexts to foster attention, emotion regulation, motivation, and social-emotional competence among students (Flook et al., 2012; Schonert-Reichl & Lawlor, 2015). Research evidence indicates that MBSR interventions can significantly improve students' capacity for sustained attention and self-regulation, thereby promoting academic engagement and psychological well-being (Zenner et al., 2014). Empirical studies have also shown that mindfulness-based interventions can reduce procrastination and its related risk factors by enhancing psychological capital and academic optimism (Black et al., 2012; Hashemi, 2020). In addition, mindfulness training has been found to facilitate cognitive flexibility and working memory while simultaneously strengthening self-compassion, key mechanisms that counteract self-critical thinking and maladaptive avoidance tendencies (Kuyken et al., 2010; Gu et al., 2015). Collectively, these findings support the view that mindfulness-based approaches, particularly MBSR, hold strong potential as preventive and therapeutic strategies for addressing academic procrastination by targeting both emotional and attentional mechanisms.

MBSR can be conceptualized within the broader self-regulation framework (Baumeister & Heatherton, 1996; Zimmerman, 2000), which posits that effective goal-directed behavior depends on the coordinated regulation of emotional and cognitive processes. Within this framework, mindfulness exerts its effects on academic procrastination through two complementary mechanisms that together constitute a dual-pathway model of self-regulation (Tang et al., 2015). The affective-regulatory pathway emphasizes the role of emotional

awareness and acceptance in reducing self-critical and ruminative thinking that often underlies avoidance behaviors. Through enhanced metacognitive awareness, individuals learn to relate to experiences of failure or stress with self-compassion rather than self-judgment, thereby reducing the emotional discomfort that drives procrastination (Neff, 2023; Brewer et al., 2011). The cognitive-control pathway, in turn, involves improvements in sustained and executive attention that enable individuals to maintain focus on effortful but goal-relevant tasks, minimizing susceptibility to distractions and impulsive tendencies associated with attention deficits (Jha et al., 2007; Moore et al., 2012). Thus, by simultaneously fostering self-compassion and strengthening attentional regulation, MBSR promotes adaptive self-regulation, offering an integrated approach to mitigating academic procrastination—a maladaptive pattern rooted in both emotional dysregulation and cognitive inattention (Sirois & Pychyl, 2016; Peixoto et al., 2021).

Although previous studies have examined the effects of mindfulness on self-compassion (Schutte & Malouff, 2025) and attention (Jha et al., 2007; Moore et al., 2012), few have explored both mechanisms simultaneously in the context of academic procrastination. Moreover, despite growing evidence on the benefits of mindfulness, limited research has investigated its effectiveness for academic procrastination and its underlying psychological mechanisms, particularly self-compassion and attention deficits (Golestani Bakhat & Shokri, 2013). Given the high prevalence and negative consequences of procrastination among students, this study aimed to examine the effectiveness of MBSR training in enhancing self-compassion and reducing attention deficit symptoms in students with academic procrastination.

Materials and Methods

Research design and participants

A quasi-experimental method was employed, consisting of a pre-test–post-test control group design with a one-month follow-up. The study sample consisted of 30 female students enrolled in a lower secondary school in Sanandaj City, Iran, during the 2023–2024 academic year. Participants were selected through purposive sampling according to predefined inclusion and exclusion criteria and were randomly assigned into two groups: an intervention group and a control group, each containing 15 students. Moreover, Corey and Corey (2002) emphasized that small group formats—consisting of approximately 12 participants and one facilitator—create an optimal environment for member interaction, engagement

in individual activities, and the development of group cohesion. Consistent with this recommendation, several previous studies have employed comparable sample sizes in implementing MBSR programs (e.g. Piri et al., 2025).

The analysis of the participants' demographic information indicated that the participants were studying in the seventh, eighth, and ninth grades, with frequencies of 10, 8, and 12 students, respectively, corresponding to 33.3%, 26.7%, and 40% of the total number of students. Most participants were thus in the ninth grade. The students' ages ranged from 13 to 16 years, with the highest percentage (30%) being 16 years old. Most students (33.3%) had an overall grade point average between 16 and 17 out of 20, indicating a moderate level of academic performance. The inclusion criteria included students scoring above the average on the Tuckman procrastination scale (TPS) and the Youth self-report (YSR), and below average on the Self-Compassion Scale, no diagnosis of serious psychological disorders, and informed consent obtained from both students and their parents. The exclusion criteria included missing two or more intervention sessions, concurrent participation in other psychological programs, failure to complete assigned exercises and instructions during the sessions, and concurrent use of psychiatric medication.

Instruments

TPS: The TPS was developed by Tuckman (1991) to assess academic procrastination. The scale consists of 16 items rated on a 4-point Likert scale. Twelve items are scored directly, and four items are reverse-scored. Higher scores on the TPS indicate greater levels of procrastination. The scale has been translated and standardized in Iran (Saboorirad et al., 2024). Its internal consistency in Iranian samples has been confirmed with a Cronbach's α of 0.78. In the original sample, Tuckman (1991) reported an internal consistency of 0.86, and Akinsola et al. (2007) reported 0.88. In the current study, the TPS showed a Cronbach's α of 0.845.

Self-compassion scale–short form (SCS-SF). The SCS-SF, developed by Raes et al. (2011), is designed to assess individuals' levels of self-compassion. The instrument includes 12 items rated on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always), with higher total scores indicating greater self-compassion. The original version demonstrated satisfactory internal consistency (Cronbach's $\alpha=0.86$), while Wasylki et al. (2012) reported a reliability coefficient of 0.93. In Iranian validation studies, the Cronbach's α for the total score was 0.91 (Shahbazi et al., 2015). In the present research, the internal consistency of the scale was found to be 0.823.

Youth self-report scale (YSR). To assess attention problems, the present study used the YSR developed by Achenbach and Rescorla (1991). The YSR was developed to evaluate behavioral problems in adolescents aged 11 to 18 and is completed by the adolescent. Respondents rate each item based on their behavior over the past six months using a 3-point scale (0=not true, 1=somewhat or sometimes true, 2=very true or often true). In this study, only the attention problems subscale was used, which includes items 1, 4, 8, 10, 13, 17, 41, 61, and 78, with a score range of 0 to 18. The reliability and validity of the YSR have been confirmed globally and in Iran (Minaee, 2006). For adolescent samples, the total scale has shown a Cronbach's α of 0.93. In the present study, the Cronbach's α for the Attention Problems subscale was estimated as 0.783. Intervention

The MBSR program consisted of eight 90-minute sessions. The intervention was conducted by a master's student who had completed a specialized MBSR workshop prior to implementing the program. All sessions were delivered strictly according to the standardized protocol outlined in The MBSR workbook by Woods and Rockman (2021), which has been translated and published in Iran. Throughout the intervention, the facilitator was under continuous supervision by a qualified supervisor, with weekly meetings held to ensure adherence to the protocol and fidelity of implementation. Table 1 presents a summary of the session content. This program has been widely applied in both Iranian and international studies following the same structure.

Procedure

In this study, after obtaining approval for the initial design, receiving an ethics code, and acquiring necessary permissions from the university and the Education Department, the researcher visited selected schools to explain the study's objectives and procedures and to obtain the cooperation from school principals. A lower secondary school for girls, which had shown significant academic decline, was randomly selected, and 30 students were identified through a review of academic performance and an initial screening process. They were randomly assigned to two groups of 15 participants each (intervention and control). Consent forms were prepared, and after obtaining written consent from both parents and students, the research procedure was initiated. Participants assigned to the intervention group received eight sessions of MBSR, each lasting 90 minutes, conducted by an experienced school counselor. In contrast, those in the control group did not receive any intervention during the study period. Post-test assessments were

Table 1. Summary of the MBSR sessions

Sessions	Brief Description
1	Welcome and introduction to the program, a brief breath-awareness exercise with discussion, standing yoga exercise followed by questions and answers, the raisin exercise followed by questions and answers, body scan followed by discussion, home assignments (body scan, mindful eating, informal mindfulness practice, and a self-chosen movement practice).
2	Welcome, brief standing yoga, body scan, discussion of yoga and body scan exercises, review of home assignments, brief mindfulness meditation with short inquiry, sensory perception exercise followed by questions and answers, seated meditation followed by questions and answers, home assignments (body scan, informal practice, mindfulness breathing meditation, completing the pleasant events calendar, and mindful breathing meditation), and discussion.
3	Welcome, mindfulness breathing and body awareness meditation, lying down yoga, walking meditation, discussion of seated meditation, yoga, and walking meditation, review of home assignments, home assignments (body scan, lying yoga, completing the unpleasant events calendar, and breathing and body awareness exercise), and discussion.
4	Welcome, standing yoga, body and breathing awareness, intense physical sensory perceptions, inquiry, review of home assignments, group discussion about unconscious stress responses, group discussion of the awareness circle, home assignments (body scan, lying yoga, breathing and body awareness, and examining the awareness circle and stress responses).
5	Welcome, standing yoga, seated meditation exercise, inquiry, group discussion about conscious stress responses, group discussion of the awareness circle, review of home assignments, home assignments (alternating body scan and seated meditation, using the awareness circle for monitoring unconscious stress responses, and completing the difficult communication calendar).
6	Welcome, standing yoga, seated meditation exercise, inquiry, review of home assignments, an exercise on difficult communication styles, brief seated meditation, and home assignments (alternating body scan and seated meditation, paying attention to sensory perceptions from the environment such as technology, news, and practicing mindful relationships).
7	Welcome and a chair-based exercise, yoga, seated meditation, inquiry, mountain or lake meditation, review of home assignments, interaction with the world, mindful choices, and self-care, home assignments (seated meditation, yoga, walking meditation, informal breathing- and body-awareness practice, and paying attention to sensory perceptions during interactions with the environment and activities).
8	Welcome, body scan practice, standing yoga, seated meditation, inquiry, discussion and purposeful reflection on the program, review of home assignments, home assignments (choosing a formal or informal mindfulness practice, paying attention to the present moment multiple times a day and using breathing and body as a focus), and re-administering questionnaires (post-test).

administered to both groups 48 hours after the completion of the final session, followed by a one-month follow-up evaluation. Ethical principles—including privacy protection, confidentiality, informed consent, and voluntary participation—were carefully observed. Data were analyzed using descriptive statistics and repeated-measures multivariate analysis of variance (MANOVA) in SPSS software, version 24.

Results

The descriptive statistics and assumption checks confirmed the appropriateness of the data for inferential analysis. The pre-test mean scores for academic procrastination, the primary inclusion criterion, were 46.60 for the control group and 47.07 for the intervention group, indicating higher-than-average levels of procrastination according to the TPS. Levene's test demonstrated no significant differences in variances between groups for self-compassion and attention deficits at any measurement point, supporting the assumption of homogeneity

(Table 2). Similarly, the Kolmogorov–Smirnov test indicated the normality of score distributions for all variables (Table 3). Furthermore, all subsequent inferential analyses were conducted with a 95% confidence interval (CI), providing a robust estimate of the range within which the true mean differences are likely to fall.

Descriptive statistics indicated that, following the MBSR intervention, self-compassion increased while levels of attention deficits decreased in the intervention group (Table 4). In contrast, the control group exhibited minimal changes across all stages. These descriptive trends suggest a potential effect of the intervention on the targeted outcomes.

MANOVA was conducted to examine the overall effect of MBSR training on self-compassion and attention deficits. Preliminary checks, including Box's M test, supported the homogeneity of covariance matrices. The effect sizes were substantial, with eta squared (η^2) values

Table 2. Levene's test for equality of variances for self-compassion and attention deficit

Variables		F	df1	df2	Sig.
Self-compassion	Pre-test	0.314	1	28	0.580
	Post-test	0.364	1	28	0.551
	Follow-up	1.659	1	28	0.208
Attention deficits	Pre-test	3.218	1	28	0.084
	Post-test	1.624	1	28	0.213
	Follow-up	0.012	1	28	0.914

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of 0.657 for self-compassion and 0.424 for attention deficits (Table 5), indicating that the intervention accounted for a large proportion of the variance in post-test scores.

According to Table 6, the MBSR intervention had a significant effect on self-compassion and attention deficits. Specifically, multivariate tests indicated significant differences between the intervention and control groups in the post-intervention phase for self-compassion and for attention deficits. The results confirm that MBSR training significantly increases self-compassion and reduces attention deficits in students with academic procrastination ($P < 0.001$).

An analysis of follow-up effects using within-group and between-group F-tests revealed that the improvements in self-compassion and reductions in attention deficits were largely maintained one month after the intervention (Table 7).

Pairwise comparisons using Bonferroni correction confirmed statistically significant increases in self-compassion and decreases in attention deficits between the pre-test and post-test, and between pre-test and follow-up in the intervention group ($P < 0.05$). Differences between the post-test and follow-up stages were not statistically significant, suggesting the stability of the intervention effects over time (Table 8)

Figures 1 and 2 further illustrate these trends, showing that the control group scores remained relatively stable across all assessment points. In contrast, the intervention group exhibited marked increases in self-compassion and decreases in attention deficits following the intervention, with only minor changes at follow-up. These results indicate that MBSR training effectively enhances self-compassion and reduces attention-related difficulties in students exhibiting academic procrastination, with effects persisting at least one month post-intervention.

Table 3. Kolmogorov-Smirnov test for the normality assumption of the distribution of scores

Variables	Groups		K.S	Sig.
Self-compassion	Pre-test	Control group	0.163	0.200
		intervention	0.183	0.184
	Post-test	Control group	0.145	0.200
		intervention	0.172	0.200
Attention deficit	Pre-test	Control group	0.212	0.060
		intervention	0.202	0.100
	Post-test	Control group	0.173	0.200
		intervention	0.205	0.089

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Table 4. Descriptive statistics for self-compassion and attention deficit across pre-test, post-test, and follow-up

Variables	Groups	Mean±SD					
		Pre-test		Post-test		Follow-up	
Self-compassion	Control	29.33	1.4	20.20	1.821	28.93	1.437
	Intervention	29.60	1.549	32.64	2.303	32.20	2.303
Attention deficits	Control	14.07	0.799	13.80	1.356	13.46	0.915
	Intervention	14.53	1.302	11.87	1.510	12.06	0.883

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Discussion

This study investigated the effectiveness of MBSR on self-compassion and attention deficits among students exhibiting academic procrastination. The findings revealed that MBSR significantly enhanced self-compassion and reduced attention deficits in the intervention group compared to the control group. These results align with prior research demonstrating that mindfulness training can improve self-compassion and cognitive functioning in adolescents and university students (Evans et al., 2018; Newsome et al., 2012; Neff, 2023; Schutte & Malouff, 2025; Chu & Mak, 2020; Raes et al., 2011; Sumantry & Stewart, 2021).

The enhancement of self-compassion appears to occur through cultivating a non-judgmental and accepting perspective toward oneself, which mitigates negative self-evaluation and rumination typically associated with academic procrastination (Momeni et al., 2014; Gazer & Esmaili, 2016). Specifically, students who received MBSR training learned to approach challenging aca-

demetic situations without denial or exaggeration, to focus on constructive strategies, and to reduce self-blame and isolation. Consistent with Tiwari et al. (2020), self-compassion functions as an intrapersonal resource, enabling emotional regulation, sustaining motivation, and maintaining psychological flexibility in stressful contexts. Within the framework of academic procrastination, these mechanisms allow students to respond to setbacks with understanding and care, rather than self-criticism, thereby reducing maladaptive procrastination behaviors. Moreover, mindfulness training fosters metacognitive awareness, allowing students to observe thoughts and emotions without over-identification or rumination, which reduces self-critical tendencies and emotional reactivity (Neff, 2023; Schutte & Malouff, 2025). By cultivating self-kindness and recognition of shared human experiences, MBSR encourages adaptive responses to academic difficulties, mitigating the emotional consequences of procrastination (Evans et al., 2018; Newsome et al., 2012; Raes et al., 2011; Chu & Mak, 2020).

Table 5. The model fit indicators of MANOVA for self-compassion and attention deficits following MBSR intervention

Variables	Indicators	Value	F	df Hypothesis	df Error	Sig.	Eta
Self-compassion	Pillai's Trace	0.981	207.683	2	27	0.001	0.981
	Wilks' Lambda	0.019	207.683	2	27	0.001	0.981
	Hotelling's Trace	50.608	207.683	2	27	0.001	0.981
	Roy's Largest Root	50.608	207.683	2	27	0.001	0.981
Attention deficits	Pillai's Trace	0.424	9.945	2	27	0.001	0.424
	Wilks' Lambda	0.576	9.945	2	27	0.001	0.424
	Hotelling's Trace	0.373	9.945	2	27	0.001	0.424
	Roy's Largest Root	0.737	9.945	2	27	0.001	0.424

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Table 6. MANOVA results for self-compassion and attention deficits at pre-test and post-test

Variables	Source	Sum of Squares	df	Mean Squares	F	Sig.	Eta
Self-compassion	Pre-test	0.533	1	0.533	0.245	0.624	0.009
		60.933	28	2.176			
	Post-test	88.924	1	88.924	18.761	0.001	0.657
		132.714	28	4.740			
Attention deficits	Pre-test	1.633	1	1.633	1.400	0.247	0.048
		32.667	28	1.167			
	Post-test	28.033	1	28.033	20.584	0.001	0.424
		38.133	28	1.362			

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Variables	Source	Sum of Squares	df	Mean Squares	F	Sig.
Self-compassion	Between subjects interaction	95.551	1	95.551	25.921	0.001
	Within-subjects interaction	103.215	28	3.686		
	Total	198.766	29	-		
Attention deficits	Between subjects interaction	14.700	1	14.700	18.159	0.001
	Within-subjects interaction	22.667	28	0.810		
	Total	-	29	-		

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From a cognitive-neuroscientific perspective, mindfulness practices within MBSR are associated with increased activation of the prefrontal cortex and decreased activation of the amygdala, reflecting enhanced top-down regulation of emotion and diminished automatic reactivity to stressors (Tang et al., 2015). This neural modulation signifies a shift from impulsive, emotion-driven responses toward deliberate, cognitively mediated regulation. When students encounter task-related frustration or delay, this neural balance allows them to refrain from spiraling into self-critical thought patterns, such as “I am a failure.” Instead, through metacognitive monitoring, they can recognize such thoughts as transient mental events— “I am having the thought that I am a failure”—thereby reducing self-identification with negative self-appraisals and fostering a more compassionate inner dialogue. This transition from self-critical, evaluative processing to acceptance-based self-referential processing constitutes a key neurocognitive mecha-

nism through which mindfulness enhances self-compassion (Brewer et al., 2011).

In addition to improving self-compassion, the study demonstrated that MBSR effectively enhances attention regulation among students with academic procrastination. Mindfulness involves deliberate attention control, enabling individuals to focus on the present moment while minimizing distraction (Chu & Mak, 2020; Sumantry & Stewart, 2021). MBSR practices—including breath awareness, body scanning, and focused meditation—train participants to monitor and redirect attention, enhancing sustained attention and cognitive control (Fakhrmand et al., 2019; Moore, Gruber, Derose, & Malinowski, 2012). Prior studies support these effects; for instance, Zamani-Amirzakar, Fazilat-Pour, and Towhidi (2018) reported that MBSR improved sustained attention and reduced academic burnout among undergraduate female students. Similarly, Campbell et

Table 8. Pairwise comparisons of self-compassion and attention deficits at the three evaluation stages

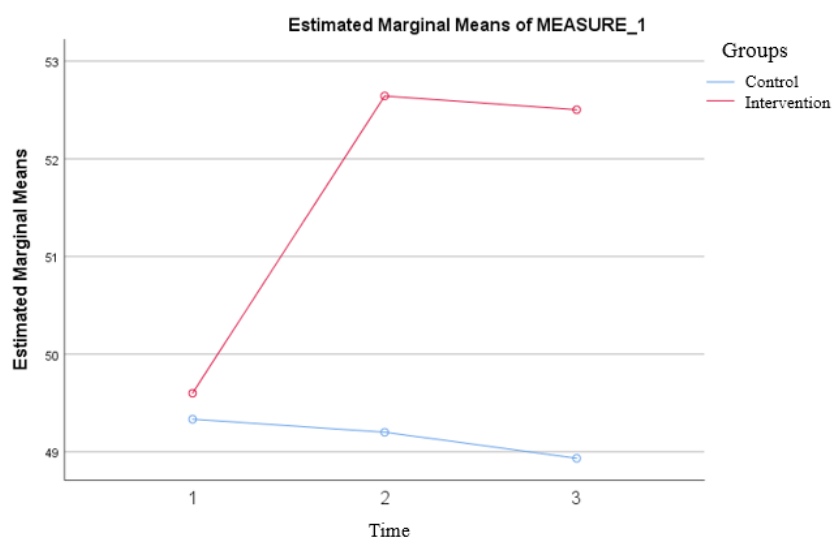
Variables	Time (I)	Time (J)	Difference of Means	Standard Error	Sig.
Self-compassion	Pretest	Post-test	-1.455	0.547	0.013
		Follow-up	-1.251	0.528	0.025
	Posttest	Pre-test	-1.455	0.547	0.013
		Follow-up	0.203	0.107	0.069
	Follow-up	Pre-test	-1.251	0.528	0.025
		Post-test	0.203	0.107	0.069
Attention deficits	Pretest	Post-test	1.467	2.161	0.001
		Follow-up	1.533	1.795	0.001
	Posttest	Pre-test	1.467	2.161	0.001
		Follow-up	0.066	1.080	0.738
	Follow-up	Pre-test	1.533	1.795	0.001
		Post-test	0.066	1.080	0.738

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al. (2012) observed reductions in rumination and improvements in mindful attention in clinical populations.

Mindfulness practices further enhance attention by strengthening the capacity to observe internal distractions and redirect focus toward goal-relevant tasks, which is critical for managing procrastination behaviors (Jensen, 2012; Zamani-Amirzakaria et al., 2018).

This improvement in attentional control also supports metacognitive regulation, allowing students to identify automatic avoidance patterns and adjust cognitive strategies in real time (Barkley, 2015; Creswell, 2017). By integrating attentional training with awareness of self-critical thoughts, MBSR not only reduces lapses in attention but also promotes cognitive flexibility, enabling students to persist in academic tasks while minimizing

**Figure 1.** The interactive effect of time and group on self-compassionPRACTICE in
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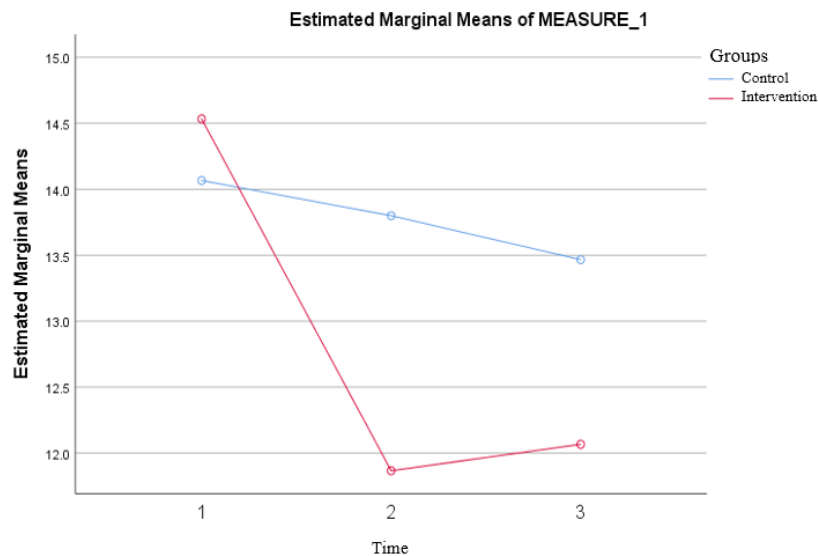


Figure 2. The interactive effect of time and group on attention deficits

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emotional interference from anxiety or negative self-evaluation. Consequently, through the dual pathways of self-compassion enhancement and attention regulation, MBSR offers a comprehensive mechanism to address the cognitive and emotional challenges underlying academic procrastination.

Furthermore, MBSR enhances metacognitive awareness—the capacity to observe one’s thoughts, emotions, and distractions without becoming entangled in them. Students who develop this awareness can recognize internal cues, such as “I am feeling bored” or “I am worrying about the exam result” without automatically disengaging from their academic tasks. This reflective awareness fosters a sense of psychological distance, enabling individuals to respond intentionally rather than react impulsively and to consciously redirect attention toward the task at hand (Jha et al., 2007). By strengthening this self-regulatory capacity, MBSR directly targets a core mechanism underlying procrastination—the habitual substitution of an aversive but essential activity with a more pleasurable yet less important one. This interpretation aligns with empirical evidence showing that mindfulness-based training improves attentional persistence and reduces avoidance tendencies in academic contexts (Zamani-Amirzakar et al., 2018; Jensen, 2012; Campbell et al., 2012).

Conclusion

While these results are promising, several limitations should be acknowledged. One of the main limitations of the present study is the small sample size ($n=30$) and

the inclusion of only female lower secondary school students from a single school in a limited geographic region. While these characteristics were acknowledged, their implications for external validity warrant further discussion. Specifically, the restricted sample limits the generalizability of the findings to other populations, including male students, students from various educational levels, or those from diverse socio-cultural and geographic backgrounds. Future research should include larger and more diverse samples, encompassing multiple schools, genders, and geographic regions, to confirm and extend these results. Second, the study did not include active control interventions or take measures to control potential confounding variables, which may have influenced the observed effects. Future studies should incorporate comparative interventions (e.g. mindfulness-based cognitive therapy) and design strategies to account for potential confounders.

Despite these limitations, the present findings have clear practical implications. School counselors and psychologists can implement MBSR programs to enhance self-compassion and attention regulation among students prone to academic procrastination. By fostering self-compassion, MBSR helps students manage negative emotions and self-critical thoughts, thereby promoting emotional resilience, motivation, and academic engagement. Furthermore, the improvement in attention control observed in this study suggests that integrating MBSR into educational programs could enhance students’ focus, learning efficiency, and overall academic performance. In conclusion, MBSR represents a promising intervention for addressing the psychological and cog-

nitive challenges associated with academic procrastination. By simultaneously cultivating self-compassion and attentional skills, this approach enables students to adopt a more adaptive and flexible approach to academic challenges, reduce maladaptive procrastination behaviors, and promote positive mental health outcomes. Future research should aim to replicate these findings in broader populations and to explore the long-term sustainability of MBSR's benefits.

Ethical Considerations

Compliance with ethical guidelines

The study protocol was approved by the Ethics Committee of Kurdistan University, Sanandaj, Iran (Code: IR.UOK.REC.1403.025) and was conducted in accordance with the ethical principles of the Declaration of Helsinki.

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Authors' contributions

All authors contributed equally to the conception, design, data collection, analysis, and writing of this manuscript.

Conflict of interest

The authors declared no conflicts of interest.

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