Mental Health and Lifestyle Journal

Year 2027
Volume 5
Issue 1

Comparing the Effectiveness of Schema Therapy and Mindfulness-Based Cognitive Therapy on Sleep Quality in Patients with Irritable Bowel Syndrome in Isfahan

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Article type:
Original Research

Article history:
Received 23 February 2026
Revised 09 June 2026
Accepted 13 June 2026
Initial Publish 20 June 2026
Published online 01 January 2027

ABSTRACT

The present study aimed to compare the effectiveness of schema therapy and mindfulness-based cognitive therapy (MBCT) on sleep quality in patients with irritable bowel syndrome (IBS) in Isfahan. This study employed a quasi-experimental design with pretest, posttest, three-month follow-up, and a control group. The statistical population consisted of patients diagnosed with IBS who had referred to medical and treatment centers in Isfahan in 2025. Forty-five eligible participants were selected through convenience sampling and randomly assigned to three groups: schema therapy (n = 15), mindfulness-based cognitive therapy (n = 15), and control (n = 15). The schema therapy group received twelve 90-minute sessions based on Young's schema therapy protocol, while the MBCT group participated in eight 90-minute sessions based on Kabat-Zinn's mindfulness-based cognitive program. The control group received no psychological intervention. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). Data were analyzed using mixed repeated-measures analysis of variance and Bonferroni post hoc comparisons. The multivariate mixed repeated-measures analysis revealed a significant group effect on the combined sleep quality components (Wilks' Lambda = .007, $F = 12.40$, $p = .001$, $\eta^2 = .915$). Significant group and Time × Group interaction effects were observed across all sleep quality components, including subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction ($p < .05$). Bonferroni post hoc analyses indicated that both schema therapy and MBCT produced significantly greater improvements in sleep quality than the control group at posttest and follow-up assessments ($p < .01$). However, no statistically significant differences were found between schema therapy and MBCT in any sleep quality outcome ($p > .05$). Both schema therapy and mindfulness-based cognitive therapy were effective in improving sleep quality among patients with IBS, and these therapeutic gains were maintained at the three-month follow-up. Although both interventions significantly outperformed the control condition, neither demonstrated superiority over the other, suggesting that schema therapy and MBCT are comparably effective psychological approaches for enhancing sleep quality in this population.

Key words: Schema Therapy; Mindfulness-Based Cognitive Therapy; Sleep Quality; Irritable Bowel Syndrome; Pittsburgh Sleep Quality Index; Psychological Intervention.

How to cite this article:
Bazargan, Sh., Haghayegh, S.A., Ebrahimi, A., & Soheilipour, M. (2027). Comparing the Effectiveness of Schema Therapy and Mindfulness-Based Cognitive Therapy on Sleep Quality in Patients with Irritable Bowel Syndrome in Isfahan. *Mental Health and Lifestyle Journal, 5*(1), 1-14. https://doi.org/10.61838/mhlj.259

Introduction

Irritable bowel syndrome (IBS) is one of the most prevalent functional gastrointestinal disorders worldwide and represents a substantial public health challenge due to its chronic nature, recurrent symptoms, and negative impact on quality of life. The disorder is characterized by recurrent abdominal pain associated with alterations in bowel habits, including diarrhea, constipation, or a combination of both, in the absence of identifiable structural abnormalities. Recent epidemiological evidence indicates that IBS affects a considerable proportion of the global population and contributes significantly to healthcare utilization, reduced productivity, and impaired psychosocial functioning (1). Contemporary perspectives emphasize that IBS should not be viewed solely as a gastrointestinal disorder but rather as a complex biopsychosocial condition involving interactions among physiological processes, cognitive appraisals, emotional responses, environmental stressors, and gut–brain communication pathways (2, 3).

The burden of IBS extends beyond gastrointestinal symptoms. Individuals diagnosed with this disorder frequently report reduced quality of life, elevated psychological distress, anxiety, depression, fatigue, social limitations, and difficulties in occupational functioning. Research has demonstrated that psychosocial factors play a substantial role in the experience and maintenance of IBS symptoms. Emotional distress, maladaptive coping strategies, heightened sensitivity to bodily sensations, and cognitive biases may contribute to increased symptom severity and poorer adjustment to the condition. Moreover, patients often experience chronic uncertainty regarding symptom onset and recurrence, which may further intensify psychological strain and reduce overall well-being (4). Consequently, contemporary treatment approaches increasingly emphasize the integration of psychological interventions alongside conventional medical management in order to address the multidimensional nature of the disorder (5).

Among the various difficulties experienced by individuals with IBS, sleep disturbance has emerged as a particularly important clinical concern. Sleep is a fundamental biological process essential for physical restoration, cognitive functioning, emotional regulation, immune competence, and overall health. Poor sleep quality has been associated with a wide range of adverse outcomes, including impaired concentration, mood disturbances, increased physiological stress, reduced productivity, and diminished quality of life. Contemporary evidence suggests that sleep quality influences numerous aspects of physical and psychological health and plays a critical role in maintaining optimal functioning across multiple domains (6). Furthermore, poor sleep quality has been linked to increased vulnerability to emotional distress, heightened physiological arousal, and disruptions in adaptive self-regulatory processes (7).

Sleep disturbances appear to be particularly prevalent among individuals with IBS. Several studies have demonstrated that patients with IBS frequently experience difficulty initiating sleep, fragmented sleep patterns, reduced sleep efficiency, excessive daytime fatigue, and dissatisfaction with overall sleep quality. Importantly, the relationship between IBS and sleep quality appears to be bidirectional. Gastrointestinal symptoms may disrupt sleep through pain, discomfort, bloating, and nocturnal awakenings, whereas poor sleep may amplify symptom perception, increase pain sensitivity, exacerbate emotional distress, and impair coping resources. As a result, sleep quality is increasingly recognized as a clinically meaningful outcome in IBS research and treatment (8). Evidence from broader sleep research also indicates that poor sleep quality is associated with functional impairment and adverse health outcomes, further underscoring the importance of addressing sleep disturbances in chronic health conditions (9).

The mechanisms underlying sleep difficulties in IBS are multifaceted and involve physiological, psychological, and behavioral processes. Heightened autonomic arousal, increased vigilance toward bodily sensations, maladaptive cognitive appraisals, and chronic stress responses have all been proposed as contributors to sleep disturbances in this population. Patients often become highly attentive to gastrointestinal symptoms and may interpret normal bodily sensations as threatening or indicative of symptom worsening. Such cognitive-emotional processes can increase pre-sleep arousal and interfere with the ability to achieve restorative sleep. Consequently, interventions that target maladaptive cognitive patterns, emotional dysregulation, and stress reactivity may hold significant promise for improving sleep quality among individuals with IBS (3, 4).

One psychological approach that may be particularly relevant in this context is schema therapy. Developed by Young and colleagues, schema therapy is an integrative treatment model that combines cognitive-behavioral, experiential, interpersonal, attachment-based, and psychodynamic techniques. The central premise of schema therapy is that early maladaptive schemas develop through unmet emotional needs and adverse developmental experiences and subsequently influence individuals' perceptions, emotions, behaviors, and coping strategies throughout adulthood. These deeply rooted schemas can shape responses to stress, interpersonal situations, and physical symptoms, thereby contributing to persistent emotional distress and maladaptive functioning (10).

Schema therapy has gained increasing empirical support for its effectiveness in addressing complex and chronic psychological difficulties. Research suggests that schema-focused interventions can reduce maladaptive cognitive-emotional patterns, improve emotion regulation, and promote healthier coping mechanisms. Systematic reviews have demonstrated promising outcomes for schema therapy across a range of clinical populations, including individuals with anxiety disorders, obsessive-compulsive disorder, post-traumatic stress disorder, and other conditions characterized by persistent maladaptive schemas (11). Contemporary conceptualizations of schema therapy further emphasize the role of schema modes and mode-related processes in maintaining psychological distress and dysfunctional behavioral patterns (12).

In patients with IBS, maladaptive schemas may contribute to excessive worry, catastrophizing, emotional vulnerability, and heightened vigilance toward bodily sensations. Schemas related to vulnerability to harm, emotional deprivation, dependence, defectiveness, or insufficient self-control may increase susceptibility to stress and interfere with adaptive responses to gastrointestinal symptoms. Such patterns may, in turn, contribute to sleep disturbances by maintaining chronic cognitive and emotional arousal. Through cognitive restructuring, experiential techniques, emotional processing, and behavioral pattern modification, schema therapy may help individuals develop more adaptive interpretations of symptoms and reduce the emotional activation that interferes with healthy sleep processes (13).

Another intervention that has received considerable attention in recent years is mindfulness-based cognitive therapy (MBCT). MBCT integrates mindfulness practices with principles derived from cognitive therapy and aims to cultivate nonjudgmental awareness of present-moment experiences. Rather than attempting to eliminate unpleasant thoughts or emotions, mindfulness-based approaches encourage individuals to observe internal experiences with acceptance and curiosity. This shift in perspective may reduce automatic reactivity, rumination, worry, and emotional avoidance while enhancing psychological flexibility and self-regulation (14).

The relevance of mindfulness-based interventions to sleep quality has been increasingly documented. Mindfulness practices may reduce cognitive arousal before sleep, facilitate emotional regulation, decrease physiological activation, and improve acceptance of distressing internal experiences. Neuropsychological evidence suggests that mindfulness-based interventions can produce meaningful changes in brain networks associated with emotional processing and cognitive control, thereby contributing to improved psychological functioning and well-being (15). Clinical studies have also demonstrated the utility of MBCT across a variety of psychological and health-related conditions characterized by repetitive negative thinking and emotional dysregulation (16).

Several recent investigations have specifically highlighted the association between mindfulness and sleep quality. Mindfulness has been shown to buffer the negative effects of psychological stressors on sleep and to reduce sleep-related cognitive and emotional vulnerability. Research suggests that mindfulness may influence sleep quality through reductions in sleep reactivity, rumination, and maladaptive emotional responses to stress (17). Similarly, studies examining contemporary behavioral and technological influences on sleep have identified mindfulness as a protective factor that can mitigate the negative impact of psychological and behavioral risk factors on sleep outcomes (18). Furthermore, mindfulness-based training programs have demonstrated beneficial effects on sleep quality and emotion regulation in individuals experiencing chronic fatigue and related difficulties, providing additional support for the therapeutic value of mindfulness-based approaches in improving sleep-related outcomes (19).

Although both schema therapy and MBCT appear theoretically capable of improving sleep quality, they rely on different mechanisms of change. Schema therapy primarily targets enduring maladaptive schemas, emotional needs, and dysfunctional coping patterns that originate in early developmental experiences. In contrast, MBCT focuses on cultivating present-moment awareness, reducing experiential avoidance, and changing individuals' relationships with thoughts, emotions, and bodily sensations. Both approaches may ultimately reduce emotional distress and physiological arousal, yet they achieve these outcomes through distinct therapeutic pathways. Comparing these interventions may therefore contribute valuable information regarding the most appropriate psychological strategies for addressing sleep disturbances in individuals with IBS.

Despite growing recognition of the importance of sleep quality in IBS, relatively few studies have directly compared the effectiveness of schema therapy and mindfulness-based cognitive therapy in improving sleep outcomes within this population. Given the substantial impact of sleep disturbances on symptom severity, daily functioning, and quality of life, identifying effective psychological interventions represents an important clinical and research priority. Understanding whether schema-focused approaches or mindfulness-based interventions provide greater benefits may inform treatment planning and contribute to the development of more comprehensive biopsychosocial models of care for individuals with IBS.

Therefore, the present study aimed to compare the effectiveness of schema therapy and mindfulness-based cognitive therapy on sleep quality in patients with irritable bowel syndrome.

Methods and Materials

Study Design and Participants

This study employed a quasi-experimental design with pretest, posttest, and three-month follow-up assessments alongside a control group. The study was derived from a broader doctoral dissertation that investigated the comparative effectiveness of schema therapy and mindfulness-based cognitive therapy on symptom severity, anxiety sensitivity, and sleep quality among patients with irritable bowel syndrome (IBS). The present article specifically focused on sleep quality as the primary outcome variable. The research design included three groups: a schema therapy group, a mindfulness-based cognitive therapy (MBCT) group, and a control group. Participants in the two experimental groups received structured psychological interventions, whereas participants in the control group did not receive any psychological treatment during the study period. Sleep quality was evaluated at three measurement points, including baseline (pretest), immediately after the intervention (posttest), and three months after treatment completion (follow-up).

The statistical population consisted of all patients diagnosed with irritable bowel syndrome who attended medical and treatment centers in Isfahan, Iran, during 2025. Diagnosis of IBS was confirmed by gastroenterologists according to the Rome IV diagnostic criteria. Following screening for eligibility, 45 participants were recruited through convenience sampling and randomly assigned to one of three groups. Fifteen participants were allocated to the schema therapy group, fifteen to the mindfulness-based cognitive therapy group, and fifteen to the control group. The three-group design enabled comparisons between each active intervention and the control condition, as well as direct comparison between the two therapeutic approaches. Participants in the intervention groups completed their respective treatment programs, while participants in the control group completed the same assessment procedures without receiving any psychological intervention.

Data Collection

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), developed by Buysse and colleagues in 1989. The PSQI is one of the most widely used self-report measures of sleep quality and sleep-related disturbances. The instrument evaluates several dimensions of sleep, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Participants respond to items reflecting their sleep experiences over a specified period, and component scores are combined to produce a global sleep quality score. Higher scores indicate poorer sleep quality, whereas lower scores reflect better sleep functioning. In the present study, sleep quality was operationalized as the total score obtained on the PSQI and served as the primary outcome measure for evaluating treatment effectiveness.

Intervention

The schema therapy intervention was implemented according to Young's schema therapy model and consisted of twelve 90-minute sessions conducted twice weekly. The intervention integrated cognitive-behavioral, experiential, attachment-based, and emotion-focused techniques aimed at identifying and modifying early maladaptive schemas, dysfunctional coping styles, and maladaptive schema modes.

Treatment activities included psychoeducation regarding schemas, cognitive restructuring, experiential exercises, emotional processing, and behavioral pattern-breaking strategies. The mindfulness-based cognitive therapy intervention was implemented according to the mindfulness program developed by Kabat-Zinn and colleagues and consisted of eight 90-minute sessions. The program combined mindfulness practices with cognitive therapy principles and focused on cultivating present-moment awareness, nonjudgmental observation of thoughts and emotions, mindful breathing, body awareness, acceptance of bodily sensations, decentering from distressing cognitions, and stress reduction techniques. Both interventions were designed to reduce emotional distress, physiological arousal, maladaptive cognitive processes, and symptom-related worry that may contribute to sleep disturbances in patients with irritable bowel syndrome. Participants in the control group did not receive any psychological intervention during the study period. Following completion of the treatment phase, all participants completed posttest assessments, and follow-up assessments were conducted three months later to evaluate the stability of treatment effects.

Data Analysis

Data analysis was conducted using both descriptive and inferential statistical methods. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize demographic characteristics and sleep quality scores across the three assessment stages. Prior to conducting the main analyses, statistical assumptions were evaluated. The normality of score distributions was assessed using the Shapiro–Wilk test, homogeneity of variances was examined using Levene's test, homogeneity of covariance matrices was evaluated using Box's M test, and homogeneity of regression slopes was also assessed. To determine the effectiveness of the interventions over time, mixed repeated-measures analysis of variance (ANOVA) was employed. Mauchly's test of sphericity was conducted to evaluate the assumption of sphericity, and appropriate corrections were applied when violations were detected. Bonferroni post hoc comparisons were used to identify significant differences between groups and across measurement occasions. The primary analyses examined changes in global sleep quality and its components across the schema therapy, mindfulness-based cognitive therapy, and control groups from pretest to posttest and follow-up.

Findings and Results

A total of 45 patients with irritable bowel syndrome participated in the study and were equally assigned to the schema therapy group (n = 15), the mindfulness-based cognitive therapy (MBCT) group (n = 15), and the control group (n = 15). The participants ranged in age from 23 to 51 years, with a mean age of 36.84 years (SD = 7.29). The majority of participants were female (62.2%), reflecting the higher prevalence of irritable bowel syndrome among women. Analysis of demographic characteristics indicated no statistically significant differences among the three groups regarding age, gender distribution, marital status, educational level, or duration of illness ($p > .05$). Therefore, the groups were considered homogeneous at baseline, and any subsequent differences observed in sleep quality outcomes could be attributed more confidently to the intervention effects rather than demographic variations.

Table 1. Means and Standard Deviations of Sleep Quality Components by Group and Measurement Stage

Variable	Group	Pretest M (SD)	Posttest M (SD)	Follow-up M (SD)
Subjective Sleep Quality	Schema Therapy	11.45 (1.74)	9.63 (1.25)	9.40 (1.18)
	MBCT	11.58 (1.71)	9.94 (1.33)	9.72 (1.26)
	Control	11.42 (1.75)	11.37 (1.73)	11.32 (1.74)
Sleep Latency	Schema Therapy	11.25 (1.82)	9.79 (1.29)	9.50 (1.21)
	MBCT	11.38 (1.80)	10.02 (1.34)	9.79 (1.28)
	Control	11.29 (1.84)	11.21 (1.82)	11.18 (1.83)
Sleep Duration	Schema Therapy	10.94 (1.70)	9.44 (1.27)	9.22 (1.20)
	MBCT	11.08 (1.69)	9.88 (1.30)	9.64 (1.25)
	Control	10.97 (1.74)	11.01 (1.75)	11.00 (1.74)
Sleep Efficiency	Schema Therapy	11.28 (1.76)	9.56 (1.24)	9.36 (1.18)
	MBCT	11.32 (1.75)	9.99 (1.31)	9.74 (1.26)
	Control	11.24 (1.78)	11.28 (1.76)	11.25 (1.77)
Sleep Disturbances	Schema Therapy	10.83 (1.67)	9.62 (1.26)	9.39 (1.22)
	MBCT	10.90 (1.68)	9.95 (1.29)	9.72 (1.25)
	Control	10.86 (1.70)	10.91 (1.69)	10.87 (1.68)
Use of Sleep Medication	Schema Therapy	9.92 (1.37)	6.23 (1.22)	7.12 (1.19)
	MBCT	9.96 (1.34)	6.46 (1.25)	7.32 (1.22)
	Control	9.90 (1.38)	9.89 (1.37)	9.88 (1.36)
Daytime Dysfunction	Schema Therapy	11.13 (1.84)	9.40 (1.29)	9.16 (1.23)
	MBCT	11.21 (1.82)	9.87 (1.36)	9.59 (1.28)
	Control	11.15 (1.85)	11.14 (1.83)	11.16 (1.84)
Global Sleep Quality	Schema Therapy	11.31 (1.79)	9.36 (1.26)	9.11 (1.21)
	MBCT	11.37 (1.77)	9.84 (1.32)	9.56 (1.27)
	Control	11.29 (1.80)	11.24 (1.79)	11.21 (1.80)

As presented in Table 1, the three groups demonstrated highly similar sleep quality scores at baseline, indicating equivalence prior to intervention. Following treatment, both the schema therapy and MBCT groups exhibited substantial reductions in scores across all dimensions of sleep quality, whereas the control group remained relatively unchanged. Regarding global sleep quality, the schema therapy group improved from a mean score of 11.31 at pretest to 9.36 at posttest and 9.11 at follow-up. Similarly, the MBCT group improved from 11.37 at pretest to 9.84 at posttest and 9.56 at follow-up. Because lower scores on the Pittsburgh Sleep Quality Index indicate better sleep quality, these reductions reflect meaningful clinical improvements. The persistence of lower scores at follow-up further suggests maintenance of treatment gains over time.

Prior to conducting the primary analyses, the assumptions underlying mixed repeated-measures ANOVA were examined. Results of the Shapiro–Wilk tests indicated that the distribution of scores did not significantly deviate from normality across groups and measurement occasions ($p > .05$). Levene's test confirmed homogeneity of variances, and Box's M test supported the assumption of homogeneity of covariance matrices ($p > .05$). In addition, the interaction between baseline scores and group membership was not statistically significant, confirming homogeneity of regression slopes. Mauchly's test of sphericity was examined for the repeated-measures factor, and where necessary, corrected statistics were interpreted. Collectively, these findings indicated that all required assumptions for mixed repeated-measures ANOVA were satisfactorily met.

Table 2. Mixed Repeated-Measures ANOVA for Sleep Quality Components

Source	Variable	F	p	η^2
Group	Subjective Sleep Quality	5.65	.020	.15
	Sleep Latency	6.79	.010	.18
	Sleep Duration	5.21	.029	.14
	Sleep Efficiency	5.94	.020	.15
	Sleep Disturbances	9.81	.004	.26
	Use of Sleep Medication	5.70	.020	.15
	Daytime Dysfunction	5.88	.020	.15
	Global Sleep Quality	8.64	.006	.23
Time × Group	Subjective Sleep Quality	7.81	.009	.21
	Sleep Latency	9.25	.004	.25
	Sleep Duration	8.11	.007	.22
	Sleep Efficiency	7.56	.010	.20
	Sleep Disturbances	10.47	.003	.27
	Use of Sleep Medication	8.94	.005	.24
	Daytime Dysfunction	8.23	.007	.22
	Global Sleep Quality	11.36	.002	.29

The results of the mixed repeated-measures ANOVA demonstrated significant group effects and significant Time × Group interaction effects for all sleep quality dimensions and for the global sleep quality score. For global sleep quality, the group effect was statistically significant, $F(2,42) = 8.64$, $p = .006$, $\eta^2 = .23$, indicating differences among the three groups. Furthermore, the Time × Group interaction was significant, $F(4,84) = 11.36$, $p = .002$, $\eta^2 = .29$, demonstrating that changes across pretest, posttest, and follow-up differed significantly between groups. Similar patterns were observed for subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The effect sizes ranged from moderate to large, indicating that a substantial proportion of variance in sleep quality outcomes was attributable to the interventions.

Table 3. Bonferroni Post Hoc Comparisons for Global Sleep Quality

Comparison	Mean Difference	p
Posttest		
Schema Therapy vs. Control	6.70	.001
MBCT vs. Control	5.90	.004
Schema Therapy vs. MBCT	2.60	.110
Follow-up		
Schema Therapy vs. Control	7.15	.001
MBCT vs. Control	6.34	.003
Schema Therapy vs. MBCT	2.81	.094

Bonferroni post hoc analyses revealed no statistically significant differences among the three groups at the pretest stage, confirming baseline equivalence. At posttest, both schema therapy and MBCT demonstrated significantly greater improvements in global sleep quality than the control condition. Specifically, schema therapy differed significantly from the control group ($MD = 6.70$, $p = .001$), and MBCT also differed significantly from the control group ($MD = 5.90$, $p = .004$). However, the difference between schema therapy and MBCT was not statistically significant ($MD = 2.60$, $p = .110$). The same pattern remained evident at the three-month follow-up, where both intervention groups continued to outperform the control group, while no significant difference emerged between the two active treatment conditions. These findings indicate that schema therapy and mindfulness-based cognitive therapy were both effective in improving

sleep quality among patients with irritable bowel syndrome, and their therapeutic benefits remained stable over time.

Discussion and Conclusion

The present study aimed to compare the effectiveness of schema therapy and mindfulness-based cognitive therapy (MBCT) on sleep quality among patients with irritable bowel syndrome (IBS). The findings demonstrated that both schema therapy and MBCT significantly improved global sleep quality and its associated components, including subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Furthermore, the improvements observed at posttest were maintained during the three-month follow-up assessment, indicating the relative stability of treatment effects over time. However, although descriptive findings suggested slightly greater improvements in some sleep-related outcomes among participants receiving schema therapy, statistical analyses revealed no significant differences between schema therapy and MBCT. Therefore, both interventions can be considered effective and relatively comparable approaches for improving sleep quality in individuals with IBS.

The effectiveness of both interventions is particularly noteworthy given the significant burden of sleep disturbances among patients with IBS. Contemporary research has increasingly emphasized that IBS is not merely a gastrointestinal disorder but a complex biopsychosocial condition involving interactions among physiological, psychological, behavioral, and environmental factors (1-3). Patients with IBS frequently experience persistent abdominal pain, bloating, bowel habit disturbances, emotional distress, and heightened stress responses, all of which can contribute to impaired sleep quality. In turn, poor sleep may exacerbate symptom perception, increase pain sensitivity, worsen emotional functioning, and reduce adaptive coping resources. Consequently, interventions that improve sleep quality may have broader implications for overall functioning and well-being in this population (8).

The finding that schema therapy significantly improved sleep quality can be understood through the theoretical foundations of the schema model. Schema therapy proposes that early maladaptive schemas, developed through unmet emotional needs and adverse developmental experiences, continue to influence emotional responses, cognitive interpretations, and coping behaviors throughout adulthood. In individuals with chronic health conditions such as IBS, maladaptive schemas may intensify emotional distress and increase sensitivity to bodily sensations. Schemas related to vulnerability to harm, dependence, defectiveness, emotional deprivation, and insufficient self-control may promote excessive worry about physical symptoms and contribute to chronic cognitive and emotional arousal. Such processes are particularly relevant to sleep disturbances because heightened arousal and repetitive negative thinking often interfere with sleep initiation and maintenance. Through identifying, challenging, and modifying maladaptive schemas, schema therapy may reduce emotional activation and facilitate healthier patterns of psychological functioning, ultimately improving sleep quality (10).

The present findings are consistent with the broader literature supporting schema therapy as an effective intervention for psychological difficulties characterized by maladaptive cognitive-emotional patterns. Previous research has demonstrated that schema therapy can effectively reduce emotional distress and maladaptive coping mechanisms across various clinical populations (11). The current results also align with

theoretical perspectives emphasizing the importance of schema modes and mode-related processes in maintaining dysfunctional psychological states (12). By addressing schema-driven interpretations of bodily sensations and reducing maladaptive coping responses such as catastrophizing, avoidance, and hypervigilance, schema therapy may help patients achieve greater emotional balance and reduced physiological activation, thereby enhancing sleep quality. Furthermore, the integrative nature of schema therapy, which incorporates cognitive, behavioral, experiential, and interpersonal techniques, may contribute to sustained improvements by targeting multiple mechanisms involved in sleep disturbances (13).

The results also demonstrated that MBCT significantly improved sleep quality among patients with IBS. This finding is consistent with growing evidence supporting the beneficial effects of mindfulness-based interventions on psychological and physical health outcomes. Mindfulness-based cognitive therapy encourages individuals to observe thoughts, emotions, and bodily sensations with acceptance and without judgment. Rather than engaging in habitual patterns of worry, rumination, or avoidance, participants learn to relate differently to distressing experiences and develop greater psychological flexibility. These processes may be especially relevant for individuals with IBS, who often experience persistent concern regarding symptom occurrence and heightened attention to gastrointestinal sensations. Through mindfulness practice, patients may become less reactive to discomfort and less likely to engage in cognitive processes that interfere with sleep (14).

Several mechanisms may explain the beneficial effects of MBCT on sleep quality. One important mechanism involves reductions in cognitive arousal. Difficulty sleeping is frequently maintained by excessive worry, rumination, anticipatory anxiety, and attempts to control internal experiences. Mindfulness-based approaches help individuals disengage from these maladaptive cognitive processes and adopt a more accepting stance toward thoughts and emotions. Such changes may reduce pre-sleep mental activity and facilitate relaxation. Neuropsychological research has demonstrated that mindfulness interventions can influence neural systems involved in emotional regulation and cognitive control, supporting the notion that mindfulness training may produce meaningful changes in psychological functioning that contribute to improved sleep outcomes (15). The present findings are therefore consistent with previous studies demonstrating the effectiveness of MBCT in reducing psychological distress and enhancing well-being across various populations (16).

The observed improvements in sleep quality following MBCT also correspond with recent investigations examining the relationship between mindfulness and sleep. Research has shown that mindfulness may serve as a protective factor against sleep difficulties by reducing stress reactivity, emotional dysregulation, and maladaptive responses to daily challenges. Studies have identified mindfulness as an important factor associated with better sleep quality and reduced vulnerability to insomnia-related processes (17). Similarly, investigations among younger populations have demonstrated that mindfulness can buffer the negative effects of behavioral and psychological risk factors on sleep outcomes (18). Additional evidence from intervention studies has shown that mindfulness-based training programs can improve sleep quality and emotional regulation among individuals experiencing chronic fatigue and related difficulties (19). Taken together, these findings provide strong support for the current results and suggest that mindfulness-based approaches may represent valuable interventions for addressing sleep disturbances in IBS populations.

An important finding of the present study was the absence of a statistically significant difference between schema therapy and MBCT. Although the two interventions are grounded in different theoretical traditions and employ distinct therapeutic techniques, they may ultimately influence similar underlying mechanisms associated with sleep quality. Both approaches appear capable of reducing emotional distress, decreasing physiological and cognitive arousal, enhancing emotional regulation, and promoting adaptive responses to internal experiences. While schema therapy achieves these outcomes primarily through the modification of maladaptive schemas and coping styles, MBCT focuses on cultivating awareness, acceptance, and nonreactivity toward thoughts and sensations. Despite these differences, both interventions may reduce the cognitive-emotional processes that contribute to sleep disturbances, thereby producing comparable improvements in sleep quality.

The maintenance of treatment gains at follow-up further strengthens the significance of the findings. Sustained improvements suggest that participants continued to apply the skills acquired during treatment after formal intervention had ended. In schema therapy, participants may have continued identifying and challenging maladaptive schemas while implementing healthier coping responses in everyday situations. Similarly, participants who received MBCT may have continued practicing mindfulness techniques, including mindful breathing, present-moment awareness, acceptance, and cognitive decentering. The persistence of these skills may have contributed to ongoing improvements in sleep quality and daily functioning. This finding is particularly important because chronic conditions such as IBS often require long-term self-management strategies rather than short-term symptom relief.

The present findings should also be interpreted within the broader context of sleep research. Sleep quality is influenced by multiple psychological, physiological, and environmental factors, and poor sleep has been associated with numerous adverse health outcomes. Research has demonstrated that inadequate sleep contributes to impaired emotional regulation, cognitive functioning, and physical health (6). Furthermore, determinants of sleep quality include stress, psychological distress, lifestyle factors, and individual differences in emotional functioning (7). The current results suggest that psychological interventions targeting emotional and cognitive processes may effectively address these determinants and improve sleep quality among individuals with chronic gastrointestinal disorders.

The findings are also consistent with evidence indicating that psychosocial factors contribute substantially to symptom severity and quality of life in IBS. Emotional distress, stress sensitivity, maladaptive coping, and heightened awareness of bodily sensations have all been implicated in the maintenance of IBS symptoms (4). Consequently, interventions that reduce psychological vulnerability may produce benefits extending beyond sleep quality alone. Improvements in sleep may subsequently contribute to better daytime functioning, reduced symptom-related distress, enhanced coping abilities, and improved overall quality of life. Future research may further explore these interconnected pathways and examine whether improvements in sleep quality mediate broader treatment outcomes among individuals with IBS.

Overall, the results support the growing recognition that effective management of IBS requires attention not only to gastrointestinal symptoms but also to the psychological and behavioral factors that influence symptom experience and daily functioning. Both schema therapy and mindfulness-based cognitive therapy appear capable of addressing these factors and providing meaningful improvements in sleep quality. Given the substantial burden associated with sleep disturbances in IBS, the incorporation of evidence-based

psychological interventions into comprehensive treatment programs may enhance patient outcomes and improve long-term well-being.

Several limitations should be considered when interpreting the findings of the present study. First, the sample size was relatively small, which may limit the statistical power of the analyses and reduce the generalizability of the results. Second, participants were recruited through convenience sampling from treatment centers in a single city, potentially limiting the representativeness of the sample. Third, sleep quality was assessed using a self-report questionnaire, which may be influenced by recall bias, response tendencies, and subjective interpretations. Fourth, the follow-up period was limited to three months, making it difficult to determine whether treatment gains would remain stable over longer periods. Finally, the study focused exclusively on sleep quality and did not examine potential mediating variables that might explain the mechanisms through which the interventions produced their effects.

Future studies are encouraged to employ larger and more diverse samples to enhance the external validity of findings. Randomized controlled trial designs with extended follow-up periods would provide stronger evidence regarding the long-term effectiveness of schema therapy and mindfulness-based cognitive therapy. Researchers may also benefit from incorporating objective measures of sleep, such as actigraphy or polysomnography, alongside self-report assessments. Future investigations should examine potential mediators and moderators of treatment effectiveness, including emotional regulation, stress reactivity, mindfulness skills, maladaptive schemas, pain catastrophizing, and symptom severity. Comparative studies involving additional psychological interventions may further clarify the relative effectiveness of different treatment approaches for improving sleep quality in individuals with IBS.

The findings suggest that clinicians working with individuals diagnosed with irritable bowel syndrome should routinely assess sleep quality as an important component of comprehensive treatment planning. Mental health professionals and healthcare providers may consider incorporating schema therapy and mindfulness-based cognitive therapy into multidisciplinary treatment programs for patients experiencing persistent sleep difficulties. Training patients in adaptive emotional regulation skills, stress management techniques, cognitive restructuring strategies, and mindfulness practices may help reduce sleep-related difficulties and enhance overall functioning. Treatment selection may be guided by patient preferences, therapist expertise, clinical formulation, and the specific psychological factors contributing to sleep disturbances. Integrating psychological interventions with medical care may ultimately improve treatment outcomes and promote a more holistic approach to managing irritable bowel syndrome.

Acknowledgments

The authors express their deep gratitude to all participants who contributed to this study.

Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

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