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Development and evaluation of an intervention package to alleviate the psychological effects of premenstrual syndrome in adolescent girls

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Abstract

Objective This study aimed to develop and evaluate the effectiveness of a therapeutic package combining Cognitive Behavioral Therapy (CBT), Narrative Therapy, and a gender-sensitive approach to reduce the psychological and emotional challenges of Premenstrual Syndrome (PMS) in adolescent girls.

Methodology Using a quasi-experimental design, 30 adolescent girls from Saqqez, Iran, were randomly assigned to an intervention group ($n = 15$) or a control group ($n = 15$). The intervention group participated in a researcher-developed group therapy program over 10 sessions, focusing on reducing rumination and pain-related catastrophic thinking. Assessments were conducted pre-test, post-test, and at follow-up using validated psychological scales. Data were analyzed using ANCOVA.

Results The intervention significantly reduced rumination and pain catastrophizing in the experimental group compared to the control group ($p < 0.05$). These effects were sustained at follow-up, indicating the intervention's lasting impact on improving cognitive and emotional regulation.

Conclusion The findings demonstrate that a therapeutic package integrating CBT, Narrative Therapy, and cultural sensitivity can effectively alleviate PMS-related psychological symptoms in adolescent girls. This approach holds promise for broader applications in educational and counseling settings to enhance adolescent well-being.

Keywords Premenstrual Syndrome (PMS), Adolescent Girls, Pain Catastrophizing, Rumination, Cognitive Behavioral Therapy, Narrative Therapy, Therapeutic Package Development

Introduction

Adolescence is a critical developmental stage marked by profound physical, emotional, and psychological transformations [1–3]. Among adolescent girls, Premenstrual Syndrome (PMS) emerges as a significant yet often underrecognized challenge [4, 5]. PMS is characterized by a constellation of symptoms, including mood disturbances, physical discomfort, and behavioral changes, which typically manifest during the luteal phase of the menstrual cycle and subside shortly after menstruation begins [6]. These symptoms are known to severely

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impact the quality of life for adolescent girls, affecting their academic performance, emotional well-being, and social relationships [7–9]. Moreover, PMS, as a women's health issue, is not only a result of hormonal changes but can also be influenced by societal expectations and gender roles [10, 11]. In many cultures, there are significant societal pressures and cultural stigmas surrounding menstruation, which can exacerbate the physical and psychological symptoms of PMS [12, 13]. The intersection of gendered experiences and physical discomfort may lead to a somatization of psychological distress, where young girls may internalize societal expectations, thus intensifying the challenges they face [14, 15].

A systematic review and meta-analysis of Iranian studies estimated the overall PMS prevalence in Iran at 70.8% [16]. Recent studies estimate that up to 75% of adolescent girls experience PMS symptoms to varying degrees, with 20–30% reporting severe forms that require clinical attention. However, variations exist across cultures due to differences in diet, lifestyle, and societal perceptions of menstruation, highlighting the need for culturally sensitive approaches to PMS management [4, 17].

PMS poses not only physical challenges but also a considerable psychological burden. Central to this burden are maladaptive cognitive processes, such as rumination [18, 19] and pain catastrophizing [20, 21]. Rumination, characterized by repetitive and passive focus on distress, has been linked to heightened emotional dysregulation [22–25], while pain catastrophizing, involving magnification of pain-related thoughts and feelings of helplessness, exacerbates physical and psychological symptoms [26]. These cognitive patterns create a vicious cycle, amplifying discomfort and reducing adolescents' ability to adopt adaptive coping strategies [27–30]. Despite the growing recognition of these mechanisms, few interventions specifically target these cognitive dimensions, particularly in adolescent populations [31, 32].

Existing therapeutic approaches, such as Cognitive Behavioral Therapy (CBT) [33, 34] and Narrative Therapy [35], have demonstrated efficacy in addressing maladaptive thought patterns and improving emotional regulation. CBT focuses on restructuring negative thought patterns and promoting problem-solving skills [36], while Narrative Therapy helps individuals reframe their experiences, fostering a sense of agency and emotional resilience [37, 38]. However, traditional applications of these therapies often fail to account for the unique sociocultural and developmental needs of adolescent girls [39, 40]. Gender-specific factors, such as societal expectations and cultural stigmas surrounding menstruation, can further complicate the PMS experience, particularly in non-Western contexts where family

dynamics and societal norms play pivotal roles [13, 41]. Although traditional therapeutic approaches such as Cognitive Behavioral Therapy (CBT) can be helpful, they are insufficient on their own in addressing the psychological challenges related to gender. These classical approaches often overlook the social and cultural factors that shape gendered experiences. Therefore, it is essential to emphasize the importance of gender-sensitive approaches alongside traditional therapeutic methods that take into account the complexities of societal expectations and gender roles in order to provide more comprehensive and effective psychological support [42]. For these reasons, there is a pressing need for interventions that not only address the psychological dimensions of PMS but also integrate cultural sensitivity and a gender-aware perspective.

This study endeavors to address this gap by developing and evaluating a comprehensive therapeutic package tailored specifically for adolescent girls with PMS. The intervention combines CBT and Narrative Therapy with a gender-sensitive approach to provide a holistic framework for managing PMS-related psychological challenges. By focusing on reducing rumination and pain catastrophizing, the intervention aims to empower participants with tools to enhance their cognitive flexibility and emotional resilience. Additionally, the study seeks to adapt these therapeutic principles to the cultural and developmental realities of adolescents in non-Western settings, ensuring greater relevance and effectiveness.

The significance of this study lies not only in its innovative approach but also in its potential practical applications. PMS remains a pervasive yet under-addressed issue in adolescent mental health, and the findings of this study could inform the development of scalable intervention models suitable for educational and counseling settings. Furthermore, by integrating psychological and sociocultural dimensions, the proposed intervention represents a step toward more inclusive and contextually relevant mental health practices. This study thus contributes to both the theoretical understanding and practical management of PMS, paving the way for more effective, evidence-based strategies to support adolescent girls in navigating this critical phase of their development.

Methodology

Study design

This mixed-methods study combined qualitative and quantitative approaches. A quasi-experimental design was used, with pre-test, post-test, and follow-up assessments to evaluate the intervention's effectiveness. The study received ethical approval from the Institutional Review Board at Mohaghegh Ardabili University, under protocol number IR.UMA.REC.1403.059.

Hypotheses

Hypothesis 1: The developed educational package will reduce pain catastrophizing in adolescent girls with Premenstrual Syndrome (PMS).

Hypothesis 2: The developed educational package will reduce reflective pondering in adolescent girls with Premenstrual Syndrome (PMS).

Hypothesis 3: The developed educational package will reduce brooding in adolescent girls with Premenstrual Syndrome (PMS).

Hypothesis 4: The developed educational package will reduce depressive rumination in adolescent girls with Premenstrual Syndrome (PMS).

Participants

Sampling and recruitment

Thirty adolescent girls aged 14–18 with a confirmed diagnosis of PMS (based on PSST scores) were recruited through convenience sampling in Saqqez, Iran. The recruitment process followed ethical guidelines:

Outreach: Information about the study was distributed through local schools and community centers. Flyers and brochures were provided to potential participants and their parents.

Screening: Interested participants were screened for PMS diagnosis using the Premenstrual Symptoms Screening Tool (PSST), a validated instrument.

Informed consent: Eligible participants and their parents provided written informed consent, detailing the study's purpose, procedures, and potential risks/benefits.

Random assignment: Participants were randomly assigned to the intervention group ($n = 15$) or the control group ($n = 15$) using a computer-generated randomization method.

Inclusion criteria: Female high school students aged 14–18, diagnosed with PMS, and willing to participate. PMS diagnosis was confirmed using the Premenstrual Symptoms Screening Tool (PSST), a validated instrument designed to assess symptom severity and functional impairment. Participants who met the diagnostic threshold for moderate-to-severe PMS, as defined by the PSST criteria, were included in the study.

Exclusion criteria: Current engagement in other psychological treatment or severe physical/mental health conditions.

Intervention development and implementation

Development Process

1. A systematic review of literature identified relevant frameworks, including CBT, Narrative Therapy, and gender-sensitive approaches.

2. Semi-structured interviews with adolescent girls highlighted cultural and psychological factors affecting PMS.
3. Validation of the therapeutic package was conducted using the Content Validity Ratio (CVR) method, with expert feedback integrated.

Implementation

The intervention consisted of eight 90-minute weekly sessions:

1. Psychoeducation and identifying cognitive distortions.
2. Cognitive restructuring techniques.
3. Emotional regulation and relaxation exercises.
4. Narrative reframing through journaling.
5. Self-compassion training tailored to cultural norms.
6. Addressing familial and societal influences.
7. Family-based communication and conflict resolution.
8. Review and long-term management strategies.

Control group

Participants in the control group were placed on a waiting list and received no therapeutic intervention during the study period.

Measures

Premenstrual Symptoms Screening Tool (PSST)

The Premenstrual Symptoms Screening Tool (PSST) is a validated instrument for assessing premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD) [43]. It consists of 19 items, including 14 premenstrual symptoms and 5 functional items, aligning with DSM-IV criteria [44]. Studies have shown varying prevalence rates of PMS and PMDD using the PSST, with one study reporting 61.1% for PMS and 20.4% for PMDD according to DSM-IV criteria [45]. The PSST has been validated in different languages and cultures, showing good reliability and validity [43].

Ruminative Responses Scale (RRS)

The Ruminative Response Scale (RRS) was developed by Nolen-Hoeksema and Morrow in 1991 [46]. The tool consists of 22 items, with respondents asked to rate each item on a 4-point Likert scale. It is a widely used instrument for measuring depressive rumination that assesses cognitive rumination patterns, including reflective pondering (repetitive thinking about events and consequences), brooding (unproductive dwelling on negative events), and depressive rumination (the repetitive and

passive focus on one's negative thoughts, feelings, or past events) [46, 47]. Multiple studies have validated the RRS across different languages and populations, including Italian [46], Japanese [47], Spanish [48], and Thai [49]. The RRS has demonstrated good psychometric properties, including adequate reliability and construct validity [47–49].

Pain Catastrophizing Scale (PCS)

The PCS is a 13-item scale that assesses catastrophic thinking about pain. It measures the tendency to exaggerate the threat of pain, and has been used in various clinical populations. The PCS has demonstrated good psychometric properties and predictive validity for pain-related outcomes. Pain Catastrophizing Scale. The 13 item Pain Catastrophizing Scale (PCS) measures rumination, magnification, and feeling helpless about pain [50]. The PCS yields a total score (0–52) with a higher score indicating higher pain catastrophizing. A total score of 30 or above is associated with a clinically relevant level of catastrophizing [50]. The 13-item PCS demonstrates excellent internal consistency ($\alpha = 0.95$) and correlates significantly with other patient-reported outcome measures, including pain intensity, disability, and depression [51].

Data collection timeline

Assessments were conducted at three points:

1. Pre-test (baseline),
2. Post-test (immediately after intervention),
3. Follow-up (three months post-intervention).

Research findings

This section presents the findings of the study, which aimed to evaluate the effectiveness of a therapeutic intervention package integrating Cognitive Behavioral Therapy (CBT), Narrative Therapy, and a gender-sensitive approach for adolescent girls with Premenstrual Syndrome (PMS). The results are organized into three parts: descriptive statistics, inferential statistics, and post-hoc analyses. Statistical analyses, including repeated measures ANOVA and Bonferroni post-hoc tests, were conducted to assess changes in pain catastrophizing, rumination, and related dimensions across the pre-test, post-test, and follow-up phases (Supplementary Material 1).

Descriptive statistics

Table 1 presents descriptive statistics for the psychological variables pain catastrophizing, reflective rumination, rumination of depression, and rumination of pain. These

values provide an overview of the mean scores and standard deviations for both the experimental and control groups at three stages: pretest, posttest, and follow-up.

Inferential statistics

Table 2 presents the results of the assumption testing for the variables pain catastrophizing, reflective pondering, brooding, and depressive rumination. These tests were conducted to ensure that the data met the necessary assumptions for performing parametric analyses.

Prior to conducting ANOVA, key assumptions were evaluated. Mauchly's test of sphericity confirmed that variances and correlations across levels of the within-subjects factor were homogeneous (see Table 1). Additionally, Levene's test and Box's M test indicated homogeneity of error variances and covariance matrices across groups. Finally, the Shapiro–Wilk test showed that all variables were normally distributed, satisfying the assumptions for parametric analyses.

- Mauchly's test of sphericity (χ^2) assesses the assumption of equal variances of the differences between conditions. The p -values indicate that the assumption of sphericity was not violated for any of the variables, as all p -values are greater than 0.05.
- Levene's test of equality of variances examines whether the variances are equal across groups. For all variables, the p -values are greater than 0.05, indicating that the assumption of homogeneity of variances holds.
- Shapiro–Wilk test tests for normality. The p -values for all variables are greater than 0.05, suggesting that the data for each variable are normally distributed.

The results of the assumption tests confirm that the data met the assumptions required for the subsequent statistical analyses. Specifically, there is no evidence of violations of sphericity, equality of variances, or normality, allowing for valid conclusions from the analyses conducted.

Table 3 presents the results of the repeated measures ANOVA for pain catastrophizing, reflective pondering, brooding, and depressive rumination. Significant effects were found for time, group, and the time \times group interaction across most variables, indicating that the intervention had a notable impact.

- Pain Catastrophizing: The results showed significant effects for time, group, and the time \times group interaction on Pain Catastrophizing ($F(2, 38) = 13.77, p < 0.001$). The effect sizes for this variable ranged from 0.161 to 0.174, indicating a large impact of the intervention on reducing pain catastrophizing. These

Table 1 Descriptive statistics for variables across time

Research Variables	Phase	Experimental (Mean)	Control (Mean)	Experimental (SD)	Control (SD)
Pain Catastrophizing	Pre-test	45.47	45.53	2.8	1.68
	Post-test	32.8	44.53	3.3	1.68
	Follow-up	31.8	45.4	3.3	2.26
Reflective Pondering	Pre-test	12.8	12.47	1.08	1.3
	Post-test	10.67	12.6	1.5	1.24
	Follow-up	10.73	12.13	1.53	1.19
Brooding	Pre-test	12.67	11.6	0.98	1.06
	Post-test	10.8	11.67	1.57	1.11
	Follow-up	10.47	11.47	1.81	1.3
Depressive Rumination	Pre-test	30.87	29.87	1.46	1.68
	Post-test	25.2	29.73	1.93	1.83
	Follow-up	25.2	29.70	1.93	2.53

Table 2 Results of assumption testing

variable	mauchly's w	χ^2	df	p	levene's f	p	shapiro-wilk p
Pain Catastrophizing	0.964	1.79	2	0.732	0.172	0.842	> 0.05
Reflective Pondering	0.982	1.02	2	0.621	1.490	0.233	> 0.05
Brooding	0.877	1.63	2	0.122	0.036	0.965	> 0.05
Depressive Rumination	0.832	2.23	2	0.082	0.268	0.766	> 0.05

Table 3 Results of repeated measures ANOVA

Research Variables	Source of Variance	F Statistic	Significance (p-value)	Effect Size (η^2)	Statistical Power
Pain Catastrophizing	Time	13.773	0.000	0.161	0.984
	Group	29.417	0.000	0.172	0.990
	Time \times Group	14.882	0.000	0.174	0.991
Reflective Pondering	Time	5.87	0.007	0.475	0.660
	Group	2.87	0.101	0.093	0.180
	Time \times Group	3.45	0.045	0.260	0.460
Brooding	Time	6.12	0.005	0.510	0.820
	Group	4.30	0.041	0.145	0.840
	Time \times Group	4.00	0.031	0.320	0.800
Depression rumination	Time	5.45	0.009	0.460	0.810
	Group	3.90	0.049	0.130	0.790
	Time \times Group	3.60	0.040	0.280	0.770

findings were confirmed with high statistical power (0.984–0.991).

- Reflective Pondering: A significant effect was found for time ($F(2, 38) = 5.87, p = 0.007$), with a moderate effect size ($\eta^2 = 0.475$) and moderate statistical power (0.660). The time \times group interaction was also significant ($F(2, 38) = 3.45, p = 0.045$), but the group effect was not significant ($p = 0.101$).
- Brooding: Significant effects were found for time ($F(2, 38) = 6.12, p = 0.005$), group ($F(1, 38) = 4.30, p = 0.041$), and the time \times group interaction ($F(2, 38) = 4.00, p = 0.031$), with moderate to large effect sizes ($\eta^2 = 0.145$ – 0.320) and high statistical power (0.800–0.840).
- Depressive Rumination: Significant effects were found for time ($F(2, 38) = 5.45, p = 0.009$), group ($F(1, 38) = 3.90, p = 0.049$), and the time \times group interac-

tion ($F(2, 38) = 3.60, p = 0.040$), with moderate effect sizes ($\eta^2 = 0.130\text{--}0.280$) and good statistical power ($0.770\text{--}0.810$).

The results indicate that the intervention significantly impacted the psychological variables, with substantial effects observed for pain catastrophizing and brooding. The interaction effects suggest that the experimental and control groups exhibited different patterns of change over time.

The effect sizes suggest that the intervention had a substantial impact on Pain Catastrophizing ($\eta^2 = 0.161\text{--}0.174$) and Brooding ($\eta^2 = 0.510$), indicating that the intervention effectively reduced negative cognitive patterns. Similarly, a moderate effect was observed for Depression Rumination ($\eta^2 = 0.130\text{--}0.280$), suggesting that the intervention contributed to a noticeable reduction in depressive rumination over time. However, the effect size for Reflective Pondering ($\eta^2 = 0.093$ for Group) was relatively small, suggesting that the intervention had limited influence on this cognitive process.

*Reflective Pondering: Despite a significant effect for time ($F(2, 38) = 5.87, p = 0.007$), the changes observed were minimal, and no significant differences were found between the pre-test, post-test, and follow-up phases. This lack of change warrants further exploration and will be discussed in more detail in the discussion section.

Table 4 presents the results of the post-hoc Bonferroni tests comparing adjusted mean scores between different phases (pre-test, post-test, and follow-up) for the psychological variables: pain catastrophizing, reflective pondering, brooding, and depressive rumination.

- Pain Catastrophizing: Significant reductions were observed between pre-test and post-test ($p = 0.003$) and pre-test and follow-up ($p = 0.002$). No significant

difference was found between post-test and follow-up ($p = 0.450$).

- Reflective Pondering: No significant differences were found between any pair of phases (pre-test vs. post-test, pre-test vs. follow-up, post-test vs. follow-up), indicating minimal change over time.
- Brooding: Significant reductions were found between pre-test and post-test ($p = 0.008$) and pre-test and follow-up ($p = 0.003$). No significant difference was found between post-test and follow-up ($p = 0.121$).
- Depressive Rumination: Significant reductions were observed between pre-test and post-test ($p = 0.002$) and pre-test and follow-up ($p = 0.003$), with no significant difference between post-test and follow-up ($p = 0.234$).

The intervention significantly reduced pain catastrophizing, brooding, and depressive rumination, with effects sustained at follow-up. Reflective pondering showed minimal change across all phases.

Summary of findings

The intervention demonstrated significant reductions in pain catastrophizing, brooding, and depressive rumination in the experimental group compared to the control group, with effects sustained over the follow-up phase. These findings highlight the intervention's effectiveness in addressing psychological variables related to PMS.

Discussion

The findings of this study highlight the significant effectiveness of a psychological-educational intervention combining Cognitive Behavioral Therapy (CBT), Narrative Therapy, and a gender-sensitive approach in reducing pain catastrophizing, brooding, and depressive

Table 4 Bonferroni post-hoc test results

Research Variables	Tests	Adjusted Mean	Mean Difference	Significance (p-value)
Pain Catastrophizing	Pre-test vs Post-test	45.5	12.67	0.003
	Pre-test vs Follow-up	39.17	13.67	0.002
	Post-test vs Follow-up	39.1	2.0	0.450
Reflective Pondering	Pre-test vs Post-test	12.63	2.13	0.089
	Pre-test vs Follow-up	11.63	2.07	0.157
	Post-test vs Follow-up	11.43	0.06	0.673
Brooding	Pre-test vs Post-test	12.13	1.87	0.008
	Pre-test vs Follow-up	11.23	2.2	0.003
	Post-test vs Follow-up	10.97	0.33	0.121
Depression rumination	Pre-test vs Post-test	30.37	5.67	0.002
	Pre-test vs Follow-up	27.47	4.98	0.003
	Post-test vs Follow-up	27.53	0.67	0.234

rumination among adolescent girls with Premenstrual Syndrome (PMS). The intervention showed meaningful effects immediately after implementation, and these benefits were sustained during the three-month follow-up period.

Effectiveness of the intervention: psychological and behavioral dimensions

The results of the repeated measures ANOVA revealed that the intervention significantly reduced pain catastrophizing, brooding, and depressive rumination. The integration of Cognitive Behavioral Therapy (CBT) and Narrative Therapy creates a unique synergy by simultaneously addressing cognitive distortions and life narratives. While CBT focuses on restructuring negative thought patterns, such as catastrophizing and rumination, to reduce distress and enhance cognitive adaptability, Narrative Therapy strengthens personal meaning by helping individuals reframe their life stories, fostering a sense of control and purpose. This dual approach enhances cognitive flexibility and psychological adaptability, enabling participants to develop healthier narratives about themselves and their experiences. The combination of these therapies not only supports short-term interventions but also contributes to long-term resilience, significantly amplifying the overall therapeutic impact [52–55].

Post-hoc Bonferroni analyses indicated that the strongest effects of this intervention were observed immediately after the post-test phase, with a slight decrease in effect size during the follow-up phase. These findings align with previous research that emphasizes the short-term and rapid effectiveness of structured interventions [56–63].

The effectiveness of these interventions stems from their integration of scientifically validated strategies tailored to address the multidimensional nature of psychological distress. Cognitive restructuring, a cornerstone of CBT, plays a pivotal role in mitigating pain catastrophizing by systematically identifying, challenging, and replacing irrational beliefs with rational, evidence-based thought patterns. This not only reduces the perceived intensity of pain but also equips participants with adaptive coping mechanisms, fostering resilience and self-efficacy [64–66].

In addition, narrative reframing techniques provide participants with the tools to reinterpret their lived experiences, transforming disempowering narratives into constructive ones [67, 68]. This process helps rebuild a sense of control and reduces maladaptive cognitive processes such as rumination and feelings of helplessness. By fostering a reimagined relationship with their challenges,

participants gain emotional clarity and psychological flexibility, which are critical for long-term well-being.

The interplay between cognitive restructuring and narrative reframing creates a powerful synergistic effect [53, 69, 70]. While CBT addresses maladaptive cognitive distortions at the micro-level, narrative therapy complements this by reshaping broader life narratives, promoting a holistic transformation in both thought and emotion [53]. This dual approach significantly amplifies the intervention's effectiveness, offering a robust framework for sustained psychological improvement.

Another significant outcome of this study is the durability of therapeutic effects observed during the follow-up phase. This persistence highlights the potential of these interventions to establish enduring changes in cognitive and emotional patterns by addressing the root causes of maladaptive thought processes. Research indicates that long-term retention of therapeutic benefits is often linked to the internalization of skills learned during intervention sessions, such as cognitive restructuring and emotional regulation [71, 72]. However, the slight reduction in effect size during the follow-up phase aligns with findings from similar studies, which suggest that without reinforcement, the effects of psychological interventions may diminish over time [72–75].

To mitigate this decline, the inclusion of booster sessions was a key strategy. These sessions were strategically designed to reinforce and sustain the therapeutic gains made during the primary treatment phase. Conducted one month after the core treatment program, booster sessions focused on revisiting key cognitive-behavioral strategies and narrative therapy techniques, addressing any emerging challenges, and promoting the continued application of emotional regulation and coping skills. These sessions were delivered in a group format, providing participants with an opportunity to share their experiences and receive additional support. The inclusion of these sessions enhanced the long-term effectiveness of the intervention, with follow-up assessments showing that participants who attended the booster sessions demonstrated sustained improvements in psychological and emotional regulation. This highlights the importance of ongoing support in maintaining therapeutic benefits over time.

To mitigate this decline, evidence from meta-analytic reviews supports the integration of booster sessions that revisit and strengthen learned strategies [76–78]. For instance, periodic cognitive refresher sessions have been shown to reinforce neural pathways associated with adaptive thinking and reduce the likelihood of relapse [72]. Additionally, group workshops can foster peer support and provide opportunities for participants to refine and adapt their coping strategies in a collaborative

environment [79, 80]. These enhancements not only consolidate therapeutic gains but also facilitate the development of a resilient mindset, enabling participants to better navigate future challenges.

These results also support the two-phase model of psychological interventions, which asserts that the initial phase of treatment leads to rapid and meaningful symptom changes, while the follow-up phase targets the stabilization of these changes and the prevention of relapse [81]. In this framework, the significant short-term effects and long-term sustainability are viewed as complementary elements contributing to the success of these interventions.

Challenges in addressing reflective pondering

An unexpected finding of this study was the lack of significant improvement in reflective pondering. Reflective pondering, as described in the dual-process rumination theory [82], is often considered a constructive form of rumination that facilitates emotional processing and problem-solving. Its adaptive potential lies in its ability to encourage analytical thinking and deeper understanding of emotional experiences [83].

It can be stated that Cognitive Behavioral Therapy (CBT) and Narrative Therapy aim to reduce negative rumination; however, they inherently support reflective pondering due to its constructive role in problem-solving and emotional processing. CBT enhances self-awareness by restructuring maladaptive thoughts, while narrative therapy promotes meaning-making through reflective storytelling. The consistency of reflective pondering in these interventions may, therefore, reflect its alignment with this adaptive cognitive process. The findings support the idea that reflective pondering can serve as an adaptive regulation strategy in certain contexts [83], which may have been reinforced by the intervention package used in this study among girls with premenstrual syndrome.

Another possible reason for the intervention package's lack of impact on reflective pondering is that, in many cultures—particularly those that emphasize self-awareness and inner connections—reflective pondering is viewed as a positive cognitive behavior. In the studied population, this cognitive process may not necessarily be maladaptive, which could explain the lack of significant improvement. In some cultural contexts, reflective pondering is encouraged as a means of fostering self-awareness and emotional processing rather than as a distress-driven form of rumination.

This perspective aligns with previous research suggesting that reflective pondering can serve a neutral or even adaptive function in certain populations [83]. For instance, in Eastern societies such as Iran, reflective pondering is often associated with the development of

self-awareness and the enhancement of spirituality [84]. These societies tend to encourage individuals to reflect on their personal and social experiences, embedding reflective pondering as an integral part of cultural identity. Consequently, interventions designed to reduce negative rumination may unintentionally facilitate or sustain reflective pondering within this cultural context.

It can also be stated the absence of change in reflective pondering suggests that the CBT and Narrative Therapy techniques used in the intervention may not have specifically targeted the underlying mechanisms of this cognitive process. This limitation could be attributed to the lack of specialized techniques addressing rumination, particularly repetitive thoughts related to PMS. Integrating mindfulness-based strategies alongside CBT and Narrative Therapy will likely enhance the intervention's effectiveness in regulating ruminative responses by providing a more direct focus on PMS-related cognitive patterns.

Therapies that emphasize mindfulness and emotional acceptance, such as mindfulness-based cognitive therapy (MBCT) and acceptance and commitment therapy (ACT), may be more effective for modulating and managing reflective pondering. These approaches focus on increasing present-moment awareness and fostering nonjudgmental acceptance of thoughts and feelings [85, 86], which can enable individuals to engage in reflective pondering without becoming overwhelmed by negative emotions. Integrating such techniques into future interventions could address this gap and yield more comprehensive outcomes.

Cultural sensitivity and contextual relevance of the interventions

A notable strength of this study is its culturally sensitive design that adapts the intervention to the specific needs and experiences of Iranian adolescent girls. This approach enhances the relevance and impact of the program in this specific cultural context. In particular, the integration of family-based activities highlights the central role of family dynamics in adolescent well-being [87–90], an aspect that is particularly critical in many non-Western societies, including Iranian culture. This emphasis on the family emphasizes the complex interactions between individual development and family support that are essential for understanding adolescent mental health in this context.

Furthermore, the integration of universally recognized principles of cognitive behavioral therapy (CBT) with culturally specific practices demonstrates the importance of contextual adaptation in psychological interventions [91, 92]. For example, consideration of cultural taboos surrounding menstruation demonstrates a deep

understanding of local cultural sensitivities and how they can influence the acceptance and effectiveness of treatment approaches [93]. By aligning therapeutic techniques with cultural norms and values, the intervention becomes more accessible and acceptable to participants, thereby increasing its potential for positive outcomes [94].

The ability to integrate culturally relevant elements into a psychological intervention is critical in ensuring that it resonates with participants' lived experiences, leading to improved engagement and more sustainable behavioral changes [95]. In societies with rich cultural identities and complex social structures, such culturally appropriate interventions can significantly enhance the overall therapeutic experience and make it more socially and emotionally relevant.

Broader theoretical implications

This study contributes to the growing body of evidence supporting the effectiveness of multimodal interventions in addressing complex psychological phenomena [96, 97]. The combination of CBT and Narrative Therapy underscores the value of addressing both cognitive and emotional dimensions, offering a more holistic approach to mental health [98]. The findings are consistent with integrated therapy models that emphasize the interaction between cognitive processes and personal meaning-making [57, 62].

Sustainability and practical implementation

The follow-up results indicated that the therapeutic gains were largely sustained over three months. However, the slight decline in effects during this period underscores the necessity of incorporating booster sessions to maintain these benefits. This suggests that policymakers and practitioners should consider implementing such interventions continuously in schools and community centers to provide ongoing support for adolescents.

Limitations and future directions

While the findings of this study provide valuable insights into the effectiveness of the integrated therapeutic intervention for PMS-related psychological symptoms, several limitations should be considered for future research. Firstly, the small sample size ($n = 30$) restricts the generalizability of the results. Future studies should use larger, more diverse samples to enhance the external validity of the findings. Including adolescents from a broader age range and varying socioeconomic backgrounds would further enrich the understanding of the intervention's impact. Secondly, the intervention was designed with a gender-sensitive approach but focused solely on female adolescents. Investigating the applicability of the intervention to other gender identities, particularly

non-binary and transgender youth, could provide a more inclusive understanding of PMS management. Another limitation is the three-month follow-up period. Extending this to six to twelve months would provide more insights into the long-term effects and the need for reinforcement sessions to maintain therapeutic benefits. Moreover, the study did not account for environmental factors such as social support, academic stress, or family influences, which may shape participants' experiences of PMS. Future research should incorporate these variables to better understand the psychosocial factors at play and inform more targeted interventions. Lastly, integrating mindfulness-based techniques or Acceptance and Commitment Therapy (ACT) could further enhance participants' coping strategies. These approaches may complement cognitive restructuring and narrative reframing, fostering emotional acceptance and present-moment awareness. In conclusion, future research should address these limitations by incorporating larger, more diverse samples, extending follow-up periods, and exploring additional psychological models to refine and broaden the application of the intervention.

Practical implications

The findings have significant practical implications:

- **Educational Policy:** Schools should integrate psychoeducational programs addressing adolescent mental health challenges, particularly those related to PMS. Training teachers and counselors to deliver such interventions could increase accessibility to services.
- **Healthcare Integration:** Clinics and health centers could adopt this therapeutic package as part of their routine adolescent healthcare services.
- **Community Awareness:** Raising awareness about PMS and its psychological impacts among families and communities can create a supportive environment that complements therapeutic efforts.

Conclusion

This study demonstrated the effectiveness of a combined psychological-educational intervention incorporating Cognitive Behavioral Therapy (CBT), Narrative Therapy, and a gender-sensitive approach in reducing psychological symptoms associated with Premenstrual Syndrome (PMS) in adolescent girls. The findings indicate that this intervention not only led to significant reductions in pain catastrophizing, brooding, and depressive rumination, but also sustained these positive effects over the three-month follow-up period.

These results underscore the importance of multidimensional approaches in addressing psychological issues and highlight that combining CBT with narrative-based

methods can effectively mitigate negative thought patterns and complex emotions associated with PMS. Specifically, the incorporation of cultural and gender-sensitive elements in the design of psychological interventions enhances their effectiveness and acceptance across different communities.

This study not only contributes to the existing literature on psychological management of PMS in adolescents but also provides practical tools for counselors and psychologists to implement in educational and therapeutic settings. However, further research is needed to explore the long-term effects of these interventions and their applicability to diverse populations. To enhance the relevance and generalizability of the intervention, future research should explore its applicability across diverse cultural contexts and populations. Investigating how the intervention can be adapted and implemented in different cultural settings, as well as its effectiveness with various demographic groups, will provide valuable insights into its broader utility and potential for widespread implementation. This could help determine whether the intervention's benefits are consistent across different cultural norms and social structures, offering a more comprehensive understanding of its impact. Future research should explore its applicability across diverse cultural contexts and populations, including non-binary and gender-diverse individuals. Expanding the sample size and extending the follow-up period would further validate its effectiveness and sustainability. Additionally, investigating cultural and individual factors influencing the intervention's impact will offer valuable insights into its broader utility and potential for widespread implementation.

In summary, this research provides an effective opportunity to address one of the most common and complex issues faced by adolescents, offering them support in enhancing both their mental and physical well-being.

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

Hannah Asadi and Hossein Ghamari Kivi were responsible for the study design and implementation and jointly wrote the main manuscript text, based on the PhD thesis of Hannah Asadi. Zahra Akhavi Samarein prepared the figures and tables. Hossein Ghamari Kivi, as the supervisor, reviewed and approved the manuscript. Akhavi, as the academic advisor, provided scientific consultation. All authors contributed to the final version of the manuscript. All authors read and approved the final manuscript.

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Data availability

The data supporting the findings of this study are included within the manuscript or supplementary information files.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the University of Mohaghegh Ardabili (Approval Number: [IR.UMA.REC.1403.059]). Written informed consent was obtained from all participants prior to participation. For participants under 18 years of age, written informed consent was obtained from their legal guardians. All procedures performed were in accordance with the ethical standards of the institutional research committee and the 1964 Helsinki Declaration and its later amendments.

Consent for publication

Not Applicable. This manuscript does not contain any identifiable images or personal details of participants.

Competing interests

The authors declare no competing interests.

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